City of Worcester

City Manager Michael V. O'Brien

District Improvement Financing Application

CITYSQUARE

Section 1
District Improvement Financing Application Cover Sheet

1. Applicant Information

Applying City or Town (the Municipality or Applicant): City of Worcester

Applying Entity (if not the City or Town): _____

Primary Contact Person: Michael V. O'Brien

Title: City Manager

Address: Worcester City Hall,

455 Main Street, Worcester, MA 01608

Phone Number: 508 799-1175

Fax Number: 508 799-1208

E-mail address: obrienm@ci.worcester.ma.us

2. Application Information

District Name: Worcester CitySquare DIF District Duration: 30 Years

Program Name: Worcester CitySquare DIF Program Duration: 30 Years

IRD Name: Worcester CitySquare Invested Revenue District Duration: 30 Years

IRDDP Name: Worcester CitySquare Invested Revenue District Development Program Duration: 30 Years

3. Assessed Value Information

Certified, Original Base Assessed Value in the District: $ Total $31,,760,400.
(Real estate = $3,350,500, plus personal property = $1,409,900)

Certified, Original Base Assessed Value in the IRD: $ 31,760,400.
(Real estate = $3,350,500, plus personal property = $1,409,900)

Section 2 – General Information

1. **Index for the Application**
   ☒ Enclosed
   The index will specify the location of each element of the application. Using a 3-ring binder to accumulate information under each section and subsection is strongly recommended for ease of indexing and reviewing.

2. **Contact Summary Sheet**
   ☒ Enclosed
   The Contact Summary Sheet identifies the public and private parties involved in the District, the Program and, if applicable, the IRD and IRDDP.

3. **Municipal Description**
   ☒ Enclosed
   A general description of the Municipality. The intent is to familiarize the EACC with your community so that they have a context in which to understand the Application. A recent or updated copy of a rating agency general obligation bond report could complete this subsection.

4. **Municipal Certification**
   ☒ Enclosed
   A copy of the Municipal certification affirming that all of the DIF districts within the Municipality do not together comprise more than 25% of the total area of the Municipality along with a map showing all existing and proposed districts and their percent of the area of the Municipality.

5. **Consultants' Reports**
   ☒ Enclosed (*If any, itemize below*) ☐ N/A See Appendix for copies of reports.

   a) RKG State Benefits Report

   b) Environmental Assessment (3 documents)

   c) Vanesse Traffic Study (executive summary)

   d) _____

6. **Other Useful Information**
   ☒ Enclosed (*If any, describe below*) ☐ N/A See Appendix for copies of reports.

   a) Worcester Action Agenda (Sasaki report)

   b) Worcester Comprehensive Economic Development Study (CEDS) Plan

   c) Community Development Action Grant application to DHCD

   d) ZHA Market Analysis of Downtown

   e) Additional reports can be found in the Appendix and are enumerated on pages II-10.

2.1 INDEX

		Section	Page #
Section 1:	**District Improvement Financing Application Cover Sheet**	I	1
Section 2:	**General Information**		
	1. Index for the Application	II	1
	2. Contact Summary Sheet	II	4
	3. Municipal Description	II	6
	4. Municipal Certification	II	8
	5. Consultants' Reports	II	9
	6. Other Useful Information	II	10
Section 3:	**District Information**		
	1. District Description	III	1
	2. Objectives / Goals (District)	III	4
	3. Public Notice (District)	III	7
	4. Written Record of Public Hearing (District)	III	26
	5. Certification of Compliance with Legal Approval Requirements (District)	III	27
	6. Approving Order (District)	III	29
	7. Maps (District)	III	30
	8. Assessed Value Information	III	33
	9. IRD Information	III	44
Section 4:	**Approval of a Development Program**		
	1. Objectives / Goals (Program)	IV	1
	2. Written Record of Public Hearing (Program)	IV	2
	3. Certification of Compliance with the Local Approval Requirements (Program)	IV	3
	4. Approving Order (Program)	IV	5
	5. Goal Attainment (Program)	IV	6
	6. Execution (Program)	IV	32
Section 5:	**IRD Description**		
	1. Description (To be provided if the IRD is not coterminous with the District)	V	1

2.	Municipal Order (IRD and IRDDP)	V	2
3.	Project Description (IRD and IRDDP)	V	3
4.	Zoning (IRD and IRDDP)	V	4
5.	Property Acquisition (IRD and IRDDP)	V	5
6.	Financial Plan (IRD and IRDDP)	V	6
7.	Impact Statement (IRD and IRDDP)	V	11

Section 6: Private Partner Information

1.	Person Completing this Section for the Private Partner	VI	1
2.	Person Who Can Answer Questions Regarding this Section	VI	
3.	Counsel – Person who is providing legal counsel to the Private Partner	VI	1
4.	Authorized Signatory for the Private Partner	VI	1
5.	Relationship Bank for the Private Partner	VI	2
6.	Investment Bank	VI	2
7.	Corporate Information for the Private Partner	VI	2
8.	Private Partner's Responsibilities	VI	3
9.	Experience	VI	3
10.	Miscellany	VI	5

APPENDICES (See separate Appendix volume.)

Project Information		VII
A.	Maps & Plans a. CitySquare Site Plan b. CitySquare Site Axonometric -- Phasing c. DIF District Plan Map d. Proposed Eminent Domain Plan (2 sheets)	
B.	RKG State Benefits Report	
C.	Environmental Assessment Report: Asbestos Operations & Maintenance Program for 120 Front Street, Worcester, prepared June 18, 2004 by URS Corporation	
D.	Environmental Assessment Report: Asbestos Operations & Maintenance Program, Worcester Commons Mall, prepared July 13, 2004 by URS Corporation	
E.	Environmental Assessment Report: Report: Phase II Environmental Site Assessment, Worcester Center, prepared June 10, 2004	
F.	Vanesse Traffic Study Executive Summary	
Useful Reports		VIII
G.	Worcester Action Agenda (Sasaki report)	

H.	ZHA Market Analysis of downtown Worcester
I.	Worcester Comprehensive Economic Development Plan (CEDS)
J.	CARD Plan
K.	EO 418 annual certification
L.	Mayor Murray's white paper on downtown Worcester
M.	Worcester Common Improvements
N.	Legal Description of CitySquare

2.2 CONTACT SUMMARY SHEET

City of Worcester

City Manager Michael V. O'Brien
Worcester City Hall
455 Main Street, Worcester, MA 01608
508 799-1175
508 799-1208, fax
obrienm@ci.worcester.ma.us

Julie A. Jacobson
Assistant City Manager
Worcester City Hall
455 Main Street, Worcester, MA 01608
508 799-1175
508 799-1208, fax
jacobsonj@ci.worcester.ma.us

George A. Ciccone
Director of Economic Development
Worcester City Hall
455 Main Street, Worcester, MA 01608
508 799-1523
508 799-1524, fax
cicconeg@ci.worcester.ma.us

David M. Moore, Esquire
City Solicitor
Worcester City Hall, Room 201
455 Main Street, Worcester, MA 01608
508 799-1161
508 799-1163, fax
moored@ci.worcester.ma.us

John Pranckevicius
Chief Financial Officer
Worcester City Hall
455 Main Street, Worcester, MA 01608
508 799-1180
508 799-1203
pranckeviciusj@ci.worcester.ma.us

Robert J. Allard, Jr., MAA
City Assessor
City Hall, Room 201
455 Main Street, Worcester, MA 01608
508 799-1024
508 799-1021, fax
allardr@ci.worcester.ma.us

Worcester Renaissance, LLC (Berkeley Investments, development partner)

Young Park
CEO and President
Berkeley Investments
121 High Street
Boston, MA 02110
617 439-0088
617 439-4449
ypark@berkinv.com

Barbara Smith-Bacon, Esq.
Vice President and Project Manager
Berkeley Investments
121 High Street
Boston, MA 02110
617 439-0088
617 439-4449
bsmithbacon@berkinv.com

Iain McGill
Assistant Project Manager
Berkeley Investments
121 High Street
Boston, MA 02110
617 439-0088
617 439-4449
imcgill@berkinv.com

2.3 MUNICIPAL DESCRIPTION

The City of Worcester, with a population of 172,648 (US Census 2000), is the third largest city in New England, and possesses a diverse economy. Worcester has transformed itself from an economy based on heavy manufacturing to new directions, including services, health care, and biotechnology. Worcester's employment base has continued its shift to services from manufacturing. In 2000, the service sector accounted for 33.9% of employment, compared with 29.7% in 1991. In 2000, manufacturing accounted for 15.3% of employment, compared with 18.7% in 1991.

Sixteen institutions of higher education, including the state university medical school, educating over 37,000 students, are located in the Worcester area. Worcester has a strong residential character, in addition to more than 1,200 acres of city-owned parkland situated within its 38 square miles.

Worcester is wired with 15,000 miles of optical wire. It is an inland port of entry for foreign commerce, and is serviced by major interstate highways and rail lines which traverse the municipality. Worcester has a city-owned airport, which recently underwent a $15 million modernization. Worcester Union Station, which is an urban intermodal transportation center in downtown, has ten round-trip commuter trains daily to Boston. A private inter-city bus terminal is nearby. The City is completing the construction of a new inter-city bus terminal attached to Union Station, replacing the outdated existing terminal on Madison Street. When completed, three private bus companies will provide service.

Worcester is a center for arts and culture, with the nationally renowned Worcester Art Museum, the Higgins Armory Museum (housing one of the largest private collections of medieval armor in the country), and the annual Worcester Musical Festival, which is one of the oldest in the nation.. The DCU Center (formerly the Centrum) and historic Mechanics Hall are major entertainment and meeting venues in downtown Worcester.

Downtown Worcester today serves as the primary visitor destination with government uses, medical, banking and financial services, retail and entertainment venues. The downtown district includes the historic street and block pattern of the nineteenth century, and the larger super-block pattern of the late twentieth century. Worcester is currently restoring the historic Worcester Common (circa 1669) in the heart of the City at a cost of approximately $5.6 million. In addition, the City of Worcester is working with the Commonwealth on the redesign and reconstruction of Washington Square on the eastern edge of downtown and Worcester CitySquare. Construction has begun on a new 430,000 SF regional courthouse at a cost of $180 million which is expected to open in 2007. In addition, construction has just begun on a $25 million, 200-room Hilton Garden Inn on a site adjacent to the new courthouse, the Worcester Convention Center and a 500 space municipal parking garage. A spring 2005 construction start date is expected for a new sky bridge project, linking the hotel, parking garage and Convention Center and creating a first class convention center facility.

The City's S&P bond analyst states that the "city's tax base is large, has been increasing at a strong rate, and exhibits no taxpayer concentration. The 2004 tax base totaled $8.8 billion, or a moderate $51.07 per capita market value. Growth in the tax base has been strong, fueled by ongoing strong residential and commercial construction. From 2000-2004, assessed value increased by 10.4%." (Source: *Standard & Poor's RatingsDirect, August 12, 2004.*)

Moody's stated that they anticipate that Worcester "will continue to experience steady tax base expansion to its large, $9.6 billion base, as a result of economic revitalization efforts, leveraging of the city's important medical and higher education sectors, residential construction, and the continued housing value appreciation being experienced regionally. Reversing a trend of significant tax base contraction since the height of the early 1990's market, assessed values have grown by double-digit annual percentages the past three years and averaged 10% annual gains from 1999 to 2004. It should also be noted that if the significant tax-exempt properties were included in the tax base, the equalized value would likely exceed $12 billion. New development in the biotechnology and information technology fields, as well as infrastructure improvements to increase accessibility to and from the city, have resulted in improved occupancy rates and taxable value appreciation. Ongoing projects of note include the expansion of the courthouse, construction of a new 200-room hotel near the city convention center and the planned redevelopment of the failing Worcester Common Outlets into a mixed use project with housing, retail, and office space." (Source: *Moody's Investment Service, August 12, 2004*.)

The City of Worcester has operated under the Council-Manager form of government since 1950. An eleven –member city council, six of whom are elected at-large and five of whom who are elected from districts, perform the legislative function and policy-making. The City Council is responsible, among other things, for passing ordinances, and adopting the budget. City Council members are elected biennially. The City Manager, appointed by the City Council, is the chief executive officer with appointive and removal authority over department heads and other employees of the city. The City Manager is responsible for the implementation of policies established by the City Council and for overseeing the day-to-day operations of the government. The City Auditor and City Clerk are elected by and are employees of the City Council. The Mayor is the Councilor who receives the highest number of votes for Mayor provided he or she is also elected as one of the six at-large councilors. The Mayor serves as presiding officer of the City Council, and ex-officio chairperson of the School Committee.

2.4 MUNCIPAL CERTIFICATION

CERTIFICATION

The City of Worcester certifies that the Worcester Center DIF District is less than twenty-five percent of the total area of the City of Worcester. There are no other DIF Districts in the City of Worcester. The twenty acres contained within the Worcester Center DIF District constitutes less than one percent of the 38 square miles comprising the land area of the City of Worcester.

_____
Michael V. O'Brien
City Manager

_____
Date

2.5 CONSULTANT'S REPORTS

- RKG State Benefits Study (Appendix B)
- Environmental Assessment – 3 Reports (Appendices C, D, and E)
- Vanesse Traffic Study Executive Summary (Appendix F)

2.6 OTHER USEFUL INFORMATION

- Worcester Action Agenda (Sasaki report) (Appendix G
- CEDS Report for Worcester County, 2003-2004 (Appendix H)
- ZHA Market Analysis of downtown Worcester (Appendix I)
- CARD Plan (Appendix J)
- EO 418 annual certification and plan (Appendix K)
- Mayor Murray's white paper on downtown Worcester (Appendix L)
- Worcester Common Improvements (Appendix M)
- Legal Description of CitySquare (Appendix N)

Section 3 District Information

1. District Description

☒ Enclosed

A description of the District which must include its name, proposed duration and a general description of the District. The intent is to identify and familiarize EACC with the District and provide the background necessary to support a statement explaining why the Municipality has defined the District boundaries as proposed.

2. Objectives / Goals (District)

☒ Enclosed

A description of the Applicant's objective or goal in creating the District. This subsection should include information which the Applicant believes will be helpful to the EACC in arriving at its conclusion that it is reasonably probably that the Applicant will achieve its goals in creating the District.

3. Public Notice (District)

☒ Enclosed

Documentation of the public notice procedures used during the District approval process. Include a copy of the notice and a copy of the mailing or distribution list. In addition to the general notice, notice must be given to taxpayers located in the District, the chief elected officers and the chairpersons of the legislative bodies of abutting cities and / or towns, and the EACC. The public may also include underlying and overlapping governmental entities, the Applicant's own planning department and conservation commission, and any other parties the Applicant considers important to the reasonably probable success of the DIF program. A transparent and all inclusive process is the end goal.

4. Written Record of Public Hearing (District)

☒ Applicable

A copy of the written record of the public hearings relating to the District and any written comments that have been provided to the Applicant by members of the public concerning the District. The Applicant may provide a summary to facilitate the EACC's review but is not required to do so.

5. Certification of Compliance with the Local Approval Requirements (District)

☒ Applicable

A certificate from the Municipality stating that it has fully complied with the local approval requirements specified in 402 CMR 3.00, Section 3.04 with regard to the proposed District. These include:

a) Designation or creation of an entity that will be responsible for the District
b) A public hearing prior to adoption of the District and a written record of such hearing
c) Notice to the public of the public hearing and the opportunity to comment in writing on the proposed District
d) Evidence that all information required in 402 CMR 3.06(a-j) {and, if the Program was approved concurrently, Section 3.08(3) regarding the Program} have been provided to the municipal governing body prior to its approval of the District {and Program}.

6. Approving Order (District)

☒ Enclosed

A certified copy of a formal, duly enacted order of the city or town council of the Applicant (with evidence of approval by the mayor or city manager where such approval is required by law) or vote of the town meeting of the Municipality, whichever is applicable, identifying and approving the proposed District. In addition, include the following:

a) The entities and / or individuals (including their titles, qualifications and contact information, if not already identified on the contact sheet) who may act on behalf of the Municipality in implementing the Program within such District

b) Describe where policy control rests, whether staff is dedicated or shared and their respective powers

c) Itemize administrative costs and provision for payment of administrative expenses

d) Any other information which is necessary to understand the administration and operations of the District.

7. Maps (District)

☒ Enclosed

Maps and / or plans of the proposed District and the surrounding area showing:

a) District boundaries

b) Any significant District features that help define the nature and scope of the District which may include topographical, natural or hazardous environmental features

c) Property lines, building foot prints and parking areas

d) Existing uses and ownership of each parcel (Identify land in mixed use and public land)

e) Current zoning

f) All thoroughfares, public rights of way and easements.

8. Assessed Value (AV) Information

☒ Enclosed

AV information including, but not limited to:

a) A copy of the Assessor's certification of the original, base AV of the taxable real and personal property within the District

b) The AV of each parcel of real estate within the District

c) The most recent annual property tax levy on each parcel within the District

d) Past due taxes as well as any significant historic delinquencies for each parcel*

e) Any pending appeals or significant historic appeals for each parcel*

f) Any significant personal property or concentrations in personal property*

g) Any District major taxpayers and their percent of the District's AV

**Note: "Significant" should be defined in the context of current character of the District as well as in its improved, future nature. In any event, a delinquency or concentration equal to or over 5% should be reported. Consideration of the previous 5 years is sufficient for historic reporting.*

9. IRD Information (if applicable)

☒ Enclosed ☐ N/A

☐ See Section 4, subsection 1

a) A statement identifying parcels, if any, within the IRD that are subject to a Tax Increment Financing (TIF – EDIP Program) agreement, an Urban Center Housing Tax Increment Financing (UCH-TIF) agreement or a special tax assessment pursuant to M.G.L. c. 23A, § 3E(3)

b) A copy of the TIF or UCH-TIF agreements impacting parcels in the IRD

c) A statement describing the impact of this IRD on existing and future economic development agreements including the Economic Development Incentive Program.

Section 3: District Information

3.1 DISTRICT DESCRIPTON

NAME: Worcester CitySquare DIF District

PROPOSED DURATION: 30 years

GENERAL DESCRIPTION: The investment area contains approximately 21 acres in Downtown Worcester's Central Business District within Census Tract 7317. The site is known as Worcester CitySquare (formerly known as the Worcester Fashion Common Outlet Mall), and currently consists of two office buildings totaling 486,000 square feet, a 550,000 square foot shopping mall, two parking structures with 4,000 parking spaces, and seven tax parcels, and Worcester Center Boulevard, a municipally-owned street.. Worcester CitySquare is bounded by Franklin Street to the south; Front Street and Commercial Street to the West; Foster Street to the north; and Worcester Center Boulevard to the east. It is adjacent to the Worcester Public Library, Worcester Common, Worcester City Hall, the DCU Center, Massachusetts College of Pharmacy, Worcester Medical Center, Union Station, and Interstate 290, as well as numerous historic and contemporary commercial and residential buildings. (See map of proposed DIF District in the Appendix.)

CitySquare is identified in Worcester's recently adopted Action Plan as the catalyst project for the revitalization of downtown in particular and of the entire City of Worcester, in general. Since it is a complex, phased project, Worcester CitySquare will be a single DIF district.

The "vision" for the new Worcester CitySquare is to replace the former mall, which had become an economically obsolete retail center, with a new, open and vibrant mixed-use urban district which integrates office, residential, retail and entertainment uses within a newly created street grid. This new urban district would complement the efforts of the City of Worcester to stimulate job creation while creating a transit-oriented downtown, and is consistent with the City's plans for downtown, as envisioned in both the City's Economic Development Action Agenda and Mayor Tim Murray's White Paper.

The preliminary development plan envisions the following components:

- A **new street grid for vehicles, bicycles and pedestrians** will

reconnect key landmarks in the downtown area. Front Street will be extended to the East along its original alignment and connect City Hall and the Financial District to the Union Station/Washington Square transportation hub. North/south connections will be created via a new street, Trumbull Street, connecting the Worcester Medical Center (and points north) to Front Street; and by a new street, Bartlett Street, running south from Front Street (as extended) to Franklin Street. In addition, new secondary and primary pedestrian streets will create walking paths throughout the new development.

- The two existing **office** towers (486,000 GSF) are being repositioned to cement their position as true Class A buildings. A **new building** is being targeted as either a corporate headquarters or multi-family residential at the corner of Front Street and Worcester Center Boulevard.

- **New residential condominiums** (140 to 170 units) will be built fronting on the intersection of Front Street and a newly constructed street.

- Several **retail sites,** totaling approximately 300,000 SF are intended to create a minimum density for both large format retail and store fronts. Urban entertainment uses including **restaurants, sports bars, outdoor cafes, and other entertainment venues** are intended to be integrated into the retail program.

- A commercial building with possible links to Worcester Medical Center will be leased to commercial officer users or to Worcester-based medical practitioners groups, and others.

- The existing **Foothills Theatre**, the only equity theatre in Central Massachusetts, will be upgraded with a new entrance and marquee.

- **Upgraded parking structures** (existing, new and redesigned) and surface parking for up to 3,950 cars will service new land uses in a distributed rather than a centralized system for maximum accessibility and safety.

- **New streetscape improvements** will include paving, landscaping and street furniture.

- **A senior housing development** (200 to 250 units). .

- **New condominium units** (200 to 250 units) overlooking Worcester Common will be built in the final phase, incorporating street level storefront retail and restaurant uses.

The total program is projected to be approximately **2.1 million SF** in gross buildable area including the existing office buildings.

The CitySquare development program will create 1,675 permanent new or retained full-time jobs at full build-out, and may create over 3,105 jobs. Based on the current development program, the base scenario includes over 564 medical jobs and 676 retail jobs, and nearly 500 office jobs. In addition, there will be $103 to $104 million in construction wages, which translates to 2,270 to 2,300 construction jobs during the eight-year build-out period.

Berkeley Investments is the development partner of Worcester Renaissance, LLC, the owner and developer of CitySquare. Berkeley Investments and the City of Worcester are working with Worcester educational and cultural institutions to create a new cultural or civic entertainment facility, which will be an additional source of new jobs, including retaining the Foothills Theatre, an actor-equity professional theater, within CitySquare.

The City of Worcester in recent years has experienced a softening of its commercial tax base. The redevelopment of the former Worcester Common Outlets into CitySquare by Berkeley Investments will not only revitalize this property but strengthen the entire downtown Worcester area.

3.2 DISTRICT OBJECTIVES

The City of Worcester's objectives for downtown as set forth in the 2004 Economic Development Action Agenda are as follows:

- **Build upon Existing Assets**, including Worcester's topography, rail connections, historic building stock, colleges and universities, and an engaged citizenry.
- **Invest in Public Projects** that leverage private investment, including infrastructure and amenities that can act as a catalyst for subsequent private investment (as embodied in the redevelopment of the Worcester Common Outlet Mall (now the proposed CitySquare DIF District project). The public and the private sectors shall work in concert in an interactive partnership.
- **Reconnect Downtown with Worcester's neighborhoods.** By recreating the street and sidewalk network, the Worcester CitySquare DIF will remove barriers and better integrate Worcester's residential neighborhoods with downtown.
- **Balance Big Moves with Small**. The City of Worcester intends to support large projects along with small projects which can reinforce relationships with the surrounding urban context.
- **Create a Range of Jobs** for Worcester area residents ranging from retail to professional with career ladders, from entry-level to senior-level.
- **Lead in Transit-Oriented Development and Smart Growth.** Building upon the strategic location of Union Station at the edge of downtown, and across from Worcester CitySquare, the City intends to use the Worcester CitySquare project as the cornerstone of its program to support transit-oriented development and mixed-use development (e.g., Worcester CitySquare) and smart growth.

OBJECTIVE	ACTION
Build on Existing Assets	▪ The Worcester CitySquare DIF redevelops the over 30% vacant Worcester Common Outlets complex in the center of downtown. ▪ The CitySquare project capitalizes upon and complements downtown.
Invest in Public Projects	▪ The City of Worcester through the CitySquare DIF will invest in public infrastructure – streets, sidewalks, pedestrian amenities, and parking
Reconnect Downtown with Worcester's neighborhoods.	▪ By rebuilding the street network through the CitySquare project, the existing mall structure that works to deter neighborhood access to downtown will be modified. CitySquare, by creating a vibrant 18/7 center with retail, commercial, and entertainment uses, will connect with Worcester's neighborhoods by providing residents with an additional reason to come downtown.

Balance big moves with small.	Worcester CitySquare is a "big move" that reinforces many of the City's existing projects (small and large) – refurbishment of Worcester Common, reinforcement of Union Station improvements, the addition of more commuter train trips, the bikeway, the renovation and expansion of the Worcester Public Library, recruitment of Mass College of Pharmacy to downtown, for example.
Create a range of jobs	Based on the current development program, the base scenario creates or retains over 564 medical jobs and 676 retail jobs, and nearly 500 office jobs. In addition, there will be $103 to $104 million in construction wages, which translates to 2,270 to 2,300 construction jobs during the eight-year build-out period.
Lead in Transit-Oriented Development and Smart Growth	The Worcester CitySquare DIF will restore a walking environment to downtown Worcester, offer bicyclist amenities, and capitalize on downtown's proximity to transit – commuter rail, intra-city bus, and local bus transit – all smart growth objectives.

The goal in creating this district is to revitalize the entire downtown Worcester area into a vibrant mixed-use neighborhood by redeveloping an area that will provide the most leverage of public money with private investment. By focusing initial development within the CitySquare site, the City of Worcester can capitalize on the district's many existing assets, including:

1. Its strategic location in the heart of downtown and close proximity to residential neighborhoods.
2. Its sizeable area (approximately 21 acres) providing the critical mass that is needed to act as a tipping point for the surrounding area.
3. Creating a connection between downtown and modes of public transportation, including the commuter rail line at Union Station, the bus terminal currently under construction and several local bus stops, which promotes "smart growth" principles of development.
4. An available labor force desiring work.

Many view the Worcester Common Outlets site as a physical barrier between key areas of the city that has stymied past attempts at revitalization. The current development program for CitySquare calls for demolishing a large portion of the mall and instituting a new street grid through the site. The extension of Front Street will connect City Hall and the Common to Shrewsbury Street via Washington Square from the east and west, and two new streets will connect the Worcester Medical Center, Front Street and Franklin Street, from the north and south. In addition to these new public streets, other infrastructure that will be needed to support future development includes streetscape improvements, new lighting, landscaping, street furniture, retail kiosks, fountains, and most notably a new underground parking garage with approximately 1,025 new parking spaces. With demolition one-half of the existing East

(Red/Blue) Garage located along Worcester Center Boulevard to allow for the extension of Front Street, additional parking will be needed to serve all sections of the district. By reusing the mall's existing basement level, there will be significant cost savings associated with building an underground parking facility, with two levels of underground parking.

With the city of Worcester providing the instrumental infrastructure, private development can flourish. Current program elements for CitySquare include:

1. A new 275,000 SF medical/clinical office building fit for different uses such as a cancer treatment center, an orthopedic and rehab center, a women's wellness center, and other out-treatment facilities. An alternative plan for this building is Class A commercial office space. Ground level retail is planned for this building.
2. New residential complexes with street level retail. Three possible buildings are laid out in the site plan with a mix of market-rate condominium units planned on the corner of the Front Street Extension and along Commercial Street.
3. A senior housing development is currently planned for the corner of Worcester Center Boulevard and Franklin Street.
4. Several double-story retail sites with enough critical mass and density for both large and small format storefronts. Urban entertainment uses include restaurants, sports bars, outdoor cafes, and other possible entertainment venues.

The map of the DIF District can also be found in the Appendix A.

3.3 PUBLIC NOTICE (District)

1. General Notice and documentation of public notice procedures for DIF public hearings and for public meetings deliberating on the DIF;
2. Notice to taxpayers in the district;
3. Notice to neighboring Chief Elected Officials and Chairpersons of legislative bodies in neighboring communities
    a. Auburn
    b. Leicester
    c. Paxton
    d. Holden
    e. West Boylston
    f. Shrewsbury
    g. Grafton
    h. Millbury

Copies of the letters of public notice are on file for public inspection at Worcester City Hall, Office of Economic Development.

3.4 WRITTEN RECORD OF THE PUBLIC HEARING (District)

To be added by the City of Worcester following the public hearing.

- **Stenographic record of public hearing**
- **Copies of all written comments filed from the public participation process**

3.5 CERTIFICATION OF COMPLIANCE WITH THE LOCAL APPROVAL REQUIREMENTS (District)

A. **DESIGNATION OF IMPLEMENTING ENTITY BY CITY**	The office of the City Manager (Michael V. O'Brien, City Manager) is the responsible municipal entity for implementation of the CitySquare DIF District Development Program. Worcester Renaissance, LLC (of which Berkeley Investments is the development partner_ is working with the Office of the City Manager as the private partner on the implementation of the CitySquare DIF District Development Program.
B. **PUBLIC HEARING**	A public hearing will be held on Thursday, May 5, 2005 at 6:00 pm, at the Worcester Public Library, Saxe Room, One Salem Square, Worcester. **The stenographic record, written comments, notice and the minutes of the public hearing to be added following the public hearing.**
C. **NOTICE OF PUBLIC HEARING**	The Notice of Public Hearing was posted at Worcester City Hall, 455 Main Street, Worcester, MA 01608, on the standard public notice posting board for all to see, and an advertisement and legal notice for the public hearing appeared on Tuesday, April 19, 2005 in the Worcester Telegram & Gazette, which was at least fourteen (14) days prior to the public hearing. A copy of the notice follows this page.
D. **COPIES OF DIF MATERIALS & APPLICATION**	Complete copies of the Worcester CitySquare District Improvement Financing DISTRICT application and all supporting materials were provided to the Worcester City Council prior to final action and approval by the Council.
E. **CERTIFICATION**	**CERTIFICATION OF ABOVE-STATED FACTS TO BE INSERTED following the public hearing.**

LEGAL NOTICE OF THE PUBLIC HEARING

A legal notice advertising the public hearing appeared in the Worcester Telegram & Gazette on Tuesday, April 19, 2004. A copy of the legal notice is on file for public inspection at Worcester City Hall, Office of Economic Development.

3.6. APPROVING ORDER

Approving Order to be inserted following action by the Worcester City Council

6a. All entities and persons responsible for implementation have been identified on the contact sheet.

6b. The policy control of the Worcester CitySquare DIF rests with the Worcester City Manager, Michael V. O'Brien.

6.c. Four positions are to be assigned to the administrative responsibilities of the Project. Salary and fringe benefit expenses are as follows:

Economic Development	$80,000 per annum
Accountant	$60,000 per annum
Two Support Staff	$120,000 per annum

Annual ordinary maintenance funding to be $20,000 per annum.

Administration will be required for the first four years of the Project. Total amount to be funded equals 4 X $280,000 = $1,120,000. Funding source is from the DIF Incremental Tax account.

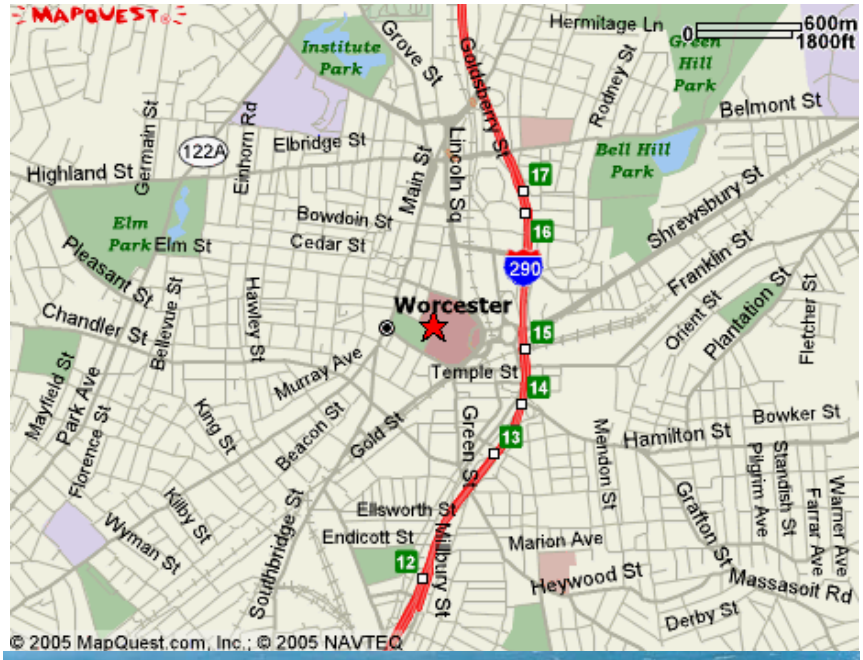
6d. No other information is necessary.

3.7. MAPS

Locus and Site Orientation

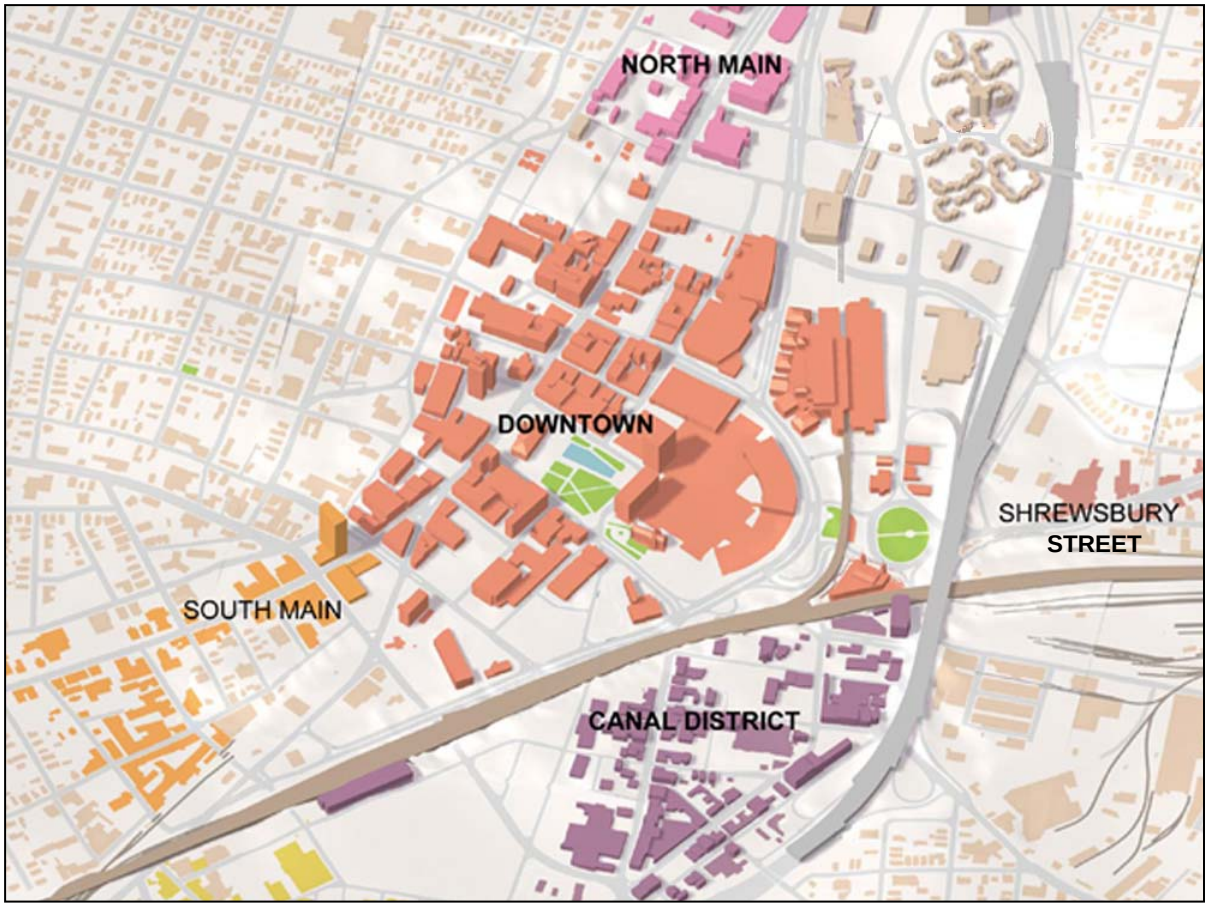
CitySquare is in the heart of downtown Worcester adjoining the Worcester Common, as shown in the map to the left by the red star, and below.

Additional maps can be found in Appendix A.



Map A. Site Locus Map

Map B. Site Orientation Map.

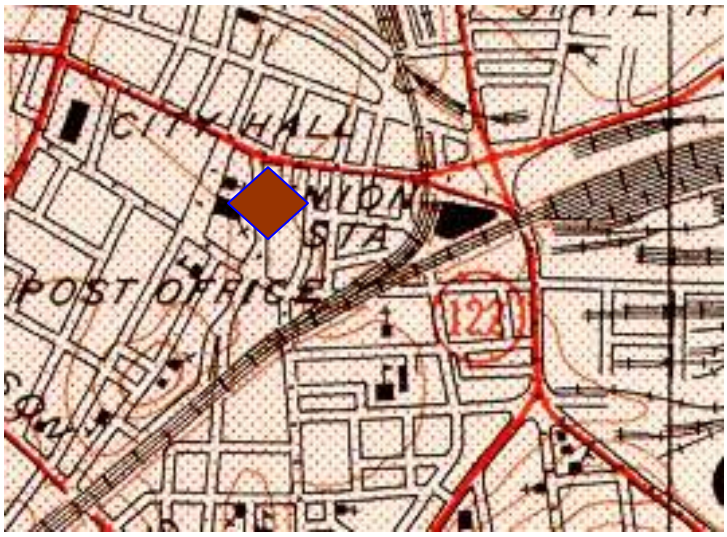


Source: Worcester Action Agenda

Map C. Vicinity Map of Downtown Worcester and adjacent neighborhoods.

Map D. Topographic Map of Downtown Worcester

Excerpt from 1949 USGS Worcester North, Southeast Quadrant



CitySquare

In Appendix A, an over-sized **DIF District map** and the **Eminent Domain Plan** can be found. The DIF District map illustrates the boundaries, topographic features, property lines, and existing building footprints. The Eminent Domain Plan identifies the land to be acquired by the City of Worcester for public ways – roadways and sidewalks.

3.8 ASSESSED VALUE INFORMATION

3.8 a Assessor's certification of the original base value is attached. (Document follows.)

3.8 b Assessor's certification of original base AVof the taxable and personal property within the District. (Documents follow.)

3.8 c The most recent annual property tax levy on each parcel in the District follows. (Parcels 02-23B-000F, 02-23B-00GA, 02-23B-ABO-1, and 02-23B-00O-1 did not exist in fiscal 2005). (Documents follow.)

3.8 d There are no past due taxes or historical delinquencies on any parcel.

3.8 e There are no pending appeals or historical appeals on any parcel.

3.8 f There are no significant concentrations of personal property within the District.

3.8g There are two owners, that combined, own 100% of the privately owned real estate in the proposed CitySquare DIF District. The Worcester Renaissance Towers, LLC is the owner of four parcels, which have a combined total assessed value of $28,563,800.00, or about ninety-four percent (94%) of the District's total assessed value. Worcester Renaissance, LLC is the owner of three parcels that have a combined total assessed value of $1,786,700.00, or about six percent (6%) of the District's total assessed value. The only publicly-owned property within the boundaries of the CitySquare DIF District is the public right-of-way of Worcester Center Boulevard, which is owned by the City of Worcester.

MBL	ST NO	STREET	CLASS	FY06 VALUE	FY05 R.E. TAX
02-23B-00001	200	FRONT ST	323	$1,572,000	$164,189.64
02-23B-0000F	90	FRONT ST	323	$214,200	
02-23B-0000M	100	FRONT ST	340	$17,163,500	$473,712.60
02-23B-0000O	120	FRONT ST	340	$11,026,900	$304,342.44
02-23B-000GA	0000	COMMERCIAL ST	336	$335,000	
02-23B-00O-1	120 R	FRONT ST	424	$38,400	
02-23B-ABO-1	120 R	FRONT ST	390	$500	
			TOTAL	**$30,350,500**	$942,244.68

FY 2005 REAL ESTATE TAXES PAID

ROBERT J. ALLARD, JR., M.A.A.
City Assessor

CITY OF WORCESTER – ASSESSING DEPARTMENT

ASSESSOR'S OFFICE

WORCESTER, MASSACHUSETTS

Real Estate located within the Berkeley DIF area, Worcester, MA 01608

Assessed Owners: Worcester Renaissance, LLC & Worcester Renaissance Towers, LLC

Parcel IDs: 02-23B-00001, 02-23B-0000F, 02-23B-0000M, 02-23B-0000O, 02-23B-000GA, 02-23B-00O-1 & 02-23B-ABO-1

Fiscal Year	Assessment Date	Land Area	Land Value	Building Value	Total Value
2006	01/01/2005	882,724 sf	$5,533,100	$24,817,400	$30,350,500

This letter is to certify that the information contained herein is a true statement of the assessment records. The information above was taken from the **fiscal 2006** real estate records. I attest that I am the officer having legal custody of the records referenced above, which are official records kept within the Commonwealth.

Robert J. Allard, Jr., City Assessor Date: 2-18-05

City Hall, Room 201 • 455 Main Street • Worcester, MA 01608 • (508) 799-1098 • FAX (508) 799-1021
assessing@ci.worcester.ma.us

Worcester
All-America City
1981 - 2000

ROBERT J. ALLARD, JR., M.A.A.
City Assessor

Deputy Assessor
KENNETH L. DICKS, MAI

ASSESSING DEPARTMENT

CITY OF WORCESTER

ASSESSOR'S OFFICE

WORCESTER, MASSACHUSETTS

Real Estate located at 200 Front Street, Worcester, MA 01608

Assessed Owner: Worcester Renaissance, LLC

Parcel ID: 02-23B-00001

Fiscal Year	Assessment Date	Land Area	Land Value	Building Value	Total Value
2006	01/01/2005	591,123 sf	$886,700	$685,300	$1,572,000

This letter is to certify that the information contained herein is a true statement of the assessment records. The information above was taken from the **fiscal 2006** real estate records. I attest that I am the officer having legal custody of the records referenced above, which are official records kept within the Commonwealth.

Robert J. Allard, Jr., City Assessor Date: 2-8-05

City Hall, Room 201 • 455 Main Street • Worcester, MA 01608 • (508) 799-1098 • FAX (508) 799-1021
assessing@ci.worcester.ma.us

Worcester
All-America City
1949 · 1960 · 1965
1981 · 2000

ROBERT J. ALLARD, JR., M.A.A.
City Assessor

Deputy Assessor
KENNETH L. DICKS, MAI

ASSESSING DEPARTMENT

CITY OF WORCESTER

ASSESSOR'S OFFICE

WORCESTER, MASSACHUSETTS

Real Estate located at 90 Front Street, Worcester, MA 01608

Assessed Owner: Worcester Renaissance, LLC

Parcel ID: 02-23B-0000F

Fiscal Year	Assessment Date	Land Area	Land Value	Building Value	Total Value
2006	01/01/2005	**124,102 sf**	$179,500	$34,700	$214,200

This letter is to certify that the information contained herein is a true statement of the assessment records. The information above was taken from the **fiscal 2006** real estate records. I attest that I am the officer having legal custody of the records referenced above, which are official records kept within the Commonwealth.

Robert J. Allard, Jr., City Assessor Date: 2-18-05

City Hall, Room 201 • 455 Main Street • Worcester, MA 01608 • (508) 799-1098 • FAX (508) 799-1021
assessing@ci.worcester.ma.us

Worcester
All-America City
1949 - 1960 - 1965
1981 - 2000

ROBERT J. ALLARD, JR., M.A.A.
City Assessor

CITY OF WORCESTER – ASSESSING DEPARTMENT

ASSESSOR'S OFFICE

WORCESTER, MASSACHUSETTS

Real Estate located 100 Front Street, Worcester, MA 01608

Assessed Owners: Worcester Renaissance Towers, LLC

Parcel IDs: 02-23B-0000M

Fiscal Year	Assessment Date	Land Area	Land Value	Building Value	Total Value
2006	01/01/2005	**17,71** sf	$3,152,000	$14,011,500	$17,163,500

This letter is to certify that the information contained herein is a true statement of the assessment records. The information above was taken from the **fiscal 2006** real estate records. I attest that I am the officer having legal custody of the records referenced above, which are official records kept within the Commonwealth.

Robert J. Allard, Jr., City Assessor Date: 2-3-05

City Hall, Room 201 • 455 Main Street • Worcester, MA 01608 • (508) 799-1098 • FAX (508) 799-1021
assessing@ci.worcester.ma.us

Worcester
All-America City
1949 · 1960 · 1965
1981 · 2000

ROBERT J. ALLARD, JR., M.A.A.
City Assessor

CITY OF WORCESTER – ASSESSING DEPARTMENT

ASSESSOR'S OFFICE

WORCESTER, MASSACHUSETTS

Real Estate located 120 Front Street, Worcester, MA 01608

Assessed Owners: Worcester Renaissance Towers, LLC

Parcel IDs: 02-23B-0000O

Fiscal Year	Assessment Date	Land Area	Land Value	Building Value	Total Value
2006	01/01/2005	38,852 sf	$1,078,600	$9,948,300	$11,026,900

This letter is to certify that the information contained herein is a true statement of the assessment records. The information above was taken from the **fiscal 2006** real estate records. I attest that I am the officer having legal custody of the records referenced above, which are official records kept within the Commonwealth.

Robert J. Allard, Jr., City Assessor Date: 2-18-05

City Hall, Room 201 • 455 Main Street • Worcester, MA 01608 • (508) 799-1098 • FAX (508) 799-1021
assessing@ci.worcester.ma.us

Worcester
All-America City
1981 - 2000

ROBERT J. ALLARD, JR., M.A.A.
City Assessor

CITY OF WORCESTER – ASSESSING DEPARTMENT

ASSESSOR'S OFFICE

WORCESTER, MASSACHUSETTS

Real Estate located 0000 Commercial Street, Worcester, MA 01608

Assessed Owners: Worcester Renaissance Towers, LLC

Parcel IDs: 02-23B-000GA

Fiscal Year	Assessment Date	Land Area	Land Value	Building Value	Total Value
2006	01/01/2005	106,370 sf	$212,700	$122,300	$335,000

This letter is to certify that the information contained herein is a true statement of the assessment records. The information above was taken from the **fiscal 2006** real estate records. I attest that I am the officer having legal custody of the records referenced above, which are official records kept within the Commonwealth.

Robert J. Allard, Jr., City Assessor **Date:** 2-18-05

City Hall, Room 201 • 455 Main Street • Worcester, MA 01608 • (508) 799-1098 • FAX (508) 799-1021
assessing@ci.worcester.ma.us

Worcester
All-America City
1949 - 1968 - 1985
1981 - 2000

ROBERT J. ALLARD, JR., M.A.A.
City Assessor

Deputy Assessor
KENNETH L. DICKS, MAI

ASSESSING DEPARTMENT

CITY OF WORCESTER

ASSESSOR'S OFFICE

WORCESTER, MASSACHUSETTS

Real Estate located at 120 R Front Street, Worcester, MA 01608

Assessed Owner: Worcester Renaissance, LLC

Parcel ID: 02-23B-00O-1

Fiscal Year	Assessment Date	Land Area	Land Value	Building Value	Total Value
2006	01/01/2005	11,565 sf	$23,100	$15,300	$38,400

This letter is to certify that the information contained herein is a true statement of the assessment records. The information above was taken from the **fiscal 2006** real estate records. I attest that I am the officer having legal custody of the records referenced above, which are official records kept within the Commonwealth.

Robert J. Allard, Jr., City Assessor Date: 2-18-05

City Hall, Room 201 • 455 Main Street • Worcester, MA 01608 • (508) 799-1098 • FAX (508) 799-1021
assessing@ci.worcester.ma.us

Worcester
All-America City
1949 - 1960 - 1965
1981 - 2000

ROBERT J. ALLARD, JR., M.A.A.
City Assessor

CITY OF WORCESTER – ASSESSING DEPARTMENT

ASSESSOR'S OFFICE

WORCESTER, MASSACHUSETTS

Real Estate located 120 R Front Street, Worcester, MA 01608

Assessed Owners: Worcester Renaissance, LLC

Parcel IDs: 02-23B-ABO-1

Fiscal Year	Assessment Date	Land Area	Land Value	Building Value	Total Value
2006	01/01/2005	11,565 sf	$500	$0	$500

This letter is to certify that the information contained herein is a true statement of the assessment records. The information above was taken from the **fiscal 2006** real estate records. I attest that I am the officer having legal custody of the records referenced above, which are official records kept within the Commonwealth.

Robert J. Allard, Jr., City Assessor Date: 2-18-05

City Hall, Room 201 • 455 Main Street • Worcester, MA 01608 • (508) 799-1098 • FAX (508) 799-1021
assessing@ci.worcester.ma.us

Worcester
All-America City
1981 - 2000

ROBERT J. ALLARD, JR., M.A.A.
City Assessor

Deputy Assessor
KENNETH L. DICKS, MAI

ASSESSING DEPARTMENT

CITY OF WORCESTER

ASSESSOR'S OFFICE

WORCESTER, MASSACHUSETTS

Personal Property located within the Berkeley DIF area, Worcester, MA 01608

Assessed Owners: Various

Fiscal Year	Assessment Date	Property Class	Total Value
2006	01/01/2005	501	$1,186,200
2006	01/01/2005	502	$223,700

This letter is to certify that the information contained herein is a true statement of the assessment records. The information above was taken from the **fiscal 2006 personal property** records. I attest that I am the officer having legal custody of the records referenced above, which are official records kept within the Commonwealth.

Robert J. Allard, Jr., City Assessor Date: 2-18-05

City Hall, Room 201 • 455 Main Street • Worcester, MA 01608 • (508) 799-1098 • FAX (508) 799-1021
assessing@ci.worcester.ma.us

Worcester
All-America City
1949 - 1960 - 1965

3.9 IRD INFORMATION

The Worcester CitySquare Invested Revenue District is co-terminus with the Worcester CitySquare DIF District.

A. The City will approve a tax increment financing plan for the commercial uses of parcels H, J & E on such terms and conditions as may be acceptable to the City. Any tax increment financing plan for Parcel E shall provide that at least 50% of the rentable space in building E shall be for entertainment use.

B. There are no pre-existing TIF agreements in place within the DIF District or the IRD. A previous TIF agreement that was present on one parcel within the DIF District has lapsed and is no longer in effect. The DIF Project will be self-supporting without any reliance on the existing tax base, thus no adverse impact to the DIF area or its environs is anticipated. Completion of the Project will increase the tax base of the Project area as well as its environs.

   The Invested Revenue District and Economic Development Incentive Program's TIF incentive for Worcester CitySquare are being evaluated and considered by the City of Worcester. No adverse effect is anticipated by the use of both the DIF and EDIP programs. The EDIP real estate tax incentive to Berkeley Investments will be small, since the City intends to use the majority of the increment for the DIF bonds.

Section 4 – Approval of a Development Program

1. Objectives / Goals (Program)

☒ Applicable

Provide a description of the Applicant's objective or goal in creating the Program and an explanation of how the Municipality will benefit from the implementation of the Program. This subsection should include information which the Applicant deems helpful to the EACC in arriving at its conclusion that it is reasonably probably that the Applicant will achieve its goals in creating the Program.

2. Written Record of Public Hearing (Program)

☒ Enclosed

A copy of the record of the public hearing relating to the Program and any written comments that have been provided to the Applicant by members of the public concerning the Program. The Applicant may provide a summary to facilitate the EACC's review but is not required to do so.

3. Certification of Compliance with the Local Approval Requirements (Program)

☒ Enclosed

A certification from the Municipality that it has fully complied with the local approval requirements specified in 402 CMR 3.04 with respect to the Program. These include:

a) Designation of an entity that will be responsible for the Program
b) A public hearing prior to adoption of the Program and written record of such hearing
c) Notice to the public of the public hearing and the opportunity to comment in writing on the proposed Program
d) Reasonable effort to provide direct written notice to all owners of real property to be acquired by the municipality as part of the proposed Program of public hearings and providing the opportunity to comment in writing on the Program
e) Evidence that all information required in 402 CMR 3.08(3) had been provided to the municipal governing body prior to its approval of the Program.

4. Approving Order (Program)

☒ Enclosed

A certified copy of a formal, duly enacted order of the city or town council of the Applicant (with evidence of approval by the mayor or city manager where such approval is required by law) or vote of the town meeting of the Municipality, whichever is applicable, identifying and approving the proposed Program. Such order must include a name for the Program. If different from the District, describe where policy control rests, whether staff is dedicated or shared, their respective powers, administrative costs, and provision for payment of administrative costs. Please provide any other information that is necessary to understand the administration, implementation and execution of the Program.

5. Goal Attainment (Program)

☒ Enclosed

Description of how the Applicant expects to achieve its objectives through the Program. This subsection should include:

a) A description of proposed development activities and projects within the District and under the Program. Specifically, identify which activities and projects will be undertaken by public entities and which will be undertaken by private entities.
b) Plans or maps illustrating changes to be made to the District pursuant to the proposed Program and identifying:
    (1) Proposed property lines and the foot-print of buildings and parking areas on each parcel within the District
    (2) Proposed uses and zoning of all parcels
    (3) Proposed thoroughfares, public rights of way and easements

(4) Those parcels to be acquired by the Municipality (if any)
(5) Those parcels to be sold or disposed of by the Municipality (if any)
(6) Buildings or structures to be demolished rehabilitated or constructed (if any).

c) A list of buildings or structures to be constructed or renovated in connection with the Program, with a description of such construction or renovation, including who will be undertaking it. If none, indicate same.

d) A list of buildings or structures to be demolished, either in whole or in part, in connection with the Program and by whom. If none, indicate same.

e) A description of how public ways and other infrastructure will be affected. If none will be affected, indicate so.

f) A description of streetscaping measures that are to be undertaken under the Program including, but not limited to, coordinated signage, façade and sidewalk improvements, beautification steps, and coordination plans. If none, indicate same.

g) A description of how transportation facilities and resources will be affected. If none, indicate same.

h) A description of provisions which exist or which will be established to govern densities, land coverage, land uses, setbacks, off-street parking and loading, and building height and bulk.

i) A statement describing how the Program will improve:
(1) The overall quality of life within the District
(2) The physical facilities and structures within the District
(3) The quality of pedestrian and vehicular traffic control within the District
(4) The transportation facilities and resources within the District.

j) An estimate of the number of jobs that will be created, retained and eliminated as a result of the Program, and the wages and benefits associated with such jobs. If no impact, indicate none.

k) A statement describing whether, and to what extent, proposed projects to be undertaken within the District would be in compliance with existing zoning laws and ordinances. With respect to proposed development that would not be in compliance with existing zoning laws and ordinances, the Applicant should explain how such compliance will be achieved, including a specification of the zoning changes that will be necessary prior to implementation.

l) A detailed financial plan. The financial plan must explicitly identify sources of revenue that are sufficient to pay all project costs and demonstrate that, under various scenarios, there is a reasonable probability that the Applicant will achieve its goals in creating the District and Program. The plan should include the following (as applicable):
(1) Estimates of the captured assessed values including the original, certified assessed value and projected assessed values after 1 year, 5 years, 10 years, 15 years, 20 years, 25 years, and 30 years, as applicable. Provide underlying assumptions
(2) The portion of the captured assessed value to be applied to the Program and projected tax increments in each year of the Program. Provide underlying assumptions
(3) Describe the method of calculating tax increments together with any provisions for adjustment to the method of calculation
(4) Provide a projection of the tax revenues to be derived in the absence of the Program
(5) Identify specific projects that will be funded by the tax increments, the timing and amount of such funding through tax increments, and what percentage portion of each project will be funded through tax increments
(6) The board or officer of the city or town responsible for calculating the tax increment.
(7) Allocation, if any, of excess incremental revenue(s) which accrues in any year.

m) If a municipality intends to acquire property in connection with its Program, a statement identifying:
(1) All properties to be acquired by the Municipality within the District
(2) The method of acquisition of each property, including whether the property will be acquired by eminent domain, negotiated sale, or other means
(3) The owner of such properties
(4) The estimated cost of property to be acquired and the basis for such estimate

(5) Identification of any property to be acquired by the Municipality in which any officer or employee of the Municipality who, on account of an interest in the acquisition, would be required to make disclosure under chapter 268A

(6) The current and planned use of properties to be acquired

(7) Plans for the relocation of persons displaced by the Municipality's acquisition of such properties. Such plans shall conform to all applicable requirements in M.G.L. c. 79A and 80, the regulations and guidelines there under.

n) If the Applicant proposes to take property by eminent domain, it must provide a statement as to why the property will be acquired in this manner. The Applicant may not take property by eminent domain unless there is a public purpose warranting such taking. The EACC may require, at the expense of the Applicant paid for in advance, the written opinion of qualified independent counsel as to whether the Application establishes the requisite public purpose.

o) A description of plans, if any, for the development of housing (both affordable and market rate) as part of the Program. Include the number of housing units that will be retained, renovated and / or created as a result of the Program.

p) A description of workforce training or workforce development activities, if any, to be undertaken in connection with the Program.

q) A schedule for implementing the Program containing a description of anticipated events during each of the first 5 years of the Program, and for each five-year period thereafter, and a statement identifying the duration of the Program.

r) The names and addresses of persons or entities that may have a direct interest in whether the proposed Program is approved by the EACC. If it is not practicable for the Applicant to name these persons or entities individually, the municipality may refer to groups of persons or entities, provided that this is accomplished with a reasonable degree of specificity.

6. Execution (Program)

☒ Enclosed ☐ N/A

A description of expected public participation during the execution of the Program. Include disclosure of competitive bidding, fair wage or other similar requirements.

Section 4: Approval of a Development Program

4.1 OBJECTIVES/GOALS (Program)

The Worcester CitySquare DIF District actualizes one of the core strategies of the Worcester Economic Development Action Plan – promoting downtown as a mixed-use city center, with entertainment, office and government destinations. The redevelopment of the Worcester Fashion Common Outlet Mall, which has been underutilized with a high retail vacancy rate for the past five years, was identified as a catalyst project in the Action Plan. As Worcester's first DIF project, the City intends to invest public resources in a catalyst project to be the foundation for Worcester's twenty-first century. The redevelopment of the Worcester Fashion Common Outlet Mall into CitySquare by Worcester Renaissance, LLC, with supporting infrastructure financed by the City through DIF, enables Worcester to fulfill several goals set forth in the Action Plan and the Comprehensive Economic Development Strategy.

The CitySquare project capitalizes on Worcester's existing assets and public investments in Worcester Common and Washington Square; reconnects downtown Worcester with its nearby, walkable residential neighborhoods; and embraces a transit-oriented development and smart growth agenda.

CitySquare will provide necessary economic development and job opportunities for a cross-section of skills, from entry-level to highly skilled medical professionals, by creating and retaining a mix of jobs. New and expanding businesses at Worcester CitySquare will provide a range of employment opportunities for career ladders. Retail, entertainment and restaurant jobs provide persons with a high school diploma or little formal education with opportunities with a career ladder to store manager and district management. CitySquare is creating 300,000 SF of retail, entertainment, and restaurant space. Over 55% of downtown residents between ages 25 and 64 have at most a high school education, compared to 45% of all Worcester residents, and 31% of Massachusetts residents. Worcester CitySquare will provide job and educational opportunities in walking distance for low-and-moderate income residents of Worcester.

The Worcester CitySquare DIF District is strategically located within one block of the Union Station commuter rail station, which now has ten daily trains to-and-from Boston. This station serves as a inter-modal center, with the addition of new bus berths for inter-city bus service. Downtown Worcester is the hub of the local regional interstate transit system.

4.2 WRITTEN RECORD OF PUBLIC HEARING (Program)

To be provided by the City of Worcester

- **Stenographic record of public hearing**
- **Copies of all written comments at public hearing**

4.3 CERTIFICATION OF COMPLIANCE WITH LOCAL APPROVAL REQUIREMENTS (Program)

A. DESIGNATION OF IMPLEMENTING ENTITY BY CITY	The Office of the City Manager (Michael V. O'Brien, City Manager) is the responsible municipal entity for implementation of the CitySquare DIF District Development Program. Worcester Renaissance, LLC (of which Berkeley Investments is the development partner) is working with the Office of the City Manager as the private partner on the implementation of the CitySquare DIF District Development Program.
B. PUBLIC HEARING	A public hearing was held on Thursday, Mary 5th at 6 pm, at the Worcester Public Library, Saxe Room, One Salem Square, Worcester, MA. **The notice and the minutes of the public hearing to follow:**
C. NOTICE OF PUBLIC HEARING	The Notice of Public Hearing was posted by the City Clerk at Worcester City Hall, 455 Main Street, Worcester, MA 01608 on the public posting board for all to see, and an advertisement and legal notice for the public hearing appeared on Tuesday, April 19, 2005 in the Worcester Telegram & Gazette, which was at least fourteen (14) days prior to the public hearing. A copy follows.
D. COPIES OF DIF MATERIALS & APPLICATION	Complete copies of the Worcester CitySquare District Improvement Financing DISTRICT application and all supporting materials were provided to the Worcester City Council prior to final action and approval by the Council.
E. CERTIFICATION	**INSERT CERTIFICATION OF ABOVE-STATED FACTS**

LEGAL NOTICE INSERT

4.4 APPROVING ORDER (Program)

To be added by the City

4.5 GOAL ATTAINMENT (Program)

A. Description of Development Activities within the DIF District

Following is an overview of the CitySquare development activities.

- The principal elements of Berkeley's phased development plan are to **1. Retain those components of Worcester Center** including the two office towers and a portion of the two parking structures (with upgrades and reconfiguration) that complement the ultimate master plan while generating current income; **2. Demolish the existing retail mall** as soon as the new development plan is approved and permitted, financing is secured, leases can be terminated and the remaining viable tenants can be relocated**; 3. Create an open air street network and re-build the necessary infrastructure, working hand in hand with the City and Commonwealth; 4. Develop the mixed-use components** of the proposed development in a phased sequence.

- Given the financial challenges associated with large mixed-use urban redevelopment projects, and the well-known suburban gap attributed to high construction expense vis-a-vis expected value, the public partnership will set the table for the private development by funding the infrastructure reconstruction. This will allow for the removal of some existing structured parking, the construction of the new underground garage within the area of the existing mall foundations and the green roof on top of that garage, changes to Worcester Center Boulevard around the project to make it more pedestrian-friendly and to insure the link to Union Station, and the creation of new streets and sidewalks throughout the project area.

- Public funding is sought through a variety of City, State and Federal programs, as identified in this package of materials. The City is prepared to designate the project area as a DIF District to take advantage of financing opportunities of the new District Improvement Financing legislation. However, the DIF funding needs to be supplemented for the project to proceed.

Program Elements

Berkeley's preliminary development plan envisions the following building components:

- A **new street grid for vehicles, bicycles and pedestrians** will reconnect key landmarks in the downtown area. Front Street will be extended to the East along its original alignment and connect City Hall and the Financial District to the Union Station/Washington Square transportation hub. North/south connections will be created via a new street, Trumbull Street, connecting the Worcester Medical Center (and points north) to Front Street; and by a new street south, Bartlett Street, running from Front Street (as extended) to Franklin Street. In addition, new secondary and primary pedestrian streets will create walking paths throughout the new development.

- The two existing **office** towers (486,000 GSF) are being repositioned to cement their position as true Class A buildings. A **new building** is being targeted as either a corporate headquarters or multi-family residential building at the corner of Front Street and Worcester Center Boulevard.

- **New residential condominiums** (140 to 170 units) will be built fronting on the intersection of Front Street and a newly constructed street.

- Several **retail sites,** totaling approximately 300,000 SF will create a minimum density for both large format retail and store fronts. Urban entertainment uses including **restaurants, sports bars, outdoor cafes, and** entertainment venues to be located along the new street grid, are intended to be integrated into the retail program

- A **commercial building** with possible medical uses and links to Worcester Medical Center will be leased to commercial office users or Worcester-based medical practitioner groups, and others.

- The existing **Foothills Theatre**, the only equity theatre in Central Massachusetts, will be upgraded with a new entrance and marquee.

- **Upgraded parking structures** (existing, new and redesigned) and surface parking for up to 3,950 cars will service new land uses in a distributed rather than a centralized system for maximum accessibility and safety.

- **New streetscape improvements** will include paving, landscaping, street furniture, and banners, and feature street-level retail.

- **A senior housing development** (200 to 250 units)

- **New condominium units** (200 to 250 units) overlooking Worcester Common will be built in the final phase, incorporating street level storefront retail and restaurant uses.

The total program is projected to be approximately **2.1 million SF** in gross buildable area including the existing office buildings.

Public Sector Investment in the CitySquare DIF District

The public investment through the DIF in the Worcester CitySquare DIF District includes construction of new streets, sidewalks, utilities and appurtenances, lighting, streetscape, and parking. Preparatory activities, such as demolition and relocation, are part of the public investment to construct the public ways, utilities and parking. The locus of streets and public ways is illustrated in the eminent domain plan found in Appendix A, and as highlighted in the illustrations on the following pages.

B. PLANS AND MAPS

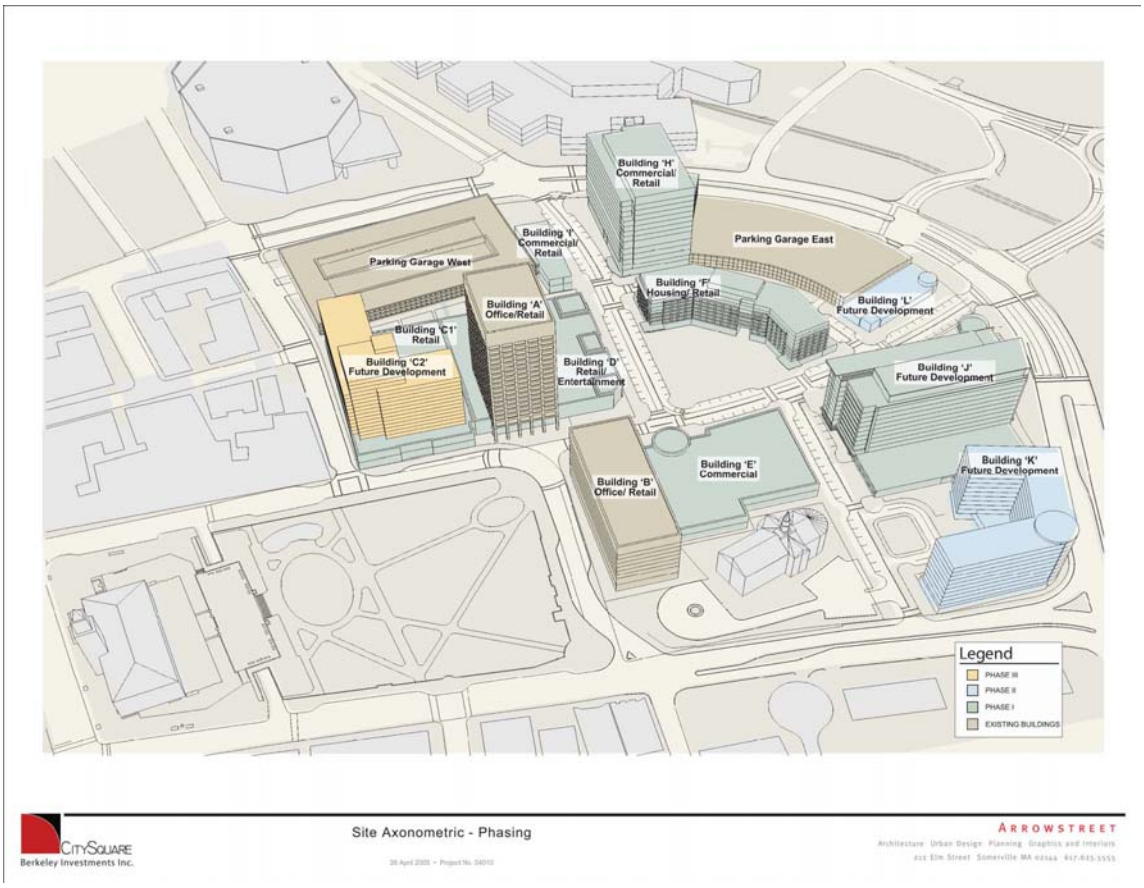
Worcester CitySquare is in the heart of downtown Worcester adjoining the Worcester Common, as shown in the map below. Worcester CitySquare is privately-owned by Worcester Renaissance, LLC. The two office towers are owned by Worcester Renaissance Towers, LLC. Additional maps and plans can be found in the Appendix at tab 7.

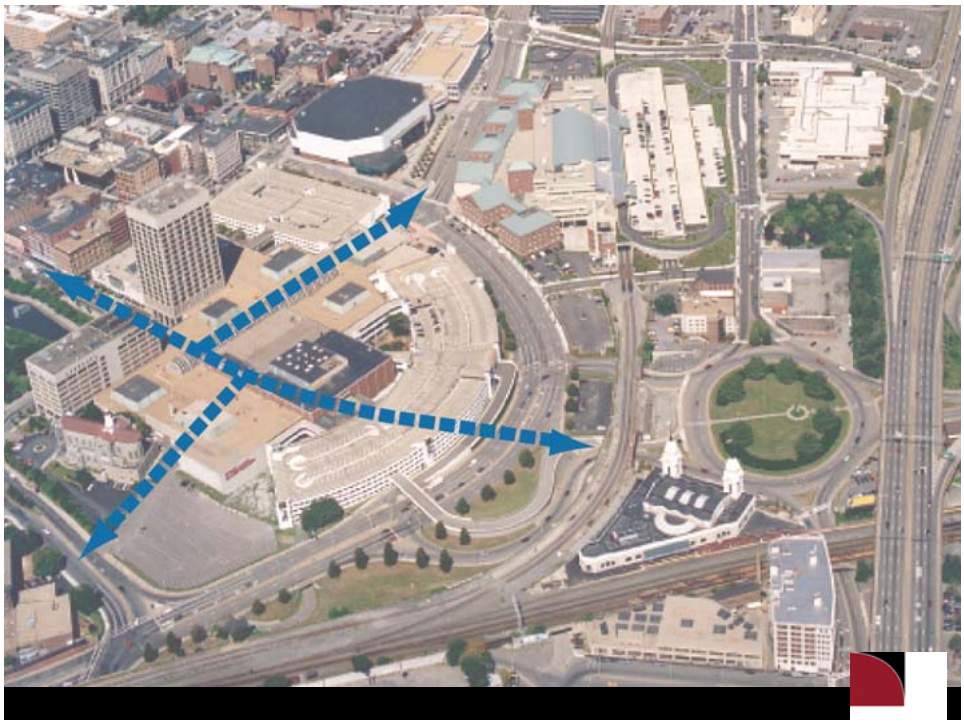
(1) The property line map and foot print of the buildings and parking areas of the CitySquare DIF district can be found in the Appendix.

(2) The zoning map is highlighted on the maps found in Appendix A. The proposed uses within the CitySquare DIF district are illustrated below.

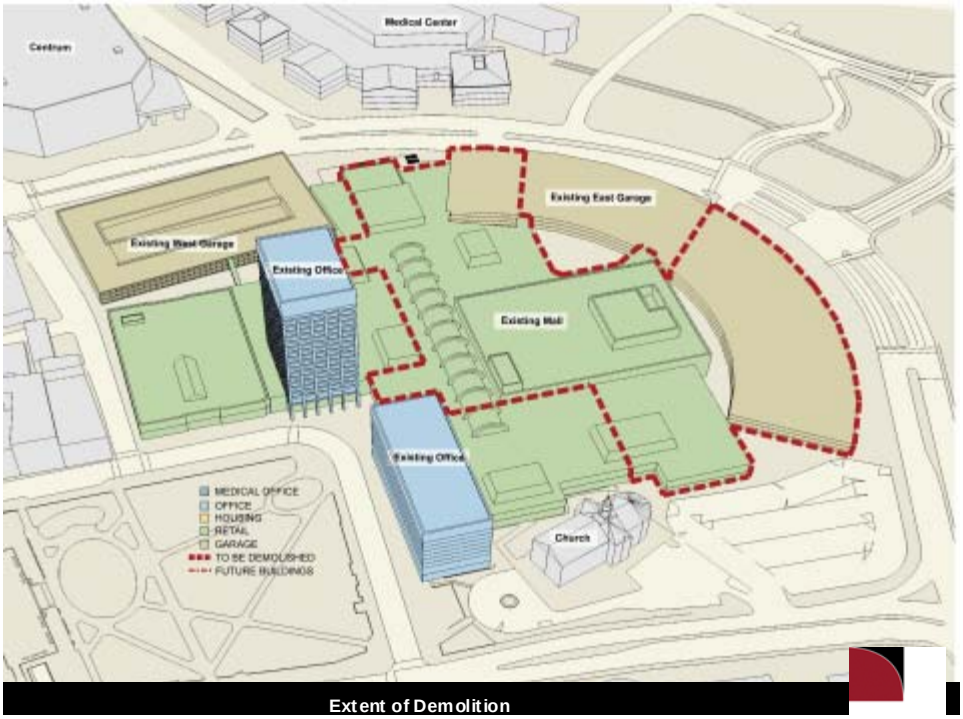
(3) The plan for easements and public rights of way can be found in the Appendix. The general area of demolition needed to construct the public roadways and their location within the CitySqyare DIF district is depicted in plans on the following pages.

Land Use Plan for Worcester CitySquare



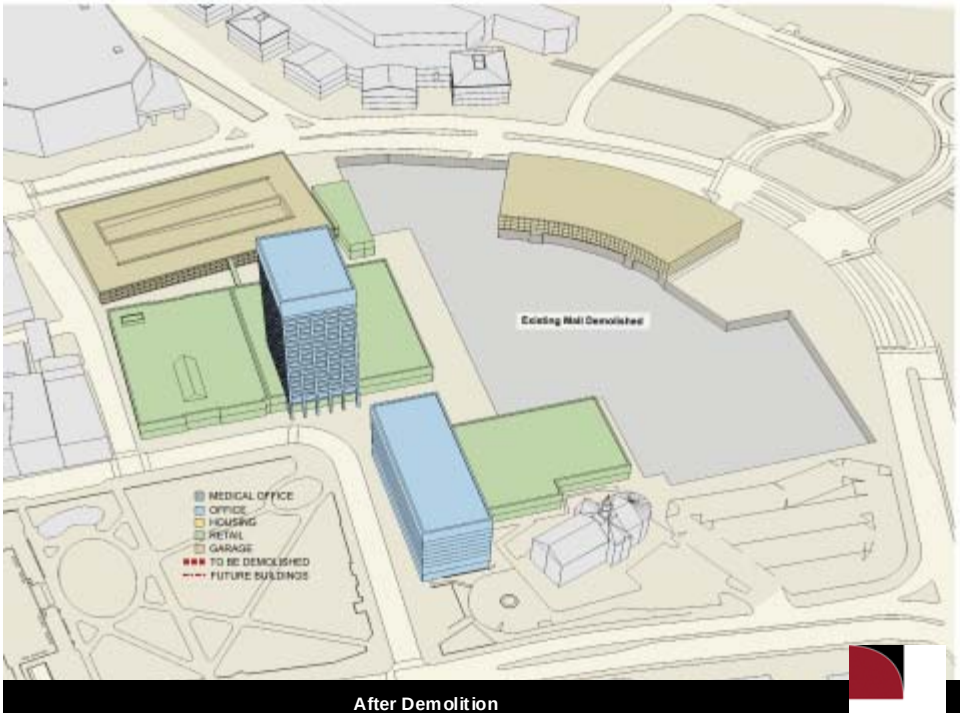


Location of new connecting public roadways through the existing mall.

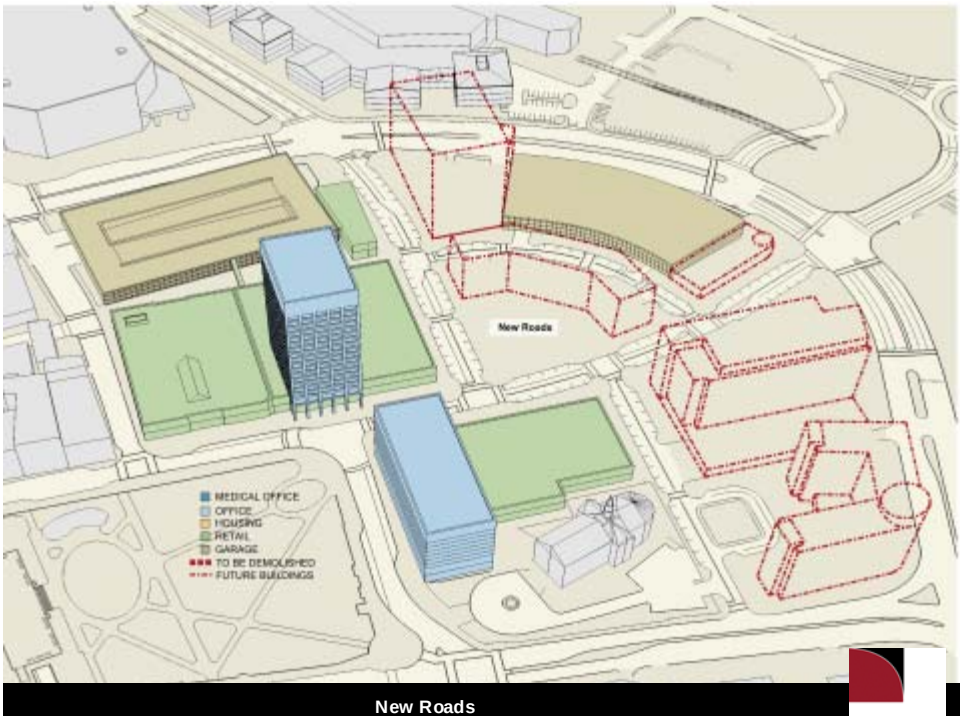


Extent of Demolition

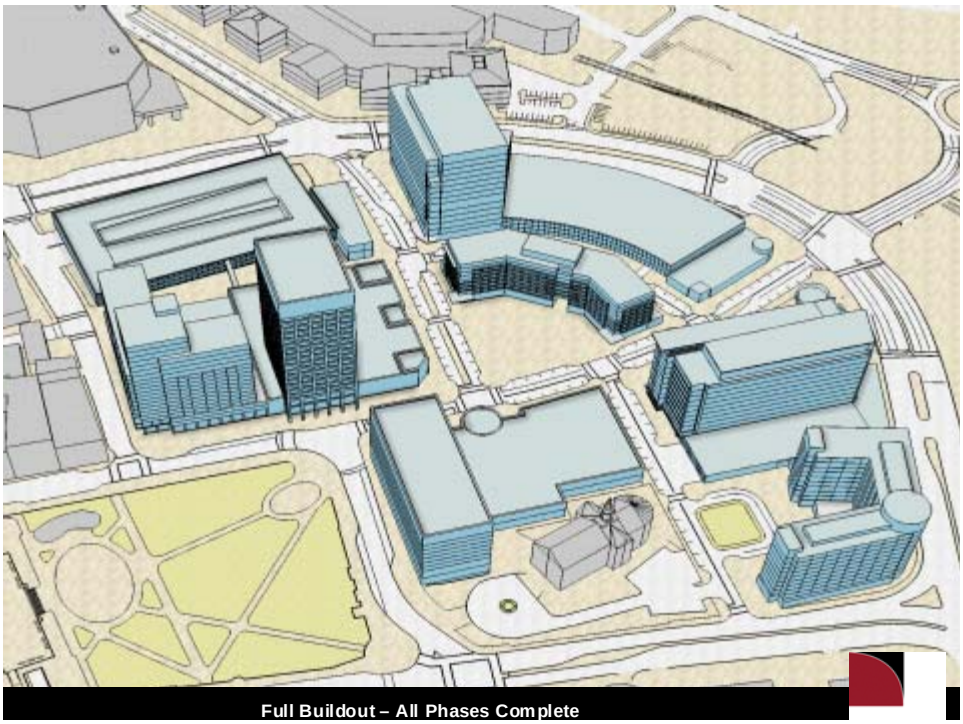
Extent of mall and parking garage demolition superimposed over existing conditions.



The area with remaining buildings following demolition.



New public roadways to be built with the DIF program and planned build-out.



Full build-out of the public and private investments for the CitySquare DIF program.

(4) Property to be acquired by the City of Worcester are the surface rights of the public roadways and sidewalks, as illustrated in the eminent domain plan contained in the Appendix..

(5) No municipal or public property will be disposed.

(6) As illustrated significant portions of the property formerly known as the Worcester Fashion Common Outlet Mall and portions of the existing east garage aligning Worcester Center Boulevard will be demolished. (See the preceding pages IV-8 to IV-11.)

C. All buildings within the Worcester CitySquare DIF as illustrated on the preceding page will be renovated or newly built during the eight-year buildout period. Worcester Renaissance, LLC, with Berkeley Investments as the development partner and master developer will oversee the renovation, redevelopment and construction of all properties within CitySquare. The schedule of project activities as to building is shown in the table **Phase 1:**

Bldg / Item	Use	Gross SF	Construction Schedule
C (Current)	Repositioned Retail, re-tenanting	75,000	Underway

Enabling	Demolition and site preparation		Commence 2005
Garage	New underground public parking garage (construction forms support for new roads and buildings; green roof)	480,000	Commence 2006 Delivery 2008
Site/Roads	New city streets, sidewalks and green roof on garage		Commence 2005 Delivery 2008
D	Retrofitted, re-skinned retail/entertainment, repositioned with new tenants	119,000	Commence Exterior Wall 2005 Interior Fit-out 2008
F	Housing, with accessory retail. New construction over new underground garage	188,000	Commence 2006 Delivery 2008
H	Commercial with accessory retail, new construction over existing basement and new parking	275,000	Commence 2006 Delivery 2008
I	Retrofitted, re-skinned retail/restaurants/commercial; repositioned with new tenants	≤19,000	Commence TBD Delivery 2008
E	Entertainment and Retail, Commercial	84,300	Commence TBD Delivery 2010

Subject to negotiation with the prospective office tenant, Phase 1 might also include the following:

J	Office/ Accessory Retail/Housing/Commercial	275,000	Commence TBD Delivery 2009

Phase 2:

J	Housing/ Accessory Retail/Commercial (if Phase 1 Bldg J is not built)	275,000	Commence 2008 Delivery 2010
K	Housing/Commercial/ Accessory Retail (no big box discount)	250,000	Commence 2008 Delivery 2010
L	Retail/Housing/Hotel	≥25,000	Commence 2008 Delivery 2010

Phase 3:

C (Future)	Housing/ Accessory Retail/Hotel/Commercial	320,000	Commence 2010 Delivery 2012

D. A portion of the existing mall and the east garage will be demolished as illustrated on pages IV-8 to IV-9 of this section.

E. No public ways presently traverse the CitySquare DIF area, exclusive of Worcester Center Boulevard. There will be minimal impact on the existing public ways that surround the CitySquare DIF area, namely Front Street, Commercial Street, Salem Street, Foster Street, and Franklin Street. Upgrading the streetscape area along Front Street, Commercial Street, and Front Street is the focus of a pending CDAG grant application, for which DIF funds will be used as match. Front Street will be extended with the CitySquare DIF project to connect with Shrewsbury Street.

F. In anticipation of a positive review and response by the City of Worcester and the Massachusetts Economic Assistance Coordinating Council of the DIF application, improvements to Buildings C and D are underway. Building C is located along Commercial Street, and it is being re-skinned creating more pedestrian-friendly facades and signage. The CDAG streetscape project will complement this private investment. Tenants are being located for Buildings C and D. A copy of the CDAG project application can be found in the Appendix.

G. The Worcester CitySquare project strengthens the connections between downtown and Union Station, the commuter rail station, and adjoining multi-modal center. The streets and sidewalks to be constructed under the DIF program enable the visual, pedestrian and vehicular connections between downtown and a variety of public transit services (commuter rail, intra-city bus, and local transit). In addition, bicycle parking will be made available at CitySquare. The Blackstone River parkway bicycle paths which terminate at the nearby Worcester Commons pass through the CitySquare DIF district.

H. CitySquare is located in downtown Worcester, and is a single development area, with no traversing public ways, exclusive of Worcester Center Boulevard. The downtown zoning classification BG has few zoning requirements in Worcester. There is a 10 feet rear setback requirement. The BG classification has no height limitations nor parking requirements in the downtown area, where CitySquare is located. Proposed parking requirements are one parking space per dwelling unit; there are no parking requirements for non-residential uses. The proposed construction of "new" parking facilities is for replacement parking, which will be demolished to re-create the street pattern connecting downtown Worcester with its surrounding neighborhoods. The new public streets will also include on-street parking, in addition to the replacement structured parking.

I. The CitySquare DIF program will improve the **quality of life** in Worcester by creating a mixed-use, retail and entertainment center with activity 18 hours/7 days per week This project will enliven the moribund downtown Worcester beyond 8 to 5 Monday through Friday and create shopping, living, and entertainment opportunities for area residents and students attending the Worcester area's sixteen colleges. Quality of life will further be enhanced through the creation of job opportunities with career ladders for Worcester area residents at CitySquare. Market-rate and luxury housing opportunities will be created downtown for professionals and retired adults, addressing a segment of the housing market currently underserved in Worcester. The theater arts community will be stabilized with a continuing home for the Foothills Theatre, Worcester County's only equity theater.

The **physical facilities** in the CitySquare DIF District will be significantly changed. Berkeley's "vision" for the new Worcester Center is to replace the existing mall with a new, open and vibrant mixed-use urban district, which integrates medical/clinical, office, residential, street-accessed retail, and entertainment uses within a newly created open-air street grid, around a central green space.

The preliminary development plan for renovated and new buildings and physical facilities encompasses over 2.1 million SF, with the following anticipated elements:

- Repositioning the two office towers (486,000 GSF).
- A new commercial building with possible medical uses and links to Worcester Medical Center and Worcester-based medical practitioner groups will be built.
- 200 to 250 units of housing for seniors.
- 140 to 170 units of new residential condominium units in the early phase, and 200 to 250 condominiums overlooking Worcester Common in the final phase, incorporating street level strorefront retail and restaurant uses.
- 300,000 SF of retail, including urban entertainment uses, such as restaurants, cafes, sports bar, and outdoor cafes.
- Conventional office or hotel 200,000 to 300,000 SF.
- Entertainment venues.
- Upgraded parking and streetscape improvements.

The quality of the **pedestrian and vehicular traffic** control within the CitySquare DIF District will be substantially enhanced through the creation of an open-air street pattern with streetscape, trees, street furniture, sidewalks, a central green space. Moreover, the vehicular traffic pattern will be enhanced by the extension of Front Street to Washington Circle and connecting with Shrewsbury Street. This connection will not only enhance vehicular traffic, but create visual sight lines from Main Street, the Worcester Commons, and Union Station, thereby strengthening the connection of historic resources, transportation facilities, and currently-disconnected activity nodes. New bus stops are contemplated within the CitySquare district.

The **transportation facilities and resources** will be changed and improved through the CitySquare DIF program. As stated, an open air street and sidewalk pattern will be created strengthening the connections for public transit users, pedestrians, and vehicles. Parking will be initially reduced, due to demolition of a portion of the east garage and the mall's underground parking to enable construction of the street and sidewalk pattern. Replacement parking will be constructed underground. Some on-street parking will be created, in addition to bike paths and bicycle storage parking.

J. The number of permanent full-time jobs to be created or retained will be at least 1,675, (or in alternative two, 3,105 jobs)[1]. During the eight-year build-out period, an estimated $103 to $104 million dollars will be expended on construction wages, thereby creating 2,270 to 2,300 construction jobs. The job projections and estimates are based on the RKG state benefits study found in the Appendix, which incorporated information from construction contractors and prospective employers in CitySquare.

[1] Alternative 1 as defined by RKG (See Appendix B) consists of 1.2 million SF of commercial space and 900 housing units. Alternative 2 consists of 1.5 million SF of commercial space and 650 housing units.

K. The development program outlined is in compliance with Worcester's Zoning Ordinance.

L. Following is a spreadsheet showing the estimates of the captured assessed values of the entire project including the original, certified assessed value and the projected assessed values after one, five, ten, fifteen, twenty, twenty-five, and thiry years.

The analysis was formulated based mainly on a sale comparison approach to valuation, limited income capitalization approach to valuation and the schedule provided by Berkeley Investments as to the construction progress. New residential condominiums have been selling in the Worcester market at a median value of $175.00 per square foot. Apartment buildings have been selling at $100.00 psf value. New residential condominiums and apartment buildings have been selling in the Worceser market at a medium value of $175.00 psf. Commercial retail, office and meical office space sales have indicated an appropriate assessment of $110.00 psf. Theater valuations derived from the income capitalization approach indicates an appropriate assessment of $90.00 psf, while the same approach was utilized to estimate a $75.00 psf assessment of health club facilities.

Area in Square Feet	Unit	Value per Unit	Assessed Valuation	YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
					FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	FY 2033	FY 2034	FY 2035	FY 2036	FY 2037
275,381	A-OFFICE	$100	$27,538,100		$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54	$27.54
14,000	A-RETAIL	$100	$1,400,000		$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40	$1.40
188,978	B-OFFICE	$100	$18,897,800		$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90	$18.90
8,000	B-RETAIL	$100	$800,000		$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80	$0.80
75,000	C1-RETAIL	$110	$8,250,000		$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25	$8.25
320,000	C2-HOUSING/MIXED USE/ COMMERCIAL	$175	$56,000,000							$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00	$56.00
95,000	D-RETAIL	$110	$10,450,000			$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45	$10.45
24,000	D-ENTERTAINMENT	$90	$2,160,000			$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16	$2.16
84,300	E-COMMERCIAL	$110	$9,273,000						$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27	$9.27
23,000	F-RETAIL	$110	$2,530,000				$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53
165,000	F-HOUSING	$175	$28,875,000				$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88	$28.88
255,000	H-COMMERCIAL	$110	$28,050,000				$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05
20,000	H-RETAIL	$110	$2,200,000				$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20
19,000	I-COMMERCIAL/RETAIL	$110	$2,090,000				$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09	$2.09
255,000	J-COMMERCIAL/HOUSING	$110	$28,050,000					$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05	$28.05
20,000	J-RETAIL/MIXED USE	$110	$2,200,000					$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20	$2.20
250,000	K-HOUSING/MIXED USE	$175	$43,750,000					$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75	$43.75
25,000	L-COMMERCIAL/MIXED USE	$110	$2,750,000					$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75
	PERSONAL PROPERTY VALUATION		$1,409,900		$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41	$1.41
1,381,659	COMM SF - - COMM VALUATION		$146,638,900	TOTAL VAL	$58.30	$70.91	$134.65	$211.40	$220.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67	$276.67
735,000	RES. SF - - - - -RES. VALUATION		$128,625,000	BASE VAL	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76	$31.76
2,116,659	TOTAL SF - -TOTAL VALUATION		$276,673,800																																
				INCREMENTAL VALUE	$26.54	$39.15	$102.89	$179.64	$188.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91	$244.91

ASSESSED VALUATION OF ENTIRE PROJECT

The financing assumptions for the CitySquare DIF program follow:

Minimum Private Investment: $470.0 million

Total Public Funds Requested: $ 92.855million

DIF:	$ 64.085 million
MA:	$ 25.000 million
Other:	$ 3.770 million
Total	$ 92.855 million

Assumed Assessed Valuations for Base Taxes:

Key Assumptions	Per Building SF	Value
Health Club		$75
Theater		$90
Existing Commercial		$100
New Commercial Retail		$110
New Residential (Mid-Rise)		$175
TAX RATES	FY 05	
Commercial	$27.60	
Residential	$13.18	

Existing tax base $876,587 (increment above this amount applied to DIF)
Taxes escalated at 2% per annum
Tax Base Revenue also escalated at 2% per annum

Assumed Garage Revenues:

Base net revenue shown on attached chart found on page IV-20.
Garage revenues ramped up as follows:

2007	15%
2008	80%
2009	100%
2010	To 2036 Escalated at 2% per annum

DIF Structure

Interest-only first 5 years; of those 5 years, 3 years of capitalized interest
Principal and interest are amortized over the remaining 25 years
Total DIF $64.085 million
Debt service analysis, and revenue surplus/(deficit) summary, attached.

State Grant(s)

Total $25.0 million, payable over 5 years (maximum)

The specific projects to be funded by the tax increments include the streets, sidewalks, streetscape, replacement parking, demolition, and all enabling work required to permit the demolition of the mall and construction of roadways and sidewalks over the existing truck

dock, and the construction of the new underground garage (necessitated by the demolition of the existing garage to permit the extension of Front Street to Washington Square and streets on top). Enabling work includes the following:

1. All utility terminations and cut and cap preparations to permit the relocation of utilities.
2. Asbestos abatement in the mall.
3. Temporary and new partitions along the new underground garage demising line.
4. Structural reinforcement for roads, over and along the truck dock and utility rooms and corridors.
5. Waterproofing of the areas currently watertight within the mall over and along the truck dock and utility rooms and corridors, below the location of the new roads and sidewalks.
6. Demolition of the mall and disposal of materials.
7. New shear walls in the remaining East Garage (required due to partial garage demolition for Front Street extension), and eliminating existing expansion joints in the remaining garage for structural stability.
8. New permanent stair and elevator at the end of the East Garage, otherwise demolition of the Red Garage results in no vertical circulation options.

The City Assessor is responsible for calculating the tax increment.

If there are any excess incremental revenues (generated by Phase I, which represents sixty percent of the project) that accrue, the intention is to have those funds remain within the Project fund through the life of the DIF Project to fund any necessary Project expenses not originally contemplated. However, the funds generated by the remaining forty percent of the project will be appropriated into the General Fund to be used for any appropriate municipal service.

Section 4, Item 5l(2)

The Program is to be completed in three phases. The portion of the captured valuation to be applied to the Program are those improvements to be completed in Phase I of the project. Over the life of the project, the taxes generated by Phase I will average 60% of the total taxes for all three phases of the entire project." The anticipated tax revenue of the entire project and the portion of the captured assessed value to be applied to the Program (and the projected tax increments in each year of the Program) are shown on the attached two spreadsheets. The underlying assumptions are also attached.

Area in Square Feet	Unit	Value per Unit	Assessed Valuation	YEAR	1 FY 2007	2 FY 2008	3 FY 2009	4 FY 2010	5 FY 2011	6 FY 2012	7 FY 2013	8 FY 2014	9 FY 2015	10 FY 2016	11 FY 2017	12 FY 2018	13 FY 2019
275,381	A-OFFICE	$100	$27,538,100		$0.76	$0.78	$0.79	$0.81	$0.82	$0.84	$0.86	$0.87	$0.89	$0.91	$0.93	$0.95	$0.96
14,000	A-RETAIL	$100	$1,400,000		$0.04	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04	$0.05	$0.05	$0.05	$0.05	$0.05
188,978	B-OFFICE	$100	$18,897,800		$0.52	$0.53	$0.54	$0.55	$0.56	$0.58	$0.59	$0.60	$0.61	$0.62	$0.64	$0.65	$0.66
8,000	B-RETAIL	$100	$800,000		$0.02	$0.02	$0.02	$0.02	$0.02	$0.02	$0.02	$0.03	$0.03	$0.03	$0.03	$0.03	$0.03
75,000	C1-RETAIL	$110	$8,250,000		$0.23	$0.23	$0.24	$0.24	$0.25	$0.25	$0.26	$0.26	$0.27	$0.27	$0.28	$0.28	$0.29
320,000	C2-HOUSING/MIXED USE/ COMMERCIAL	$175	$56,000,000							$0.74	$0.75	$0.77	$0.78	$0.80	$0.81	$0.83	$0.85
95,000	D-RETAIL	$110	$10,450,000			$0.29	$0.29	$0.30	$0.31	$0.31	$0.32	$0.32	$0.33	$0.34	$0.34	$0.35	$0.36
24,000	D-ENTERTAINMENT	$90	$2,160,000			$0.06	$0.06	$0.06	$0.06	$0.06	$0.07	$0.07	$0.07	$0.07	$0.07	$0.07	$0.07
84,300	E-COMMERCIAL	$110	$9,273,000							$0.26	$0.26	$0.27	$0.27	$0.28	$0.28	$0.29	$0.29	$0.30
23,000	F-RETAIL	$110	$2,530,000				$0.07	$0.07	$0.07	$0.07	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08	$0.09
165,000	F-HOUSING	$175	$28,875,000				$0.38	$0.39	$0.40	$0.40	$0.41	$0.42	$0.43	$0.44	$0.45	$0.45	$0.46
255,000	H-COMMERCIAL	$110	$28,050,000				$0.77	$0.79	$0.81	$0.82	$0.84	$0.85	$0.87	$0.89	$0.91	$0.93	$0.94
20,000	H-RETAIL	$110	$2,200,000				$0.06	$0.06	$0.06	$0.06	$0.07	$0.07	$0.07	$0.07	$0.07	$0.07	$0.07
19,000	I-COMMERCIAL/RETAIL	$110	$2,090,000				$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.07	$0.07	$0.07	$0.07
255,000	J-COMMERCIAL/HOUSING	$110	$28,050,000					$0.77	$0.79	$0.81	$0.82	$0.84	$0.85	$0.87	$0.89	$0.91	$0.93
20,000	J-RETAIL/MIXED USE	$110	$2,200,000					$0.06	$0.06	$0.06	$0.06	$0.07	$0.07	$0.07	$0.07	$0.07	$0.07
250,000	K-HOUSING/MIXED USE	$175	$43,750,000					$0.58	$0.59	$0.60	$0.61	$0.62	$0.64	$0.65	$0.66	$0.68	$0.69
25,000	L-COMMERCIAL/MIXED USE	$110	$2,750,000					$0.08	$0.08	$0.08	$0.08	$0.08	$0.08	$0.09	$0.09	$0.09	$0.09
	PERSONAL PROPERTY VALUATION		$1,409,900	P.P. TAXES	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04	$0.05	$0.05	$0.05	$0.05	$0.05
1,381,659	COMM SF - - COMM VALUATION		$146,638,900	TOTAL TAXES	$1.61	$1.99	$3.37	$4.93	$5.28	$6.12	$6.25	$6.37	$6.50	$6.63	$6.76	$6.90	$7.04
735,000	RES. SF - - - -RES. VALUATION		$128,625,000	BASE TAXES	$0.88	$0.89	$0.91	$0.93	$0.95	$0.97	$0.99	$1.01	$1.03	$1.05	$1.07	$1.09	$1.11
2,116,659	TOTAL SF - -TOTAL VALUATION		$275,263,900														
				TIF EXEMPTION	-$0.02	-$0.02	-$0.03	-$0.03	-$0.03	-$0.02	-$0.01						
			INCREMENTAL TAXES		$0.71	$1.08	$2.43	$3.97	$4.30	$5.14	$5.25	$5.37	$5.47	$5.58	$5.69	$5.81	$5.92

INCREMENTAL TAXES WITH FULL BUILD OUT OF ALL THREE PHASES

14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	FY 2033	FY 2034	FY 2035	FY 2036	FY 2037
$0.98	$1.00	$1.02	$1.04	$1.06	$1.09	$1.11	$1.13	$1.15	$1.18	$1.20	$1.22	$1.25	$1.27	$1.30	$1.32	$1.35	$1.38
$0.05	$0.05	$0.05	$0.05	$0.05	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.07	$0.07	$0.07	$0.07
$0.67	$0.69	$0.70	$0.72	$0.73	$0.74	$0.76	$0.78	$0.79	$0.81	$0.82	$0.84	$0.86	$0.87	$0.89	$0.91	$0.93	$0.94
$0.03	$0.03	$0.03	$0.03	$0.03	$0.03	$0.03	$0.03	$0.03	$0.03	$0.03	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04
$0.29	$0.30	$0.31	$0.31	$0.32	$0.33	$0.33	$0.34	$0.35	$0.35	$0.36	$0.37	$0.37	$0.38	$0.39	$0.40	$0.40	$0.41
$0.86	$0.88	$0.90	$0.92	$0.94	$0.95	$0.97	$0.99	$1.01	$1.03	$1.05	$1.08	$1.10	$1.12	$1.14	$1.16	$1.19	$1.21
$0.37	$0.37	$0.38	$0.39	$0.40	$0.40	$0.41	$0.42	$0.43	$0.44	$0.45	$0.45	$0.46	$0.47	$0.48	$0.49	$0.50	$0.51
$0.08	$0.08	$0.08	$0.08	$0.08	$0.08	$0.09	$0.09	$0.09	$0.09	$0.09	$0.09	$0.10	$0.10	$0.10	$0.10	$0.10	$0.11
$0.31	$0.31	$0.32	$0.32	$0.33	$0.34	$0.34	$0.35	$0.36	$0.37	$0.37	$0.38	$0.39	$0.40	$0.40	$0.41	$0.42	$0.43
$0.09	$0.09	$0.09	$0.09	$0.09	$0.10	$0.10	$0.10	$0.10	$0.10	$0.11	$0.11	$0.11	$0.11	$0.11	$0.12	$0.12	$0.12
$0.47	$0.48	$0.49	$0.50	$0.51	$0.52	$0.53	$0.54	$0.55	$0.57	$0.58	$0.59	$0.60	$0.61	$0.62	$0.64	$0.65	$0.66
$0.96	$0.98	$1.00	$1.02	$1.04	$1.06	$1.08	$1.11	$1.13	$1.15	$1.17	$1.20	$1.22	$1.25	$1.27	$1.30	$1.32	$1.35
$0.08	$0.08	$0.08	$0.08	$0.08	$0.08	$0.09	$0.09	$0.09	$0.09	$0.09	$0.09	$0.10	$0.10	$0.10	$0.10	$0.10	$0.11
$0.07	$0.07	$0.07	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08	$0.09	$0.09	$0.09	$0.09	$0.09	$0.09	$0.10	$0.10	$0.10
$0.94	$0.96	$0.98	$1.00	$1.02	$1.04	$1.06	$1.08	$1.11	$1.13	$1.15	$1.17	$1.20	$1.22	$1.25	$1.27	$1.30	$1.32
$0.07	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08	$0.09	$0.09	$0.09	$0.09	$0.09	$0.09	$0.10	$0.10	$0.10	$0.10	$0.10
$0.70	$0.72	$0.73	$0.75	$0.76	$0.78	$0.79	$0.81	$0.82	$0.84	$0.86	$0.87	$0.89	$0.91	$0.93	$0.95	$0.96	$0.98
$0.09	$0.09	$0.10	$0.10	$0.10	$0.10	$0.10	$0.11	$0.11	$0.11	$0.11	$0.12	$0.12	$0.12	$0.12	$0.12	$0.13	$0.13
$0.05	$0.05	$0.05	$0.05	$0.05	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.07	$0.07	$0.07	$0.07	$0.07
$7.18	$7.32	$7.47	$7.62	$7.77	$7.92	$8.08	$8.24	$8.41	$8.58	$8.75	$8.92	$9.10	$9.28	$9.47	$9.66	$9.85	$10.05
$1.13	$1.16	$1.18	$1.20	$1.23	$1.25	$1.28	$1.30	$1.33	$1.36	$1.38	$1.41	$1.44	$1.47	$1.50	$1.53	$1.56	$1.59
$6.04	$6.16	$6.29	$6.41	$6.54	$6.67	$6.80	$6.94	$7.08	$7.22	$7.37	$7.51	$7.66	$7.82	$7.97	$8.13	$8.29	$8.46

INCREMENTAL TAXES WITH FULL BUILD OUT OF ALL THREE PHASES

DIF Bond Debt Service Analysis - $56.95 Million Bond plus $7.135 Million Capitalized Interest

Year	Bldg	Year Calender	Total (30 yrs)		1 2006	2 2007	3 2008	4 2009	5 2010	6 2011	7 2012	8 2013	9 2014	10 2015	11 2016	12 2017	13 2018	14 2019
		Fiscal		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
2005	A	Office	$ 32.21		$ 0.76	$ 0.78	$ 0.79	$ 0.81	$ 0.82	$ 0.84	$ 0.86	$ 0.87	$ 0.89	$ 0.91	$ 0.93	$ 0.95	$ 0.96	$ 0.98
2005		Retail	$ 1.64		$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05
2005	B	Office	$ 22.10		$ 0.52	$ 0.53	$ 0.54	$ 0.55	$ 0.56	$ 0.58	$ 0.59	$ 0.60	$ 0.61	$ 0.62	$ 0.64	$ 0.65	$ 0.66	$ 0.67
2005		Retail	$ 0.94		$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03
2005	C1	Retail	$ 9.65		$ 0.23	$ 0.23	$ 0.24	$ 0.24	$ 0.25	$ 0.25	$ 0.26	$ 0.26	$ 0.27	$ 0.27	$ 0.28	$ 0.28	$ 0.29	$ 0.29
2007	D	Retail	$ 11.70			$ 0.29	$ 0.29	$ 0.30	$ 0.31	$ 0.31	$ 0.32	$ 0.32	$ 0.33	$ 0.34	$ 0.34	$ 0.35	$ 0.36	$ 0.37
2007		Entertainment	$ 2.42			$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.08
2010	E	Commercial	$ 9.05						$ 0.26	$ 0.26	$ 0.27	$ 0.27	$ 0.28	$ 0.28	$ 0.29	$ 0.29	$ 0.30	$ 0.31
2008	F	Retail	$ 2.71				$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.09
2008		Housing	$ 14.76				$ 0.38	$ 0.39	$ 0.40	$ 0.40	$ 0.41	$ 0.42	$ 0.43	$ 0.44	$ 0.45	$ 0.45	$ 0.46	$ 0.47
2008	H or J	Commercial	$ 30.03				$ 0.77	$ 0.79	$ 0.81	$ 0.82	$ 0.84	$ 0.85	$ 0.87	$ 0.89	$ 0.91	$ 0.93	$ 0.94	$ 0.96
2008		Retail	$ 2.36				$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.08
2008	I	Commercial/Retail	$ 2.24				$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07
	PHASE I	Personal Property			$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05
		Residential	$15		$ -	$ -	$ 0.38	$ 0.39	$ 0.40	$ 0.40	$ 0.41	$ 0.42	$ 0.43	$ 0.44	$ 0.45	$ 0.45	$ 0.46	$ 0.47
		Non-Residential	$127		$ 1.57	$ 1.95	$ 2.95	$ 3.01	$ 3.33	$ 3.39	$ 3.46	$ 3.53	$ 3.60	$ 3.67	$ 3.75	$ 3.82	$ 3.90	$ 3.97
		Gross Tax Revenue	$143		$ 1.61	$ 1.99	$ 3.37	$ 3.44	$ 3.76	$ 3.84	$ 3.92	$ 3.99	$ 4.07	$ 4.16	$ 4.24	$ 4.32	$ 4.41	$ 4.50
		Less - TIF Increment on Project	($0)		$ (0.02)	$ (0.02)	$ (0.03)	$ (0.03)	$ (0.03)	$ (0.02)	$ (0.01)	$ (0.00)	$ (0.00)					
		Less - EXIST. Tax	($37)		$ (0.88)	$ (0.89)	$ (0.91)	$ (0.93)	$ (0.95)	$ (0.97)	$ (0.99)	$ (1.01)	$ (1.03)	$ (1.05)	$ (1.07)	$ (1.09)	$ (1.11)	$ (1.13)
		Net Tax Revenue	$106		$ 0.72	$ 1.08	$ 2.43	$ 2.48	$ 2.78	$ 2.86	$ 2.92	$ 2.98	$ 3.04	$ 3.11	$ 3.17	$ 3.23	$ 3.30	$ 3.36
		Underground Garage Revenue	$37		$ 0.14	$ 0.69	$ 0.80	$ 0.96	$ 0.98	$ 1.00	$ 1.02	$ 1.04	$ 1.06	$ 1.08	$ 1.10	$ 1.12	$ 1.14	$ 1.17
Interest 5.5%	Bond $4.00	Bond Payment	($131)	($0.28)	$ (0.28)	$ (0.28)	$ (2.55)	$ (2.96)	$ (3.90)	$ (3.52)	$ (4.05)	$ (4.69)	$ (4.83)	$ (4.83)	$ (4.83)	$ (4.82)	$ (4.82)	$ (4.82)
		Revenue After Bond	$12.28	($0.28)	$ 0.57	$ 1.49	$ 0.68	$ 0.48	$ (0.14)	$ 0.33	$ (0.12)	$ (0.67)	$ (0.73)	$ (0.64)	$ (0.56)	$ (0.47)	$ (0.38)	$ (0.29)
		Building Permit Fees	$1.00	$0.50	$ 0.50	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		Revenue After Permit Fees	$ 13.28	$ 0.22	$ 1.07	$ 1.49	$ 0.68	$ 0.48	$ (0.14)	$ 0.33	$ (0.12)	$ (0.67)	$ (0.73)	$ (0.64)	$ (0.56)	$ (0.47)	$ (0.38)	$ (0.29)

PROJECTED TAX INCREMENTS IN EACH YEAR OF THE PROGRAM

	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
	$ 1.00	$ 1.02	$ 1.04	$ 1.06	$ 1.09	$ 1.11	$ 1.13	$ 1.15	$ 1.18	$ 1.20	$ 1.22	$ 1.25	$ 1.27	$ 1.30	$ 1.32	$ 1.35	$ 1.38
	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.07	$ 0.07	$ 0.07	$ 0.07
	$ 0.69	$ 0.70	$ 0.72	$ 0.73	$ 0.74	$ 0.76	$ 0.78	$ 0.79	$ 0.81	$ 0.82	$ 0.84	$ 0.86	$ 0.87	$ 0.89	$ 0.91	$ 0.93	$ 0.94
	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04
	$ 0.30	$ 0.31	$ 0.31	$ 0.32	$ 0.33	$ 0.33	$ 0.34	$ 0.35	$ 0.35	$ 0.36	$ 0.37	$ 0.37	$ 0.38	$ 0.39	$ 0.40	$ 0.40	$ 0.41
	$ 0.37	$ 0.38	$ 0.39	$ 0.40	$ 0.40	$ 0.41	$ 0.42	$ 0.43	$ 0.44	$ 0.45	$ 0.45	$ 0.46	$ 0.47	$ 0.48	$ 0.49	$ 0.50	$ 0.51
	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.10	$ 0.10	$ 0.10	$ 0.10	$ 0.10	$ 0.11
	$ 0.31	$ 0.32	$ 0.32	$ 0.33	$ 0.34	$ 0.34	$ 0.35	$ 0.36	$ 0.37	$ 0.37	$ 0.38	$ 0.39	$ 0.40	$ 0.40	$ 0.41	$ 0.42	$ 0.43
	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.10	$ 0.10	$ 0.10	$ 0.10	$ 0.10	$ 0.11	$ 0.11	$ 0.11	$ 0.11	$ 0.11	$ 0.12	$ 0.12	$ 0.12
	$ 0.48	$ 0.49	$ 0.50	$ 0.51	$ 0.52	$ 0.53	$ 0.54	$ 0.55	$ 0.57	$ 0.58	$ 0.59	$ 0.60	$ 0.61	$ 0.62	$ 0.64	$ 0.65	$ 0.66
	$ 0.98	$ 1.00	$ 1.02	$ 1.04	$ 1.06	$ 1.08	$ 1.11	$ 1.13	$ 1.15	$ 1.17	$ 1.20	$ 1.22	$ 1.25	$ 1.27	$ 1.30	$ 1.32	$ 1.35
	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.10	$ 0.10	$ 0.10	$ 0.10	$ 0.10	$ 0.11
	$ 0.07	$ 0.07	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.10	$ 0.10	$ 0.10
	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07
	$ 0.48	$ 0.49	$ 0.50	$ 0.51	$ 0.52	$ 0.53	$ 0.54	$ 0.55	$ 0.57	$ 0.58	$ 0.59	$ 0.60	$ 0.61	$ 0.62	$ 0.64	$ 0.65	$ 0.66
	$ 4.05	$ 4.14	$ 4.22	$ 4.30	$ 4.39	$ 4.48	$ 4.57	$ 4.66	$ 4.75	$ 4.85	$ 4.94	$ 5.04	$ 5.14	$ 5.24	$ 5.35	$ 5.46	$ 5.57
	$ 4.59	$ 4.68	$ 4.77	$ 4.87	$ 4.97	$ 5.07	$ 5.17	$ 5.27	$ 5.38	$ 5.48	$ 5.59	$ 5.71	$ 5.82	$ 5.94	$ 6.05	$ 6.18	$ 6.30
	$ (1.16)	$ (1.18)	$ (1.20)	$ (1.23)	$ (1.25)	$ (1.28)	$ (1.30)	$ (1.33)	$ (1.36)	$ (1.38)	$ (1.41)	$ (1.44)	$ (1.47)	$ (1.50)	$ (1.53)	$ (1.56)	$ (1.59)
	$ 3.43	$ 3.50	$ 3.57	$ 3.64	$ 3.71	$ 3.79	$ 3.86	$ 3.94	$ 4.02	$ 4.10	$ 4.18	$ 4.27	$ 4.35	$ 4.44	$ 4.53	$ 4.62	$ 4.71
	$ 1.19	$ 1.21	$ 1.24	$ 1.26	$ 1.29	$ 1.31	$ 1.34	$ 1.37	$ 1.40	$ 1.42	$ 1.45	$ 1.48	$ 1.51	$ 1.54	$ 1.57	$ 1.60	$ 1.63
	$ (4.82)	$ (4.78)	$ (4.78)	$ (4.82)	$ (4.81)	$ (4.81)	$ (4.80)	$ (4.80)	$ (4.80)	$ (4.79)	$ (4.79)	$ (4.78)	$ (4.78)	$ (4.77)	$ (4.76)	$ (4.75)	$ (2.85)
	$ (0.20)	$ (0.07)	$ 0.03	$ 0.09	$ 0.19	$ 0.29	$ 0.40	$ 0.51	$ 0.62	$ 0.74	$ 0.85	$ 0.96	$ 1.09	$ 1.21	$ 1.33	$ 1.47	$ 3.50
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	$ (0.20)	$ (0.07)	$ 0.03	$ 0.09	$ 0.19	$ 0.29	$ 0.40	$ 0.51	$ 0.62	$ 0.74	$ 0.85	$ 0.96	$ 1.09	$ 1.21	$ 1.33	$ 1.47	$ 3.50

PROJECTED TAX INCREMENTS IN EACH YEAR OF THE PROGRAM

DIF Analysis Assumptions for Phase 1 - CitySquare

Key Assumptions	Full Value Per Building SF	Assessed Value
Health Club	75	$75
Theater	90	$90
Land Value	90	$0
Existing Comm	$100	$100
New Comm/Retail/Office	$110	$110
New Res (Mid-Rise)	$175	$175
EQUALIZATION RATIO	100%	
Commercial	$ 27.90	
Residential	$ 13.16	
Annual Change Rates		
Non-Residential	2.0%	
Residential	2.0%	
Net Revenue	$0	
Garage 2007	15%	
Garage 2008	50%	
Garage 2009	100%	
Garage 2010 to 2036	2% per year	

DIF Analysis Assumptions for Phase 1 - CitySquare - Garage Revenues

BUILDING	TRANSIENTS* WEEKDAY	TRANSIENTS* WEEKEND	EMPLOYEES (HOURLY)** WEEKDAY	EMPLOYEES (HOURLY)** WEEKEND	EMPLOYEES (MONTHLY) RESERVED	RESIDENTS (MONTHLY) UNLIMITED	RESIDENTS (MONTHLY) DAY ONLY	RESIDENTS (MONTHLY) RESERVED	RESIDENTS (MONTHLY) UNLIMITED	RESIDENTS (MONTHLY) PM ONLY	TOTAL REVENUES	Revenue After Utilization Factor - 70%
A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
B	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
C	$ 105,280	$ 60,884	$ 39,312	$ 22,304	$ -	$ -	$ -	$ -	$ -	$ -	$ 227,780	$ 159,432
D	$ 208,320	$ 209,040	$ 74,400	$ 55,328	$ -	$ -	$ -	$ -	$ -	$ -	$ 547,088	$ 382,962
E	$ 260,190	$ 187,200	$ 102,816	$ 48,592	$ -	$ -	$ -	$ -	$ -	$ -	$ 598,798	$ 417,759
F	$ 119,070	$ 101,790	$ 156,320	$ 112,320	$ -	$ -	$ -	$ 14,963	$ 38,903	$ 153,900	$ 707,266	$ 495,086
H	$ 816,984	$ 64,568	$ 21,168	$ 11,648	$ 39,900	$ 239,400	$ 369,360	$ -	$ -	$ -	$ 1,563,148	$ 1,094,204
I	$ 112,455	$ 98,174	$ 163,296	$ 108,108	$ -	$ -	$ -	$ -	$ -	$ -	$ 480,033	$ 336,023
TOTAL	$ 1,622,299	$ 719,756	$ 567,312	$ 358,300	$ 39,900	$ 239,400	$ 369,360	$ 14,963	$ 38,903	$ 153,900	$ 4,122,092	$ 2,885,464
REV/SPACE:	$ 648.27	$ 373.45	$ 295.84	$ 186.88	$ 20.81	$ 124.88	$ 192.88	$ 7.81	$ 20.29	$ 80.28	$ 2,150.28	$ 1,505

* Guests, visitors, patrons, customers, and patients

** Employees of retail stores, groceries, restaurants, colleges, theaters, and cinemas

Net Revenue Per Space	$1,505
Operating Expenses Per Space	$625
Gross Revenue Per Space	$881

Annual Revenue in New Underground Garage $881 Per Space
$902,554 Total

Spaces New Underground Garage 1025

DIF Analysis Assumptions for City Square including Garage Revenues

Section 4, Item 5l(3)

In order to determine how the tax levy generated by a specific property will increase (or decrease) over time, one has to look at the historical data *for similar properties* over an extended period of time occurring in the recent past and from that data draw inferences for future projections.

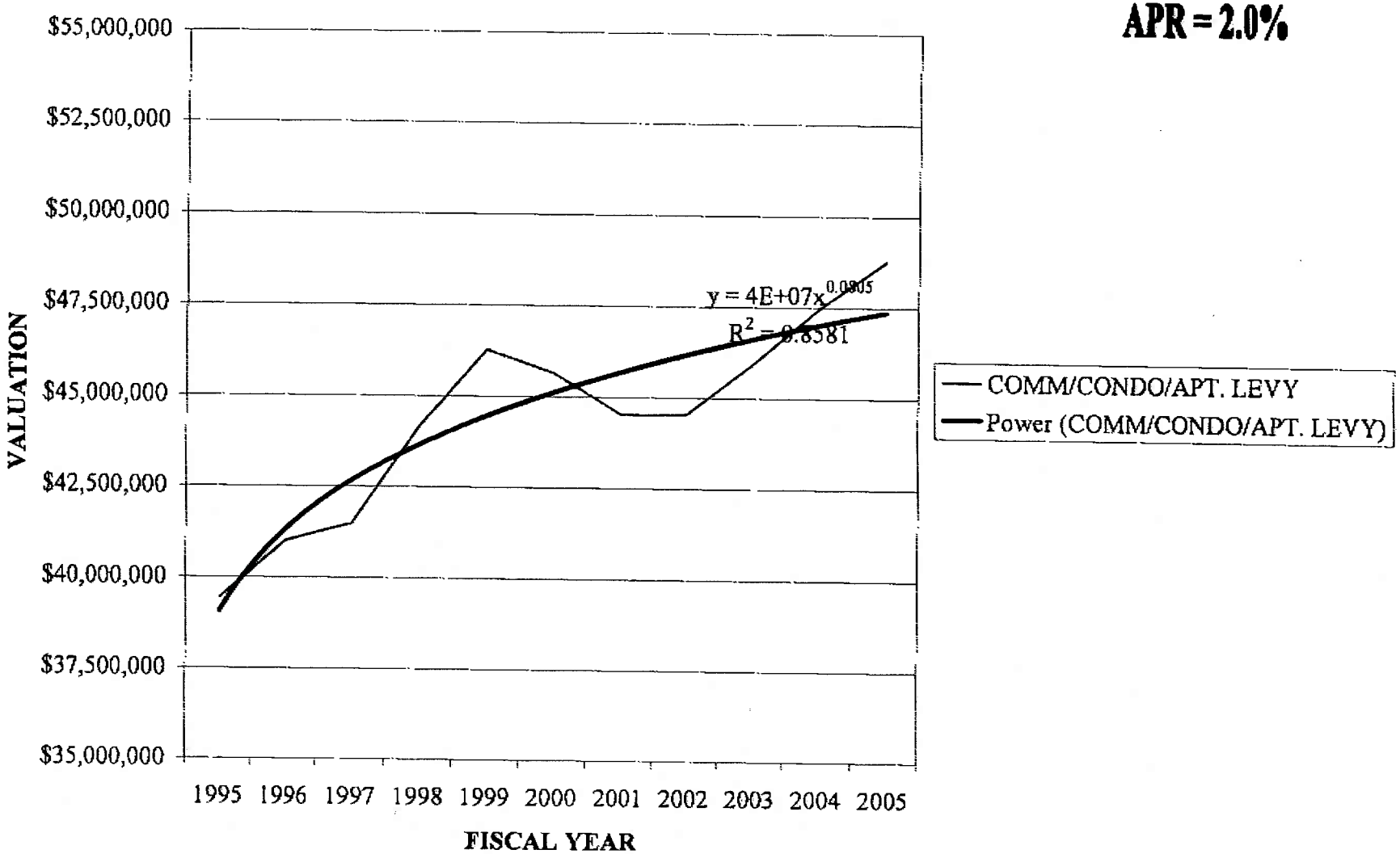
Therefore to evaluate the mixed-use CitySquare project, tax levies generated by commercial properties, condominiums and apartment buildings had to be analyzed. The period from fiscal 1995 to 2005 was a finite ten-year period having fixed annual amounts of tax levy for eleven separate periods. The CitySquare development is planned to have approximately fifty-three percent (53%) of its building area occupied by commercial properties and forty-seven percent (47%) will be occupied by residential properties. The plotting of commercial levies and residential levies separately and trending each property type, either through linear or non-linear regression analyses, failed to produce a consistent trend line meeting acceptable statistical standards, namely a high coefficient of determination, (R^2). The "goodness of fit" is best measured by R^2. The values for R^2 will range from –1.0 to 1.0, with 1.0 representing a perfect fit and 0.0 representing no correlation.

Combining the tax levies of commercial properties, condominium units and apartment buildings yielded a more reliable statistical model utilizing the power curve non-linear regression model. Our R^2 was equal to 0.8581, which falls within acceptable statistical standards for the coefficient of determination. The attached chart shows two lines. The linear line shows the actual amount of the combined levies and is labeled "COMM/CONDO/APT. LEVY." The second line is the "power curve" trend line, which has transformed the original data points through regression analysis. The start point and the end point of this trend line reflect the actual appreciation of the levy through the eleven-year period. Using these start and end points, it is possible to derive a compound interest rate that will replicate the levy growth. The annual percentage rate (APR) generated by the model was 2.06%, which we have rounded down to 2.0% for a reasonable estimate of tax levy growth.

Section 4. Item 5l(4) A projection of the tax revenues to be derived in the absence of the Program follows.

TAX LEVY GROWTH

APR = 2.0%



YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
Assessed Valuation																
$30,350,500 Existing Comm.	$0.84	$0.85	$0.87	$0.89	$0.91	$0.92	$0.94	$0.96	$0.98	$1.00	$1.02	$1.04	$1.06	$1.08	$1.11	$1.13
$1,449,900 Pers. Property	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05
TOTAL TAX	$0.88	$0.89	$0.91	$0.93	$0.95	$0.97	$0.99	$1.01	$1.03	$1.05	$1.07	$1.09	$1.11	$1.13	$1.16	$1.18

YEAR	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	FY 2033	FY 2034	FY 2035	FY 2036	FY 2037
Assessed Valuation															
$30,350,500 Existing Comm.	$1.15	$1.17	$1.20	$1.22	$1.24	$1.27	$1.30	$1.32	$1.35	$1.37	$1.40	$1.43	$1.46	$1.49	$1.52
$1,449,900 Pers. Property	$0.05	$0.05	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.07	$0.07	$0.07	$0.07	$0.07
TOTAL TAX	$1.20	$1.23	$1.25	$1.28	$1.30	$1.33	$1.36	$1.38	$1.41	$1.44	$1.47	$1.50	$1.53	$1.56	$1.59

ANTICIPATED TAX REVENUE IN ABSENCE OF PROGRAM

Section 4, Item 5l(5)

The Public Project Elements to be funded by the tax increments are:

A. The design and construction of four new public streets and associated public spaces;

B. The design and construction of an underground two-level parking garage containing no fewer than 1,025 spaces;

C. The demolition of existing structures necessary for the construction of the rights of way of the proposed public streets and the underground public parking garage;

D. The acquisition by the City of land and leasehold interests

E. The relocation of any remaining occupants.

F. The modification of Worcester Center Boulevard;

G. The services of a construction management firm; and

H. The funding of contingencies.

One hundred percent of the project will be funded through the tax increments.

Section 4, 5l(7)

If there are any excess incremental revenues (generated by Phase I, which represents sixty percent of the project) that accrue, the intention is to have those funds remain within the Project fund through the life of the DIF Project to fund any necessary Project expenses not originally contemplated. However, the funds generated by the remaining forty percent of the project will be appropriated into the General Fund to be used for any appropriate municipal service.

Section 4, Item 5m

The development program includes the following real estate transfers between the city and the sole property owner in the proposed DIF District:

- The acquisition by the city by eminent domain of the easements for street purposes for the four new public streets to be constructed within the DIF District;
- The acquisition by the city by lease of the space necessary for the construction of the public underground parking garage, said lease to be subject to the rights of the

property owner to construct and maintain the foundations and other building systems for project buildings to be constructed above the underground public parking garage;

- The acquisition by the city of easements providing access to the public underground parking garage in two locations;
- The acquisition by the city by deed or easement of the space between the limits of the public right-of-ways and the building lines at various places within the DIF District to enable the city to construct and maintain a consistent streetscape program;
- The abandonment by the City of its interest in a sliver of land adjacent to Worcester Center Boulevard underneath the location of "Ramp A", an access way connecting the "Red Garage" to Worcester Center Boulevard; and,
- Berkeley shall convey at no cost to the City a certain parcel of real property located outside of the DIF District at 36 Washington Square in Worcester, Massachusetts, and shown on a plan recorded in the Worcester District Registry of Deeds in Plan Book 617 as Plan 124 as containing 12,725 sf of land (the "Vacuum Shop Parcel").
- The City shall convey to Berkeley the area at the corner of the proposed intersection of Front Street and a newly created street, so as to allow Berkeley to own, maintain, and control such area as public space.
- No officer of employee of the city of Worcester has an interest in the subject property or the DIF District.

The parties recognize that these transactions are necessary for the success of the project, that they have value above and beyond their ordinary real estate value and, therefore, are not "arms-length" real property transactions for which an appraised valuation may be determined.

M. The planned use of the property to be acquired by the City of Worcester is for public ways. No residential relocation will be required. There are no existing residences on the property. Relocation of commercial tenants is a part of the DIF program. Relocation negotiations are underway with the four remaining tenants for temporary relocation during construction. All tenants have been notified of the pending DIF and redevelopment of the Worcester Common Outlet Mall into CitySquare.

The eminent domain plan found in Appendix A details the proposed acquisition of public ways in the CitySquare DIF District.

N. All property to be acquired is for a public purpose – streets, sidewalks, and parking. Property will be acquired by a negotiated agreement.

O. A total of 540 to 675 new housing units will be built. Housing plans for CitySquare currently include residential condominiums; a senior housing development (200 to 250 unites); and condominium units (200 to 250 units). The City's approved EO 418 housing plan calls for the creation of market rate housing in downtown Worcester. The Worcester Action Agenda prepared by Sasaki for the City of Worcester, which included extensive public participation, recommends construction of market rate housing downtown. The City also conducted an extensive housing study in 2003, and found a shortage of market-rate and luxury housing units.

P. Berkeley Investments has been in contact with the City of Worcester's Work Force Central, and intends to refer all prospective tenants to the City for assistance and help with work force training. CitySquare will include Quinsigamond Community College which provides work force training.

Q. The implementation schedule follows:

Phasing

Phasing of the development will offer flexibility in implementing the Master Plan. The preliminary phasing plan envisions the following development sequence after closing. Please note that some phases might overlap one another. A table of phased development is included.

Development Phasing and Massing Assumptions
Berkeley currently expects to build the project in the following 3 phases, subject to market conditions.

Phase I: In addition to ongoing internal upgrades to existing office Buildings A and B (Existing Office) (486,000 GSF), the following development work is expected in Phase I.

Phase 1:

Bldg / Item	Use	Gross SF	Construction Schedule
C (Current)	Repositioned Retail, re-tenanting	75,000	Underway
Enabling	Demolition and site preparation		Commence 2005
Garage	New underground public parking garage (construction forms support for new roads and buildings; green roof)	480,000	Commence 2006 Delivery 2008
Site/Roads	New city streets, sidewalks and green roof on garage		Commence 2005 Delivery 2008
D	Retrofitted, re-skinned retail/entertainment, repositioned with new tenants	119,000	Commence Exterior Wall 2005 Interior Fit-out 2008
F	Housing, with accessory retail. New construction over new underground garage	188,000	Commence 2006 Delivery 2008
H	Commercial with accessory retail, new construction over existing basement and new parking	275,000	Commence 2006 Delivery 2008
I	Retrofitted, re-skinned retail/restaurants/commercial; repositioned with new tenants	≤19,000	Commence TBD Delivery 2008
E	Entertainment and Retail, Commercial	84,300	Commence TBD Delivery 2010

Subject to negotiation with the prospective office tenant, Phase 1 might also include the following:

J	Office/ Accessory Retail/Housing/Commercial	275,000	Commence TBD Delivery 2009

Phase 2:

J	Housing/ Accessory Retail/Commercial (if Phase 1 Bldg J is not built)	275,000	Commence 2008 Delivery 2010
K	Housing/Commercial/ Accessory Retail (no big box discount)	250,000	Commence 2008 Delivery 2010
L	Retail/Housing/Hotel	≥25,000	Commence 2008 Delivery 2010

Phase 3:

C (Future)	Housing/ Accessory Retail/Hotel/Commercial	320,000	Commence 2010 Delivery 2012

R. There are no city officials or city employees related to Worcester Renaissance, LLC, the private sector property owner of CitySquare, or to Berkeley Investments, the development partner.

The development team who may have an interest in the EACC's decision includes:

Berkeley has assembled a best-in-class development team, which has the project management experience, financial capability and development know-how to fully realize Berkeley's vision.

- **Berkeley is the developer** for CitySquare. Berkeley is a Boston-based full-service real estate investment, development and management company with a diversified portfolio of 4.0 million SF under ownership and management. (www.berkeleyinvestments.com)

  Berkeley recently completed the development of a new 82,000 SF drug distribution facility for the Veterans Administration in Chelmsford, MA, and is currently developing a 50,000 SF doctors' office building at Jordan Hospital in Plymouth, MA. Berkeley has recently acquired 1.0 million square feet of the Boston Wharf portfolio, and has launched the master planning of the site for future development and re-positioning. The master plan will be carried out through the Boston Article 80 large project permitting process. Over the last five years, Berkeley has been actively involved in the design, permitting, financing, construction and marketing of a number of large mixed-use developments throughout the New England, Washington D.C. and Texas markets.

- Berkeley's **financial joint venture capital partner is Starwood Capital**, a financial partner with whom Berkeley has joint ventured on numerous projects nationally. Starwood Capital is a privately held investment management firm located in Greenwich, CT. Founded in 1991, Starwood is one of the nations most active and successful real estate investors in the US. Investments are made through real estate funds managed in its highly diversified fund portfolio includes land development, multi-family, hotel, office, retail, mixed use and industrial properties and mezzanine debt and represents over $7 billion in real estate assets in over 200 transactions. (www.starwoodcapital.com)

- The Team's principal **architect and urban design consultant** is **Arrowstreet, Inc.** of Somerville, MA. Arrowstreet is an award-winning multi-disciplinary firm with a particular focus on the design and master planning of complex downtown public-private projects. Its current projects include the West Avenue Redevelopment in Norwalk, CT, Wisconsin Place in Friendship Heights, Maryland, the recently approved redevelopment of Pier 4 on the Boston Waterfront and the South Boston Waterfront Housing (Parcels J and G). Arrowstreet brings a sophisticated understanding of the Worcester Center architectural and structural components as a result of its role as the architect of record for the earlier conversion of the regional shopping center into the fashion outlet mall. (www.arrowstreet.com)

- The Team's **pre-construction manager is Turner Construction Company.** Turner enjoys an excellent reputation in the City of Worcester for having been actively involved

in several City financed projects, and has substantial in-depth experience in complex multi-phased urban mixed use projects. (www.turnerconstruction.com)

- The Team's **public financing consultant** is **McCabe Enterprises**. McCabe offers strategic solutions in community planning and economic development. McCabe was closely involved in the drafting of the DIF legislation and would provide consulting input into infrastructure financing efforts and grant management.

- **RKG Associates, Inc**. of Durham, NH, has provided consulting services on the project, including analysis of the benefits of the project to the Commonwealth. (www.rkg1.com)

- The Team legal counsel consists of **Bingham McCutcheon** (Boston) and **Bowditch & Dewey** (Worcester and Boston).

4.6 Execution

Execution of the Worcester CitySquare DIF program – a complex, multi-level, multi-phase development program – requires special legislation to enable the developer to undertake pre-development activities to construct public infrastructure using labor compensated at prevailing wages.

Section 5: IRD Description

Does the Program include an IRD and IRDDP?

☒ Yes – Continue with this Section

☐ No (Go to Section 6, below)

1. Description (To be provided if the IRD is not coterminous with the District):

☐ Enclosed – Not Coterminous ☒ Coterminous

*If the IRD is **not** coterminous with the District, provide:*

a) A map showing the IRD boundaries and its relative size to the District and Municipality

b) Note any significant IRD features

c) Describe the IRD. The IRRDP description should be sufficiently detailed to enable the reader to understand the IRD's growth potential. It must include major taxpayers and employer information.

2. Municipal Order (IRD and IRDDP)

☒ Enclosed

☐ See Section 4, subsection 4

A certified copy of the Municipal order identifying and approving the proposed IRD and IRDDP.

3. Project Description (IRD and IRDDP)

☒ Enclosed

A thorough and complete description of the project.

4. Zoning (IRD and IRDDP)

☒ Enclosed ☒ N/A

Disclose any approved, pending or proposed zoning changes.

5. Property Acquisition (IRD and IRDDP)

☒ Enclosed ☐ N/A

Information regarding municipal acquisition of property including via eminent domain proceedings and/or relocation plans for persons, businesses or organizations.

6. Financial Plan (IRD and IRDDP)

☒ Enclosed

A copy of the financial plan associated with the Application. Such plan should demonstrate that, under various scenarios, there is a rea sonable probability that the Applicant will achieve its goals in creating the IRD and IRDDP. Such plan should include at least the following:

a) Estimates of the captured assessed value of the IRD, including the original, certified assessed value and projected assessed values after 1 year, 5 years, 10 years, 15 years, 20 years, 25 years, and 30 years, as applicable. Provide underlying assumptions

b) The portion of the captured assessed value to be applied to the IRDDP and projected tax increments in each year of the IRDDP. Provide underlying assumptions

c) Describe the method of calculating tax increments together with any provisions for adjustment to the method of calculation

d) Provide a projection of the tax revenues to be derived from the IRD in the absence of the Program

e) List the specific projects in the IRD that will be funded by the tax increments; the timing and amount of such funding through tax increments; and what percentage portion of each project will be funded through tax increments

f) Name the board or officer of the city or town responsible for calculating the tax increment

g) *Describe the bond issuance(s) or other debt obligation(s) contemplated by the Applicant in connection with the IRDDP, including the terms and conditions of such issuances or obligations, and whether the bonds issued shall be general, revenue or special obligation bonds. If the Municipality intends to issue revenue bonds in support of the IRDDP, include a letter from the Municipality's financial advisor or underwriter stating that the Municipality's financial plan is sound and viable*

h) *Allocation of excess incremental revenue(s), if any, which accrues in any year.*

7. Impact Statement (IRD and IRDDP)

☒Enclosed

A statement of the estimated impact of tax increment financing on all taxing jurisdictions in which the District is located.

Section 5: IRD Description

5.1 DESCRIPTION

The Worcester CitySquare Investment Revenue District is coterminous with the District. See previous discussion of the District in Section 3, District Information.

5.2 MUNICIPAL ORDER

To be added by the City of Worcester upon Council action.

5.3 PROJECT DESCRIPTION

The specific public projects to be funded by the DIF program through tax increments include the construction of the streets, sidewalks, streetscape, replacement parking, and all enabling work required to permit the demolition of the mall and construction of roadways and sidewalks over the existing truck dock, and the construction of the new underground garage (necessitated by the demolition of the existing garage to permit the extension of Front Street to Washington Square), and all enabling work. Enabling work includes the following:

1. All utility terminations and cut and cap preparations to permit the relocation of utilities.
2. Asbestos abatement in the mall
3. Temporary and new partitions along the new underground garage demising line.
4. Structural reinforcement for roads, over and along the truck dock and utility rooms and corridors.
5. Waterproofing of the areas (currently watertight within the mall), over and along the truck dock and utility rooms and corridors, below the location of the new roads and sidewalks.
6. Demolition of the mall and disposal of materials.
7. New shear walls in the remaining East Garage (required due to partial garage demolition for Front Street extension), and eliminating existing expansion joints in the remaining garage for structural stability.
8. New permanent stair and elevator at the end of the East Garage, otherwise demolition of the Red Garage results in no vertical circulation options.

5.4 ZONING

The Worcester CitySquare project will require site plan approval from the Worcester Planning Board. There are no other pending zoning issues regarding Worcester CitySquare.

5.5 PROPERTY ACQUISITION

The planned use of the property to be acquired by the City of Worcester is for public ways. No residential relocation will be required. There are no existing residences on the property. Relocation of commercial tenants is a part of the DIF program. Relocation negotiations are underway with the four remaining tenants for temporary relocation during construction. All tenants have been notified of the pending DIF and redevelopment of the Worcester Common Outlet Mall into CitySquare.

The development program includes the following real estate transfers between the city and the sole property owner in the proposed DIF District:

- The acquisition by the city by eminent domain of the easements for street purposes for the four new public streets to be constructed within the DIF District;
- The acquisition by the city by lease of the space necessary for the construction of the public underground parking garage, said lease to be subject to the rights of the property owner to construct and maintain the foundations and other building systems for project buildings to be constructed above the underground public parking garage;
- The acquisition by the city of easements providing access to the public underground parking garage in two locations;
- The acquisition by the city by deed of easement of the space between the limits of the public right-of-ways and the building lines at various places within the DIF District to enable the city to construct and maintain a consistent streetscape program;
- The abandonment by the City of its interest in a sliver of land adjacent to Worcester Center Boulevard underneath the location of "Ramp A", an access way connecting the "Red Garage" to Worcester Center Boulevard; and,
- Berkeley shall convey at no cost to the City a certain parcel of real property located outside of the DIF District at 36 Washington Square in Worcester, Massachusetts, and shown on a plan recorded in the Worcester District Registry of Deeds in Plan Book 617 as Plan 124 as containing 12,725 sf of land (the "Vacuum Shop Parcel").
- The City shall convey to Berkeley the area at the corner of the proposed intersection of Front Street and a newly created street, so as to allow Berkeley to won, maintain, and control such area as public space.
- No officer or employee of the city of Worcester has an interest in the subject property or the DIF District.

The parties recognize that these transactions are necessary for the success of the project, that they have value above and beyond their ordinary real estate value and, therefore, are not "arms-length" real property transactions for which an appraised valuation may be determined.

The eminent domain plan found in Appendix A details the proposed acquisition of public ways in the CitySquare DIF District.

5.6 FINANCIAL PLAN FOR THE IRD.

Phasing of Private Investment
The private development construction phasing to generate the tax increment follows:

Development Phasing and Massing Assumptions
Berkeley currently expects to build the project in the following 3 phases, subject to market conditions.

Phase 1:

Bldg / Item	Use	Gross SF	Construction Schedule
C (Current)	Repositioned Retail, re-tenanting	75,000	Underway
Enabling	Demolition and site preparation		Commence 2005
Garage	New underground public parking garage (construction forms support for new roads and buildings; green roof)	480,000	Commence 2006 Delivery 2008
Site/Roads	New city streets, sidewalks and green roof on garage		Commence 2005 Delivery 2008
D	Retrofitted, re-skinned retail/entertainment, repositioned with new tenants	119,000	Commence Exterior Wall 2005 Interior Fit-out 2008
F	Housing, with accessory retail. New construction over new underground garage	188,000	Commence 2006 Delivery 2008
H	Commercial with accessory retail, new construction over existing basement and new parking	275,000	Commence 2006 Delivery 2008
I	Retrofitted, re-skinned retail/restaurants/commercial; repositioned with new tenants	≤19,000	Commence TBD Delivery 2008
E	Entertainment and Retail, Commercial	84,300	Commence TBD Delivery 2010

Subject to negotiation with the prospective office tenant, Phase 1 might also include the following:

J	Office/ Accessory Retail/Housing/Commercial	275,000	Commence TBD Delivery 2009

Phase 2:

J	Housing/ Accessory Retail/Commercial (if Phase 1 Bldg J is not built)	275,000	Commence 2008 Delivery 2010
K	Housing/Commercial/ Accessory Retail (no big box discount)	250,000	Commence 2008 Delivery 2010
L	Retail/Housing/Hotel	≥25,000	Commence 2008 Delivery 2010

Phase 3:

C (Future)	Housing/ Accessory Retail/Hotel/Commercial	320,000	Commence 2010 Delivery 2012

Financing Assumptions

Minimum Private Investment: $470.0 million

Total Public Funds Requested: $ 92.855 million

DIF: $ 64.085 million
MA: $ 25.000 million
Other: $ 3.770 million

Assumed Assessed Valuations for Base Taxes:

Key Assumptions	**Per Building SF**	**Value**
Health Club		$75
Theater		$90
Existing Comm.		$100
New Comm. Retail		$110
New Res. (Mid-Rise)		$175
TAX RATES	FY 06	
Commercial	$27.60	
Residential	$13.18	

Existing tax base $876,587 (increment above this amount applied to DIF)
Taxes escalated at 2% per annum
Tax Base Revenue also escalated at 2% per annum

Assumed Garage Revenues:

Base net revenue shown on attached chart
Garage revenues ramped up as follows:

2007 15%
2008 80%
2009 100%
2010 To 2036 Escalated at 2% per annum

DIF Structure

Interest-only first 5 years; of those 5 years, 3 years of capitalized interest
Principal and interest are amortized over the remaining 25 years
Total DIF $64.085 million

Debt service analysis, and revenue surplus/(deficit) summary, attached.

State Grant(s)

Total $25.0 million, payable 5 years

A. Estimates of Captured Value of the IRD

The IRD is co-terminus with the District area. See section 4.5.

B. Portion of Increment applied to IRD

The projected tax increment created by the DIF program for CitySquare and the accompanying private investment will be used three ways: one, an Economic Development Incentive Program -- one percent for a tax increment financing agreement for twenty years; two, the DIF increment up to 99% of the increment for the Invested Revenue District activities – public right of way improvements and enabling activities and construction; and three, remaining funds after payment of the DIF bond and CitySquare DIF program will be allocated to the City's general revenue fund.

C. Method of Calculating Tax Increments

The method of projecting anticipated tax increments involved a comprehensive analysis by RKG Associates of proposed construction, tax valuations in Worcester, and comparable municipalities. This was then reviewed and revised by a city team comprised of Chief Financial Officer John Pranckevicius, City Assessor Robert Allard, and City Solicitor David Moore. The city team also separately determined estimated values. During the life of the Worcester CitySquare Invested Revenue District, the City Assessor will be responsible for calculating the actual tax increments, which will be based on the assessed valuation of the property using the three commonly accepted approaches to valuation (income capitalization, sales comparison, and the cost approach).

D. Projection of Tax Revenues

The IRD is co-terminus with the District area, see section 4.5.

E. Projects to be funded by the tax increments

The Worcester CitySquare Invested Revenue District projects are the specific public projects to be funded by the DIF program through tax increments and include the construction of the streets, sidewalks, streetscape, replacement parking, and all enabling work required to permit the demolition of the mall and construction of roadways and sidewalks over the existing truck dock and new underground garage, and the construction of the new underground garage (necessitated by the demolition of the existing garage to permit the extension of Front Street to Washington Square), and all enabling work. The enabling work to be undertaken is detailed on page V-3.

F. Officer Calculating Tax Increment

The City Assessor is responsible for calculating the tax increment.

G. Bond Issuance

The City will authorize and issue general obligation bonds to proceed with this DIF project in accordance with the provisions of Chapter 40Q of the Massachusetts General Laws (DIF bonds). The DIF financing will be issued for the maximum term of thirty years. The financing plan calls for three separate bond anticipation note issuances (BANs) by the City over three fiscal years beginning in FY 2006. The City will issue BANs for a two-year period at an assumed interest rate of 3.75%. Permanent bond financing will be issued to defease the Bans outstanding with interest due capitalized as a component of the bond issuance. This procedure will be followed for three separate issuances.

The financing plan requires the City to issues bans to provide initial cash flow funding of the equity contribution from the State. The financing plan requires the city to receive $5 million per year for five years beginning in fiscal 2007. The State contributions will subsequently be applied to the Bans outstanding once they mature. This procedure will avoid mandatory principal payments on these Bans outstanding in accordance with Massachusetts's statutes. The accrued interest expense incurred by the City for the State's equity contribution will also be capitalized and incorporated into the DIF bonds

The City will proceed with three bond issuances at a fixed rate estimated at 5.50%. The financing structure allows for no principal payments to be required for two successive years after the date of the individual bond issuance. Each bond will have a 28-year maturity.

Note issuance costs are estimated at 25 basis points. Loan premiums will be sized into the issuance to pay for related note issuance costs.

H. Allocation of Excess Incremental Revenue

If there are any excess incremental revenues (generated by Phase I, which represents sixty percent of the project) that accrue, the intention is to have those funds remain within the Project fund through the life of the DIF Project to fund any necessary Project expenses not originally contemplated. However, the funds generated by the remaining forty percent of the project will be appropriated into the General Fund to be used for any appropriate municipal service.

5.7 Impact Statement

The City of Worcester and the Commonwealth of Massachusetts are the sole taxing bodies with jurisdiction over the land contained within Worcester CitySquare IRD. Employment and sales taxes to be generated by the private investment and businesses in Worcester CitySquare is projected to be $6.9 million to $12.8 million annually after full build-out is completed. Annual municipal tax revenue is projected to be $4.3 to $5.9 million after complete build-out.

The DIF Project area is self-supporting and is to be fully funded by revenues generated within the DIF District area (coterminous with the IRD). The financial impact of the Project has been outlined in Section 4, Item 5l(2) of this report. There are no adverse impacts anticipated by other taxing jurisdictions within the city. It is hoped that this new urban district will stimulate the immediate area to create a transit oriented downtown, connecting downtown to the Union Station commuter rail service and the inner-city bus terminal with a wide range of new housing choices. The Project will create an open and vibrant mixed-use urban district, which integrates medical/clinical, office, residential, street accessed retail, and entertainment uses within a newly created open-air street grid around a central green space.

Section 6
Private Partner Information

Section 6 is intended to identify and describe private partners (i.e., retail, commercial and industrial partners including developers and master developers) and their roles in accomplishing the Program or IRDDP's goals and objectives. This section must be completed for each private partner. While important to the overall success of the Program, this information need not be completed for Counsel, Bankers, etc.

Are you working with a significant private partner(s)?

☒Yes – Continue with this Section ☐ No – Application end

1. Person completing this Section for the Private Partner

Name: Kathleen McCabe, AICP
Title: Principal
Business Name: McCabe Enterprises
Address: 12 Primrose Street, Boston, MA 02131
Fax Number: 617 469-1765
Phone Number: 617 469-9444
E-mail address: mccabek@aol.com

2. Person Who Can Answer Questions Regarding this Section

Name: Barbara Smith Bacon, Esquire
Title: Vice President, and Project Manager
Business Name: Berkeley Investments
Address: 121 High Street, Boston, MA 02110
Fax Number: 617 439-4449
Phone Number: 617 439-0088, extension 288
E-mail address: bsmithbacon@berkinv.com

3. Counsel – Person who is providing legal counsel to the Private Partner

Name: Robert Longden, Esquire
Title: Partner
Business Name: Bowditch & Dewey
Address: 311 Main Street, PO Box 15156, Worcester, MA 01615
Fax Number: 508 929-3025
Phone Number: 508 791-3511
E-mail address: longden@bowditch.com

4. Authorized Signatory for the Private Partner

Name: Young Park
Title: CEO and President
Business Name: Berkeley Investments
Address: 121 High Street, Boston, MA 02110
Fax Number: 617 439-4449
Phone Number: 617 439-0088
E-mail address: ypark@berkinv.com

5. Relationship Bank for the Private Partner

Name: **Flagship Bank**
Address: 120 Front Street, PO Box 487, Worcester, MA 01613
Fax Number: 800 359-6032
Phone Number: 508 799-4321 or 800 562-6722
E-mail address: commercialbanking@flagshipbank.com

6. Investment Bank (Private Partner who provides equity or handles bond sale – complete for both)

Name: **Starwood Capital Group**
Address: 591 Putnam Avenue, Grenwich, CT 06801
Fax Number 202 422-7784
Phone Number: 202 422-7710

7. Corporate Information for the Private Partner

☒ Enclosed

a) Corporate Structure

☐ *Sole proprietorship*

☐ *Partnership - If the Private Partner is a partnership, please provide sufficient information to describe the partnership including, but not limited to: its state of organization; date of partnership agreement; and, the nature of the partnership (general or limited); partner's names, positions, contact information and partnership nature. The goal is to be able to ascertain whether or not the Partnership is authorized and able to perform its partner responsibilities.*

☒ *Corporation - If the Private Partner is a corporation, please provide sufficient information to describe the corporation including, but not limited to, its state of incorporation, date of incorporation, by-laws, public/private, stock exchange (if public), officers and their position and contact information. The goal is to ensure that the corporation is authorized and able to provide its partner responsibilities.*

☐ *Other legal entity? Please describe using the above notes as an information guideline:*

Worcester City Square is owned by Worcester Renaissance, LLC, a partnership of Berkeley Investments and the Starwood Capital Group. Berkeley Investments is the managing partner. Berkeley Investments is incorporated.

b) Financial Information (Private Partner)

Please provide a five year history of the most recent audited financial statements for the Private Partner. If its financials are unaudited, provide federal income tax returns.

8. Private Partner's Responsibilities

☒ Enclosed

Please describe the Private Partner's responsibilities. Estimate project scope, cost, feasibility and timeline (schedule). Include any information deemed relevant to understanding the Private Partner's role. Include a copy of any legal agreements governing the relationship between the Applicant and Private Partner.

9. Experience

☒ Enclosed

Please provide a description of related Private Partner experience. Include any information deemed necessary to understanding the Private Partner's ability to successfully perform their role. Disclose any items or issues which would impact the Private Partner's ability to perform.

10. Miscellany

☒ Enclosed

a) Surety information

(1) Current surety provider(s) and coverage(s)

(2) Surety history: Has a bonding company ever been called on to perform on the Private Partner's default? Yes / No. If yes, explain.

b) Has the Private Partner or any of its officers ever declared bankruptcy? Yes / No. If yes, explain.

c) Prior or pending material litigation. Describe any prior or pending litigation against the Private Partner.

d) Tax history: Is the Private Partner current in ALL of its taxes? Yes / No If no, please explain. For the purpose of this question, contested taxes are considered delinquent.

Section 6: Private Partner Information

6.1 Person completing this Section for the Private Partner

Kathleen McCabe, AICP
McCabe Enterprises
12 Primrose Street
Boston, MA 02131
617 469-9444, voice
617 469-1765, fax
mccabek@aol.com

6.2 Person Who Can Answer Questions Regarding this Section

Barbara Smith-Bacon, Esq.
Vice President and Project Manager
Berkeley Investments
121 High Street
Boston, MA 02110
617 439-0088, voice
617 439-4449, fax
bsmithbacon@berkinv.com

6.3 Counsel – Person who is providing legal counsel to the Private Partner

Robert Longden, Esquire
Partner
Bowditch & Dewey
311 Main Street, PO Box 15156, Worcester, MA 01615
508 929-3025, fax
508 791-3511, phone
rlongden@bowditch.com

6.4 Authorized Signatory for the Private Partner

Young Park
CEO and President
Berkeley Investments
121 High Street
Boston, MA 02110
617 439-0088
617 439-4449, fax
ypark@berkinv.com

6.5 Relationship Bank for the Private Partner

Flagship Bank
120 Front Street
PO Box 487
Worcester, MA 01613
508 799-4321

6.6 Investment Bank (Private Partner who provides equity or handles bond sale – complete for both)

Starwood Capital Group
202 422-7784, fax
202 422-7710, phone

6.7 Corporate Information for the Private Partner

Berkeley Investments is the development partner for Worcester Renaissance, LLC, and Worcester Towers, LLC, the two property owners in the Worcester City Square DIF District. Both Worcester Renaissance, LLC and Worcester Towers, LLC are limited liability corporations formed in 2004, and are authorized to undertake real estate development and redevelopment.

Worcester Renaissance, LLC
Berkeley Investments
121 High Street
Boston, MA 02110
617 439-0088
617 439-4449, fax

Worcester Renaissance Towers, LLC
Berkeley Investments
121 High Street
Boston, MA 02110
617 439-0088
617 439-4449, fax

6.8 Private Partner's Responsibilities

The private partner, Berkeley Investments, as the development partner of Worcester Renaissance, LLC, is responsible for constructing the private sector new construction and improvements to the CitySquare area.

The business terms can be found in the Memorandum of Agreement, which can be found in this application.

6.9. Experience

Development Team

Berkeley has assembled a best-in-class development team, which has the project management experience, financial capability and development know-how to fully realize Berkeley's vision.

- **Berkeley is the developer** for CitySquare. Berkeley is a Boston-based full-service real estate investment, development and management company with a diversified portfolio of 4.0 million SF under ownership and management. (www.berkeleyinvestments.com)

  Berkeley recently completed the development of a new 82,000 SF drug distribution facility for the Veterans Administration in Chelmsford, MA, and is currently developing a 50,000 SF doctors' office building at Jordan Hospital in Plymouth, MA. Berkeley has recently acquired 1.0 million square feet of the Boston Wharf portfolio, and has launched the master planning of the site for future development and re-positioning. The master plan will be carried out through the Boston Article 80 large project permitting process. Over the last five years, Berkeley has been actively involved in the design, permitting, financing, construction and marketing of a number of large mixed-use developments throughout the New England, Washington D.C. and Texas markets.

- Berkeley's **financial joint venture capital partner is Starwood Capital**, a financial partner with whom Berkeley has joint ventured on numerous projects nationally. Starwood Capital is a privately held investment management firm located in Greenwich, CT. Founded in 1991, Starwood is one of the nations most active and successful real estate investors in the US. Its highly diversified portfolio includes land development, multi-family, hotel, office, retail, mixed use and industrial properties and mezzanine debt and represents over $7 billion in real estate assets in over 200 transactions. (www.starwoodcapital.com)

- The Team's principal **architect and urban design consultant** is **Arrowstreet, Inc.** of Somerville, MA. Arrowstreet is an award-winning multi-disciplinary firm with a particular focus on the design and master planning of complex downtown public-private projects. Its current projects include the West Avenue Redevelopment in Norwalk, CT, Wisconsin Place in Friendship Heights, Maryland, the recently approved redevelopment of Pier 4 on the Boston Waterfront and the South Boston Waterfront Housing (Parcels J and G). Arrowstreet brings a sophisticated understanding of the Worcester Center architectural and structural

components as a result of its role as the architect of record for the earlier conversion of the regional shopping center into the fashion outlet mall. (www.arrowstreet.com)

- The Team's **pre-construction manager is Turner Construction Company.** Turner enjoys an excellent reputation in the City of Worcester for having been actively involved in several City financed projects, and has substantial in-depth experience in complex multi-phased urban mixed use projects. (www.turnerconstruction.com)

- The Team's **public financing consultant** is **McCabe Enterprises**. McCabe offers strategic solutions in community planning and economic development. McCabe was closely involved in the drafting of the DIF legislation and would provide consulting input into infrastructure financing efforts and grant management.

- **RKG Associates, Inc**. of Durham, NH, has provided consulting services on the project, including analysis of the benefits of the project to the Commonwealth. (www.rkg1.com)

- The Team legal counsel consists of **Bingham McCutcheon** (Boston) and **Bowditch & Dewey** (Worcester and Boston).

6.10 Miscellany

Surety

Type	Carrier	Amount
General Liability	Zurich-American	$1 MM/occurrence and $10MM aggregate
Umbrella Liability	Chubb Group	$100 MM
Commercial Property	Liberty Mutual	$350 MM (primary)
	AIG	Shares in providing the first $50 MM of commercial property insurance (secondary)

Bankruptcy

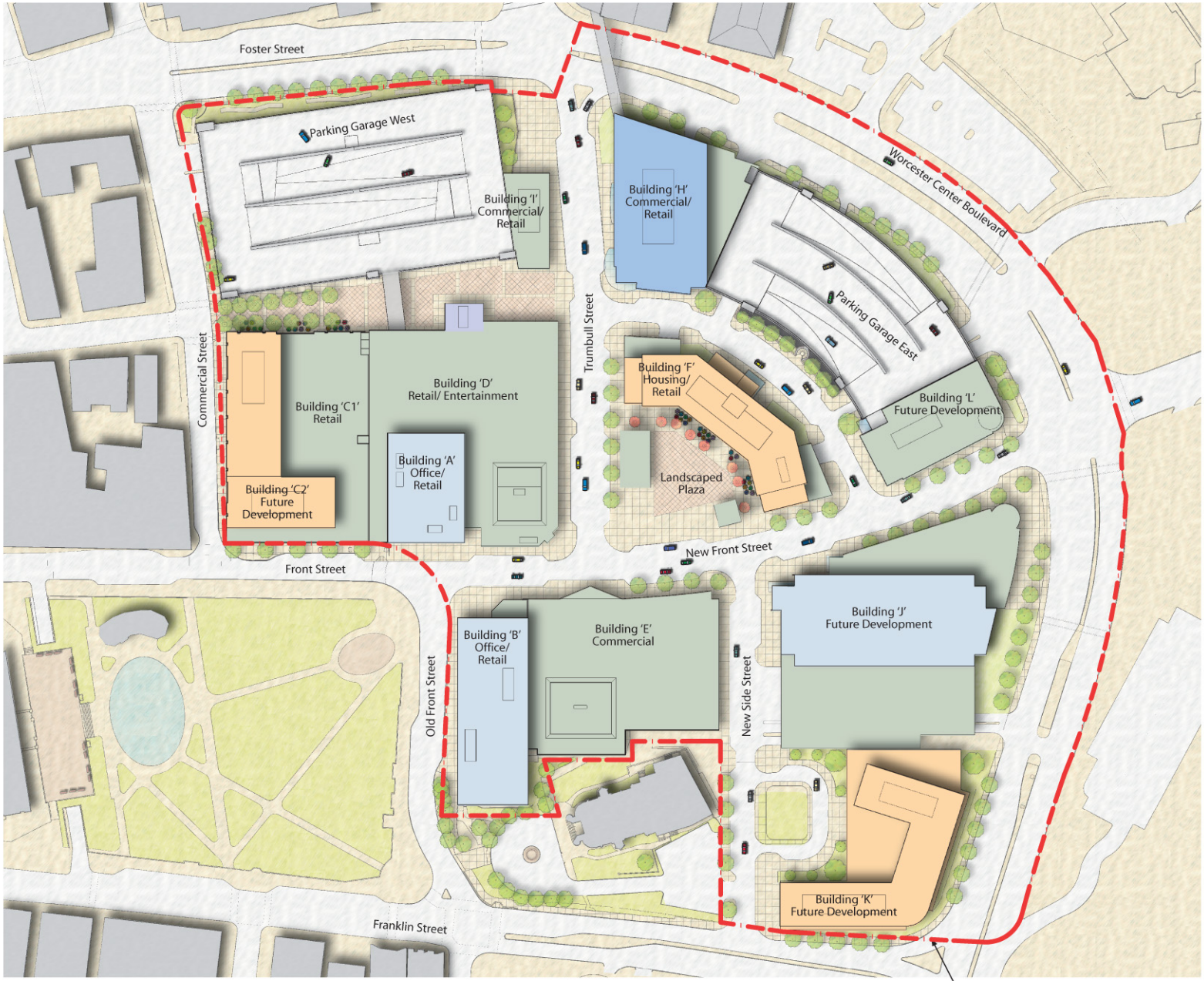
The private partners and their principals have not been involved in any bankruptcy proceedings. The principles of Starwood Capital Group are responsible for the management of the various funds engaged in real estate investment. The CitySquare project is part of SOF-VI U.S. Holdings, LLC. To the best of their knowledge, as of the date of this application, there is no litigation affecting SOF-VI U.S. Holdings, LLC, which would materially affect the ability of the fund to meet its monetary obligations with respect to the CitySquare project.

Pending Litigation

There is no pending litigation against Worcester Renaissance, LLC, nor Berkeley Investments. The principles of Starwood Capital Group are responsible for the management of the various funds engaged in real estate investment. The CitySquare project is part of SOF-VI U.S. Holdings, LLC. To the best of their knowledge, as of the date of this application, there is no litigation affecting SOF-VI U.S. Holdings, LLC, which would materially affect the ability of the fund to meet its monetary obligations with respect to the CitySquare project.

Tax History

Worcester Renaissance, LLC is current with all taxes owed to the Commonwealth and the City of Worcester. Berkeley Investments is current with all taxes owed to the Commonwealth and the City of Worcester.



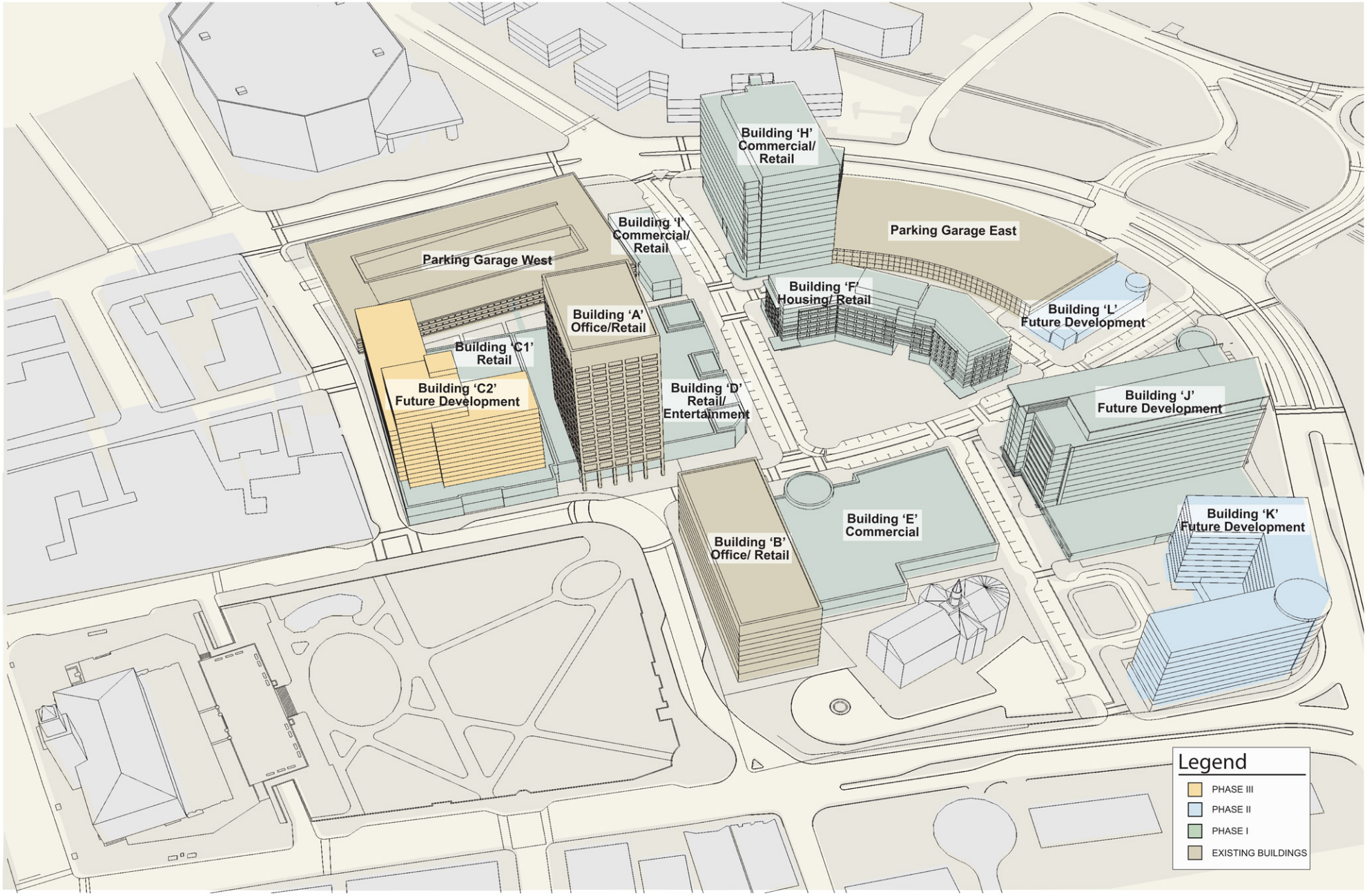
CitySquare
Berkeley Investments Inc.

Roof Site Plan

0 50' 100' 200' 300'

26 April 2005 • Project No. 04010

ARROWSTREET
Architecture Urban Design Planning Graphics and Interiors
212 Elm Street Somerville MA 02144 617.623.5555



CitySquare
Berkeley Investments Inc.

Site Axonometric - Phasing

26 April 2005 • Project No. 04010

ARROWSTREET
Architecture Urban Design Planning Graphics and Interiors
212 Elm Street Somerville MA 02144 617.623.5555

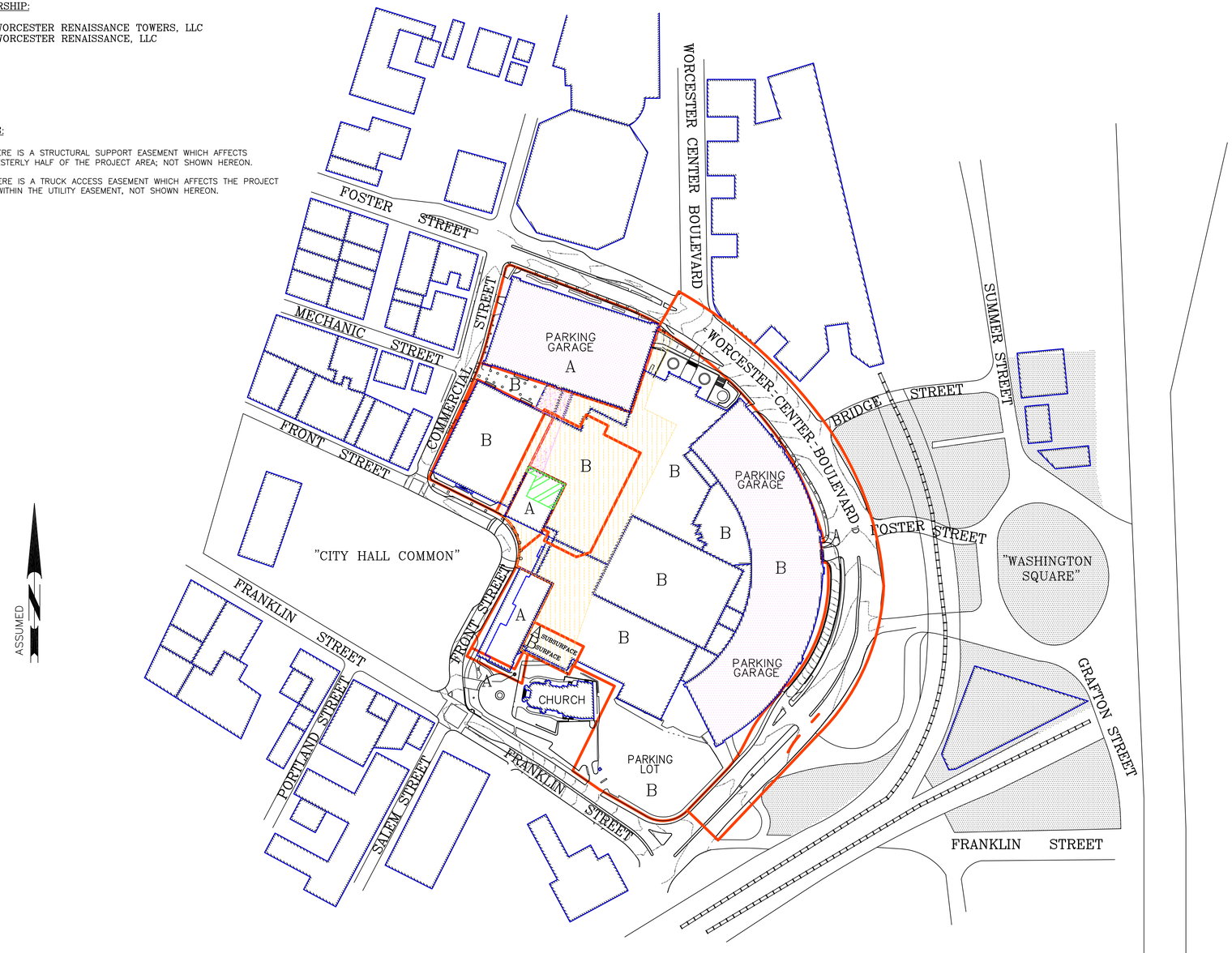
OWNERSHIP:

A WORCESTER RENAISSANCE TOWERS, LLC
B WORCESTER RENAISSANCE, LLC

NOTES:

1. THERE IS A STRUCTURAL SUPPORT EASEMENT WHICH AFFECTS THE WESTERLY HALF OF THE PROJECT AREA; NOT SHOWN HEREON.

2. THERE IS A TRUCK ACCESS EASEMENT WHICH AFFECTS THE PROJECT AREA, WITHIN THE UTILITY EASEMENT, NOT SHOWN HEREON.



ZONING INFORMATION:

MIXED USE DEVELOPMENT ZONE
UNDERLYING ZONE: GENERAL BUSINESS-BG-6.0

MAXIMUM FLOOR AREA RATIO	6 TO 1
MINIMUM LOT AREA	N/A
MINIMUM FRONT YARD	N/A
MINIMUM SIDE YARD	N/A
MINIMUM REAR YARD	10 FEET
MAXIMUM BUILDING HEIGHT	N/A

FLOOD ZONE INFORMATION:

THE ENTIRE AREA IS LOCATED IN A ZONE X FLOOD ZONE (AREA OF 500-YEAR FLOOD; AREAS OF 100-YEAR WITH AVERAGE DEPTHS OF LESS THAN 1-FOOT OR DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 100-YEAR FLOOD) AS SHOWN ON THE FLOOD INSURANCE RATE MAPS FOR THE CITY OF WORCESTER.
COMMUNITY PANEL NO. 250349-0012-B
EFFECTIVE DATE: JANUARY 16, 2003.

THE PROJECT SITE APPEARS TO BE CURRENTLY USED FOR COMMERCIAL, RETAIL, PROFESSIONAL, GENERAL, THEATER, FOOD SERVICE, BANK, HEALTH CLUB, AND SCHOOL SPACE AND DOES NOT CONTAIN ANY PUBLIC LAND WITHIN THE PROJECT AREA. JNEI HAS NOT MADE AN ATTEMPT TO VERIFY THE EXACT USES WHICH TAKE PLACE WITHIN THE PROJECT LIMITS AND ASSUMES NO LIABILITY FOR OTHER USES WHICH ARE NOT LISTED ABOVE.

LEGEND

- WASHINGTON SQUARE REDEVELOPMENT AREA
- PARKING AND ACCESS EASEMENT
- UTILITY EASEMENT
- PEDESTRIAN ACCESS EASEMENT
- HALLWAY ACCESS EASEMENT
- DIF BOUNDARY LINES

JUDITH NITSCH ENGINEERING INC.

186 Lincoln Street, Suite 200
Boston, MA 02111-2403
T: (617) 338-0063
F: (617) 338-6472
www.jnei.com

Civil Engineering
Land Surveying
Traffic Engineering
Planning
GIS Services

JNEI JOB #	5034.2
FILE:	5034_COMP
SCALE:	1"=150'
DATE:	1/05/2005
DES./COMP:	PRL
FIELD BOOK:	NA
DRAFTED BY:	PRL
CHECKED BY:	PRL

AREA SITE PLAN

NEW WORCESTER CENTER
WORCESTER, MASSACHUSETTS

PREPARED FOR:

BERKELEY INVESTMENTS, INC.

121 HIGH STREET, BOSTON, MASSACHUSETTS 02110

SHEET:

OF REV.

FOR REGISTRY USE ONLY

I HEREBY CERTIFY THAT THIS PLAN CONFORMS TO THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

JUDITH NITSCH ENGINEERING INC.

186 Lincoln Street, Suite 200
Boston, MA 02111-2403
T: (617) 338-0063
F: (617) 338-6472
www.jnei.com

Civil Engineering
Land Surveying
Traffic Engineering
Planning
GIS Services

JNEI JOB #	5034.3
FILE:	5034_TAK1.DWG
SCALE:	1"=40'
DATE:	APRIL 28, 2005
PROJECT MANAGER:	PRL
FIELD BOOK:	
DRAFTED BY:	PRL
CHECKED BY:	PRL

REV.	COMMENTS	DATE
	REVISIONS	

EMINENT DOMAIN TAKING PLAN

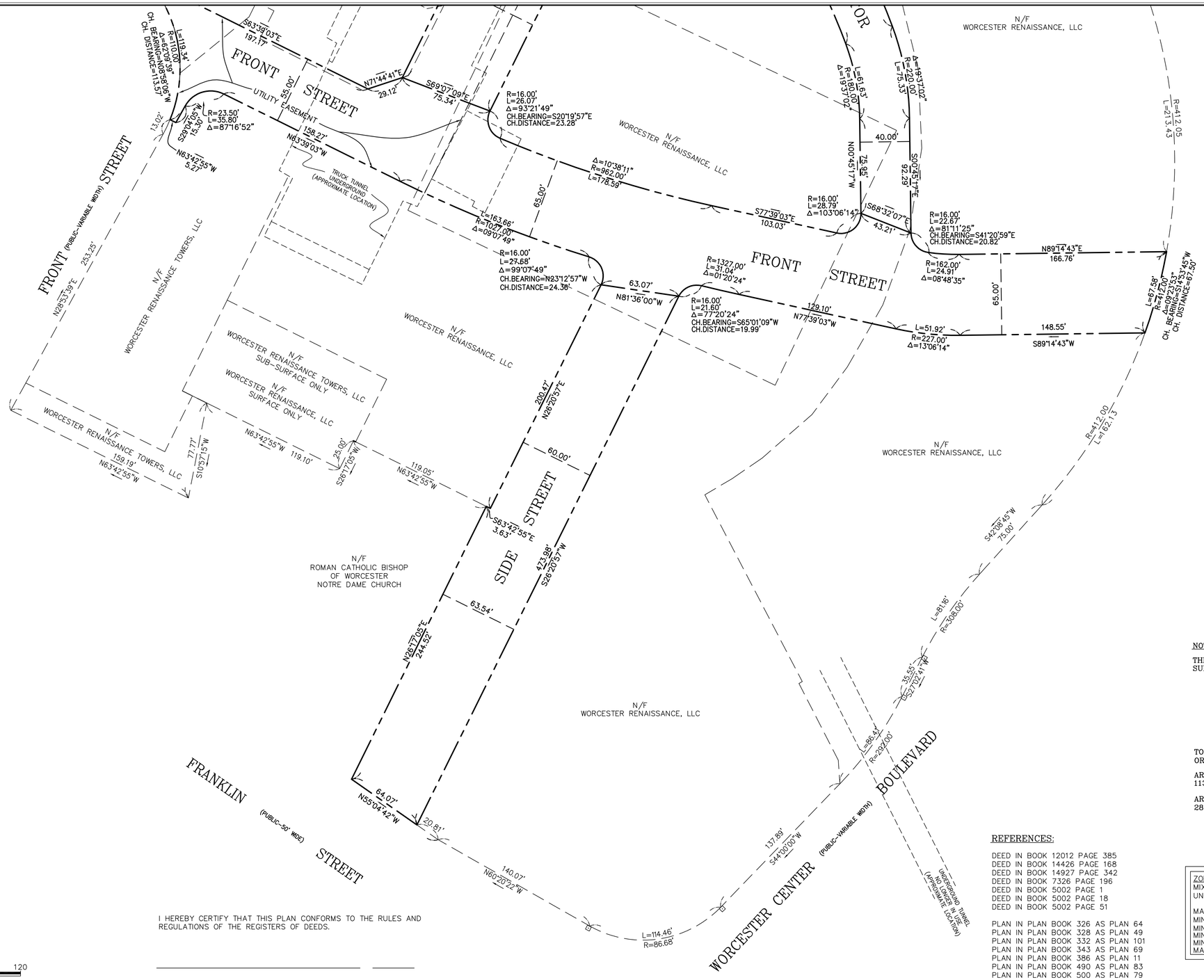
NEW WORCESTER CENTER
WORCESTER, MASSACHUSETTS

PREPARED FOR:

BERKELEY INVESTMENTS
121 HIGH STREET, BOSTON, MASSACHUSETTS 02110

SHEET: **S-1**

OF 3 REV.



FOR REGISTRY USE ONLY

NOTE:

THE PROPOSED STREETS SHOWN HEREON ARE SUBJECT TO A SUBSURFACE CROSS SUPPORT EASEMENT NOT SHOWN HEREON.

TOTAL AREA OF TAKING=142,715 SQUARE FEET OR 3.276 ACRES

AREA TAKEN FROM WORCESTER RENAISSANCE, LLC= 113,977 SQUARE FEET OR 2.617 ACRES

AREA TAKEN FROM WORCESTER RENAISSANCE TOWERS, LLC= 28,738 SQUARE FEET OR 0.659 ACRES

REFERENCES:

DEED IN BOOK 12012 PAGE 385
DEED IN BOOK 14426 PAGE 168
DEED IN BOOK 14927 PAGE 342
DEED IN BOOK 7326 PAGE 196
DEED IN BOOK 5002 PAGE 1
DEED IN BOOK 5002 PAGE 18
DEED IN BOOK 5002 PAGE 51

PLAN IN PLAN BOOK 326 AS PLAN 64
PLAN IN PLAN BOOK 328 AS PLAN 49
PLAN IN PLAN BOOK 332 AS PLAN 101
PLAN IN PLAN BOOK 343 AS PLAN 69
PLAN IN PLAN BOOK 386 AS PLAN 11
PLAN IN PLAN BOOK 490 AS PLAN 83
PLAN IN PLAN BOOK 500 AS PLAN 79
PLAN IN PLAN BOOK 801 AS PLAN 103

"SUBDIVISION AND CONSOLIDATION PLAN, NEW WORCESTER CENTER, WORCESTER, MASSACHUSETTS" PREPARED BY JUDITH NITSCH ENGINEERING, INC. AND DATED OCTOBER 17, 2004.

ZONING INFORMATION
MIXED USE DEVELOPMENT ZONE
UNDERLYING ZONE: GENERAL BUSINESS-BG-6.0

MAXIMUM FAR	6 TO 1
MINIMUM LOT AREA	5000S.F.
MINIMUM FRONT YARD	N/A
MINIMUM REAR YARD	N/A
MINIMUM SIDE YARD	N/A
MAXIMUM BUILDING HEIGHT	N/A

I HEREBY CERTIFY THAT THIS PLAN CONFORMS TO THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

GRAPHIC SCALE
40 20 0 40 80 120
SCALE: 1"=40'

JUDITH NITSCH ENGINEERING INC.
186 Lincoln Street, Suite 200
Boston, MA 02111-2403
T: (617) 338-0063
F: (617) 338-6472
www.jnei.com

Civil Engineering
Land Surveying
Traffic Engineering
Planning
GIS Services

JNEI JOB #	5034.3
FILE:	5034_TAK1.DWG
SCALE:	1"=40'
DATE:	APRIL 28, 2005
PROJECT MANAGER:	PRL
FIELD BOOK:	
DRAFTED BY:	PRL
CHECKED BY:	PRL

REV.	COMMENTS	DATE
	REVISIONS	

EMINENT DOMAIN TAKING PLAN
NEW WORCESTER CENTER
WORCESTER, MASSACHUSETTS

PREPARED FOR:
BERKELEY INVESTMENTS
121 HIGH STREET, BOSTON, MASSACHUSETTS 02110

SHEET:
S-2
OF 3 REV.

RKG Associates, Inc.

ECONOMIC AND FISCAL BENEFITS OF CITYSQUARE IN WORCESTER FOR THE COMMONWEALTH OF MASSACHUSETTS

February 23, 2005

Prepared for:

Berkeley Investments, Inc.
121 High Street
Boston, MA
Attention: Ms. Barbara Smith-Bacon
Tel.: (617) 439-0088

Prepared by:

RKG Associates, Inc.
Economic, Planning and Real Estate
Consultants
277 Mast Road
Durham, NH 03824

Tel: 603-868-5513
FAX: 603:868-6463
Web: www.rkg1.com

Economic
Planning
and
Real Estate
Consultants

TABLE OF CONTENTS

I. Executive Summary 1

II. Economic and Fiscal Benefits 2

A. Project Description 2

B. Construction Impacts 2

C. Impact at Full Build Out 4

1. Impact of Retail Sales Tax 6

III. Appendix 7

I. EXECUTIVE SUMMARY

RKG Associates, Inc. (RKG) was retained by Berkeley Investments, Inc. to estimate the potential economic and fiscal impacts of the proposed CitySquare project in Worcester for the Commonwealth of Massachusetts. The estimated impacts result from construction employment to redevelop the project, and permanent employment when the project is completed. In addition, sales and income taxes are also estimated, both during the construction and at full build out. The construction benefits are cumulative over the eight-year building period, while the benefits estimated at full build out are annual. The purpose of this report is to present the economic and fiscal benefits as well as the methodology and sources utilized in estimating these impacts,

CitySquare is a major mixed-use project containing between 3.46 and 3.50 million square feet (SF), depending upon which option is eventually built.[1] The project itself is estimated to be completed over an eight-year period and will entail substantial demolition of the existing Worcester Outlet Mall, reopening of two closed City streets, and the construction of new mid-to-high-rise buildings as well as an underground parking garage with 1,025 spaces. This project will fully compliment the nearby Worcester Medical Center, the Centrum and Convention Center complex, and Union Station, as well as help transform downtown Worcester.

The economic and fiscal benefits of this project are summarized below. These impacts and benefits will be "net" new at CitySquare, and stimulate job creation/retention within the City of Worcester and the Commonwealth of Massachusetts.

TABLE I-1 – CITYSQUARE: CUMULATIVE CONSTRUCTION IMPACTS OVER AN 8 YEAR PERIOD (2004 DOLLARS)

	Alternative 1	Alternative 2
Construction Costs [1]	$467 million	$475 million
Employment [2]	4,190	4,250
Income Taxes [3]	$13.3 million	$13.5 million
Sales Taxes [4]	$4.7 million	$4.7 million

[1] Based on preliminary estimates (Oct-2004) by Turner Construction Company
[2] Includes direct and indirect employment estimates (full and part-time)
[3] Includes income and unemployment taxes
[4] On taxable building materials
Source: RKG Associates, Inc. (refer to text for additional sources)

TABLE I-2 – CITYSQUARE: ANNUAL PERMANENT EMPLOYMENT IMPACTS UPON FULL BUILD OUT (2004 DOLLARS)

	Alternative 1	Alternative 2
Employment [1]	1,675	3,105
Income Tax [2]	$ 3.9 million	$ 9.8 million
Sales Tax [3]	$3.0 million	$3.0 million

[1] Includes direct and indirect employment estimates for net new employment and retention
[2] Includes income and unemployment taxes
[3] On taxable retail and restaurant sales
Source: RKG Associates, Inc. (refer to text for additional sources)

[1] Alternative 1 consists of 1.2 million SF of commercial space and 900 housing units; Alternative 2 consists of 1.5 million SF of commercial space and 650 housing units. Each alternative includes 1.3 million SF of parking garages with 3,800 spaces, including a new underground garage of 1,025 space

II. ECONOMIC AND FISCAL BENEFITS

RKG Associates, Inc. (RKG) was retained by Berkeley Investments, Inc. to estimate the potential economic and fiscal impacts of the proposed CitySquare project in Worcester for the Commonwealth of Massachusetts. This section of the report discusses the methodology, sources and assumptions utilized in estimating the fiscal and economic impacts. Summary tables are included with the text and more detailed tables are included in an appendix at the end of the report.

A. Project Description

The CitySquare project is a major mixed-use project containing between 3.46 and 3.50 million square feet (SF), depending upon which option is eventually built. In Alternative 1, CitySquare is planned to contain nearly 1.2 million SF of commercial space and 900 housing units. In Alternative 2, nearly 1.5 million SF of commercial space is planned as shown in Table II-1, and the residential component is reduced to 650 units.

TABLE II-1 - CITYSQUARE:
CHANGE IN PROJECT CONFIGURATION BY USE

Use	Existing	Alternative 1	Alternative 2
Retail	613,782	357,300	347,300
Office	464,359	464,359	774,359
Medical Office	0	282,000	282,000
College et al [1]	99,942	89,700	89,700
Commercial SF	1,178,083	1,193,359	1,493,359
Housing Units	0	900	650
Residential SF	0	960,200	698,200
Parking Garage SF	1,489,320	1,306,450	1,306,450
Total SF	2,667,403	3,460,009	3,498,009

[1]Community College, Health Club, Day Care, Cinema & Theater
Source: Turner Construction Company, Berkeley Investments, Inc., and RKG Associates, Inc.

The project is planned to be built in three phases over an eight-year period, and will entail substantial demolition of the existing retail space at the former Worcester Outlet Mall, which had only 53,000 SF of retail occupancy in January 2005. A new medical office/clinical building is planned in both alternatives as well as the reopening of four closed city streets, and the construction of a new underground parking garage having 1,025 spaces. A new office building is also planned in Alternative 2, which would increase the commercial component to nearly 1.5 million SF. If it is not developed, an upscale apartment building is planned in Alternative 1 and the residential component would increase from 650 units to 900 units. This project, when completed in 2012, will fully compliment the nearby Worcester Medical Center, the Centrum and Convention Center complex, and Union Station, as well as help transform downtown Worcester.

B. Construction Impacts

The construction costs for the private component of the project are estimated to range between $467 million and $475 million according to Turner Construction Company.[2]

[2] Turner Construction Co. provided preliminary costs in October 2004, which may not include complete fit-up or soft costs.

Appendix Table 1 itemizes construction costs by different buildings at the project. Depending on the alternative, construction is estimated to generate between $103 million and $104 million in wages during the eight-year construction phase, as shown in Table II-2, which equates to between 2,270 and 2,300 jobs.[3]

Using the state income tax rate of 5.3% and state unemployment rate of 2.0% obtained from the Massachusetts Department of Revenue, RKG estimated the taxes that would result from these wages, and the results of the calculations are shown in Table II-2.

TABLE II-2 - CITYSQUARE: CUMULATIVE STATE IMPACTS DURING THE 8-YEAR CONSTRUCTION PERIOD

	Alternative 1	Alternative 2
Estimated Construction Cost	$467,437,802	$474,529,802
Direct Impacts		
Direct Wages	$102,836,316	$104,396,556
Direct Employment	2,268	2,302
State Benefits on Direct Impacts		
State Income Tax	$5,450,325	$5,533,017
State Unemployment Tax	$2,056,726	$2,087,931
Indirect Impacts		
Indirect Wages	$79,015,312	$80,214,138
Indirect Employment	1,919	1,948
State Benefits on Indirect Impacts		
State Income Taxes	$4,187,812	$4,251,349
State Unemployment Tax	$1,580,306	$1,604,283
Total Employment (Direct & Indirect)	4,187	4,250
Total State Taxes (Direct & Indirect)	$13,275,169	$13,476,581
Sales Tax on Building Materials	$4,674,378	$4,745,298

Source: Turner Construction Company, Berkeley Investments, Inc., US Department of Commerce, MA Division of Employment and Training, and RKG Associates, Inc.

RKG then estimated the indirect benefits resulting from the construction of the CitySquare project by utilizing the Regional Input-Output Modeling System (RIMS II) for Massachusetts prepared by the US Department of Commerce, Economic and Statistic Administration, Bureau of Economic Analysis. [4] The cumulative indirect impact of the construction phase, as shown in Table II-2, is estimated to range between $79 and $80 million in wages, and between 1,920 and 1,950 jobs. These wages in turn would yield the state another $4.2 million in income taxes, and $1.6 million in unemployment insurance. Therefore, the Commonwealth of Massachusetts is estimated to receive from between $13.3 million and $13.5 million in income and unemployment taxes during the eight-year construction phase of the CitySquare project and between 4,180 and 4,250 jobs. In addition, the Commonwealth

[3] Bruce Ventura at Turner Construction Co. indicated that 22% of estimated construction costs was a reasonable allocation of direct wages for the project. RKG utilized the average construction wage ($45,344) in Worcester for the first quarter of 2004, obtained from Massachusetts Division of Employment and Training (MA DET) to determine the resulting number of construction jobs at the project during the eight-year period.

[4] In essence, RIMS II is based on an accounting framework called an Input-Output (I-O) table that shows the industrial distribution of inputs purchased and outputs sold between industries. I-O multipliers estimate the benefits of a project and programmed expenditures by industry of regional output (gross receipts or sales), earnings (wages and salaries) and employment. These RIMS II multipliers were used to gauge indirect benefits from temporary jobs during the construction phase and permanent jobs when the project was completed. Since the resulting indirect jobs and wages are from a much broader region, RKG assumed that the Commonwealth would only obtain 60% of the indirect benefits.

will benefit from sales taxes on taxable building materials, estimated to range between $4.67 million and $4.75 million.[5] (Appendix Table 2)

C. Impact at Full Build Out

The section evaluates the potential impacts that will result from the full build out of CitySquare. RKG utilized five steps in determining the economic impacts associated with permanent employment at the project. The first step was to calculate the major changes in building area by uses. Then, utilizing a factor of employee per building area, the estimated net change in employment was calculated. The results of the first two steps are summarized in Table II-3.

TABLE II-3: CITYSQUARE
CHANGES IN PERMANENT EMPLOYMENT LEVELS

ALTERNATIVE 1	Existing SF	Proposed	Net Change	SF per Employee [2]	Net Change in Employment
Office	464,300	464,300	0	300	0
Medical Office	0	282,000	282,000	500	564
Retail/Restaurant [1]	53,300	357,300	304,000	450	676
Total	517,600	1,103,600	586,000		1,240
ALTERNATIVE 2					
Office	464,300	774,200	309,900	300	1,033
Medical Office	0	282,000	282,000	500	564
Retail/Restaurant [1]	53,300	347,300	294,000	450	653
Total	517,600	1,403,500	885,900		2,250

[1] As of January, 2005 approximately 53,300 SF of retail space at the Worcester Common Outlets was occupied, excluding space occupied by the Community College, Day Care, Theater/Cinema & Health Club
[2] Urban Land Institute provide a range in employment by building use representing full & part time employment, and the mid-point factor was used. Employment estimates reflect the net gain in new employment plus the retention of existing jobs.
Source: Berkeley Investments, Inc. Urban Land Institute, and RKG Associates, Inc.

As shown in the previous table, office space in Alternative 1 remains unchanged, but an increase of 310,000 SF would occur in Alternative 2. This increase in turn will generate another 1,030 office jobs, based on the mid-point factor utilizing Urban Land Institute development standards. Medical office/clinical space in both alternatives is estimated to increase by 280,000 SF, which in turn would create 560 new medical related jobs. Retail/restaurant space is estimated to increase between 294,000 SF and 304,000 SF depending on the alternative, and in turn will create another 650 to 670 retail jobs. Finally, approximately 25 jobs will be created relative to the management of the on-site rental properties. As noted in the table, the retail component of the Worcester Common Outlet Mall was nearly vacant in January 2005.[6]

The third step in the analysis was to ascertain average wages in Worcester for the different use types from the Massachusetts Department of Employment and Training in order to

[5] Turner Construction Company estimated that 20% of construction costs would be for taxable building materials during the 8-year construction period, and a sale tax rate of 5% was used for this determination.

[6] The impact of existing uses at CitySquare are not estimated, but only the "net" changes at the project upon completion are estimated.

estimate the gross wages on which state income and unemployment taxes would be assessed. These calculations are summarized in Table II-4.

TABLE II-4: - CITYSQUARE:
CHANGES IN PERMANENT EMPLOYMENT AND PAYROLL (AT FULL BUILD OUT)

ALTERNATIVE 1	Net Change in Employment	Average Wage [1]	Gross Wages
Office [2]	0	$55,561	$0
Medical Office [3]	564	$37,908	$21,380,112
Retail [4]	676	$25,281	$17,078,891
Total	1,240		$38,459,003
ALTERNATIVE 2	Net Change in Employment	Average Wage [1]	Gross Wages
Office [2]	1,033	$55,561	$57,394,890
Medical Office [3]	564	$37,908	$21,380,112
Retail [4]	653	$25,281	$16,517,085
Total	2,250		$95,292,088

[1] First Quarter 2004 Average Wage for Selected Industry Types in Worcester
[2] Professional & Technical Services (NAICS 54)
[3] Health Care & Social Services (NAICS 62)
[4] Retail Trade (NAICS 44-45)
Source: MA DET, MA DOR and RKG Associates, Inc.

The fourth step in the analysis was to calculate the indirect benefits resulting from the permanent employment from the CitySquare project at full build out, utilizing the RIMS II multipliers. These calculations are presented in Table II-5.

TABLE II-5 - CITYSQUARE:
INDIRECT BENEFITS FROM PERMANENT EMPLOYMENT AND PAYROLL (AT FULL BUILD OUT)

	Employment			**Wages**		
ALTERNATIVE 1	Multiplier	Total Jobs	MA Jobs [1]	Multiplier	Total Wage	MA Wages [1]
Office	0.6859	0	0	0.7140	$0	$0
Medical Office	0.6784	383	230	0.5721	$12,231,562	$7,338,937
Retail	0.5100	345	207	0.6962	$11,890,324	$7,134,194
Total		727	436		$24,121,886	$14,473,132
ALTERNATIVE 2						
Office	0.6859	708	425	0.7140	$40,979,952	$24,587,971
Medical Office	0.6784	383	230	0.5721	$12,231,562	$7,338,937
Retail	0.5100	333	200	0.6962	$11,499,195	$6,899,517
Total		1,424	855		$64,710,709	$38,826,425

[1] An estimate 60% of jobs and wages would remain in Massachusetts
Source: US Department of Commerce and RKG Associates, Inc.

The fifth and final step was to multiply the estimated annual wages for the direct and indirect employment by the tax rates to estimate state income and unemployment taxes. These calculations are shown in Table II-6. Therefore, at full build out of the CitySquare project, the state would derive, on an annual basis, from between $3.9 million and $9.8 million in income and unemployment taxes in 2004 dollars.

TABLE II-6 - CITYSQUARE:
STATE BENEFITS AT FULL BUILD-OUT (DIRECT & INDIRECT)

	Alternative 1	Alternative 2
Direct Employment	1,240	2,250
Direct Wages	$38,459,003	$95,292,088
State Income Tax	$2,038,327	$5,050,481
Unemployment Tax	$769,180	$1,905,842
Indirect Employment	436	855
Indirect Wages	$14,473,132	$38,826,425
State Income Tax	$767,076	$2,057,801
Unemployment Tax	$289,463	$776,529
Total Income Tax	$2,805,403	$7,108,281
Total Unemployment Tax	$1,058,643	$2,682,370
Total Tax	$3,864,046	$9,790,651

Source: US Department of Commerce, MA Division of Employment and Training, Berkeley Investments, Inc., Madison Marquette Consulting Group, MA DoR, and RKG Associates, Inc.

1. Impact of Retail Sales Tax

RKG also estimated the potential income the Commonwealth may receive from retail sales tax when the 350,000 SF of retail space at CitySquare is completed. The methodology for identifying this impact first involved the allocation of space to different retail store types based on the market analysis prepared for Berkeley by the Madison Marquette Consulting Group. Then, gross sales for each store type were estimated by utilizing a sales-per-square-foot factor identified in the previously mentioned market analysis. Since many essential retail goods are exempt from sales tax, including food and clothing items and selected health care, home and household items, RKG estimated that portion of retail sales that would be taxable for each store type. The resulting sales taxes were then estimated by multiplying taxable sales by a 5% tax rate, and these calculations are exhibited in Table II-7.

TABLE II-7 : CITYSQUARE
ESTIMATED RETAIL SPACE BY TYPE AND SALES AND SALES TAX (2004 DOLLARS)

Retail Type	Bldg Size	Sales/SF	Sales	% Exempt	Taxable Sales	Sales Tax
General Merchandise	50,000	$225	$11,250,000	35%	$7,312,500	$365,625
Clothing/Accessories	60,000	$275	$16,500,000	80%	$3,300,000	$165,000
Book/Music/Video	30,000	$275	$8,250,000	5%	$7,837,500	$391,875
Food Stores	40,000	$300	$12,000,000	85%	$1,800,000	$90,000
Miscellaneous Retail	90,000	$275	$24,750,000	35%	$16,087,500	$804,375
Full Service Restaurants	50,000	$300	$15,000,000	0%	$15,000,000	$750,000
Fast Food Restaurants	30,000	$300	$9,000,000	0%	$9,000,000	$450,000
Total	350,000		$96,750,000		$60,337,500	$3,016,875

Source: Berkeley Investments, Inc., Marquette Consulting Group, MA DoR and RKG Associates, Inc.

Based on this analysis, the retail portion of the CitySquare project is estimated to generate about $3 million in sales tax (in 2004 dollars) to the Commonwealth, annually, upon full build out.

III. Appendix

APPENDIX TABLE 1 – CITYSQUARE:
ESTIMATED CONSTRUCTION COSTS (OCT-2004)

			Alternative 1			Alternative 2		
Building Use		**Phase Year**	**Bldg SF**	**Cost/SF**	**Total Cost**	**Bldg SF**	**Cost/SF**	**Total Cost**
Bldg A	Office	2005	275,381	$59.46	$16,374,927	275,381	$59.40	$16,358,870
	Retail	2005	14,000	$59.46	$832,479	14,000	$59.40	$831,663
Bldg B	Office	2005	188,978	$73.26	$13,845,058	188,978	$73.20	$13,834,039
	Retail	2005	8,000	$73.26	$586,102	8,000	$73.20	$585,636
Bldg C	Retail\Rest\CC	2005	40,800	$247.36	$10,092,402	40,800	$247.30	$10,090,023
	Health Club	2005	25,000	$247.36	$6,184,070	25,000	$247.30	$6,182,612
	CONDO	2012	285,200	$227.61	$64,915,172	285,200	$227.55	$64,898,543
Bldg D	Retail	2006	95,000	$197.36	$18,749,467	95,000	$197.30	$18,743,927
	Live Theater	2006	24,000	$112.36	$2,696,707	24,000	$112.30	$2,695,308
Bldg E	Retail/Restaurant	2010	64,300	$247.36	$15,905,428	64,300	$247.30	$15,901,679
	Cinema	2010	20,000	$252.36	$5,047,256	20,000	$252.30	$5,046,090
	Day Care	2010	8,700	$197.36	$1,717,056	8,700	$197.30	$1,716,549
Bldg F	Retail/Restaurant	2008	23,000	$254.86	$5,861,845	23,000	$254.80	$5,860,503
	CONDO	2008	165,000	$198.86	$32,812,363	165,000	$198.80	$32,802,742
Bldg H	Medical Office	2007	282,000	$329.86	$93,021,311	282,000	$329.80	$93,004,868
	Retail	2007	20,000	$254.86	$5,097,256	20,000	$254.80	$5,096,090
Bldg I	Retail/Restaurant	2006	19,000	$304.86	$5,792,393	19,000	$304.80	$5,791,285
Bldg J	Retail	2008	60,000	$254.86	$15,291,768	50,000	$254.80	$12,740,225
	MULTI-FAM	2008	262,000	$187.36	$49,089,055			
	Office	2008				310,000	$189.80	$58,839,394
Bldg K	SR CONDO	2010	248,000	$187.36	$46,465,976	248,000	$187.30	$46,451,515
Bldg L	Retail	2010	25,200	$254.86	$6,422,543	25,200	$254.80	$6,421,073
Garage	Existing	2005	864,000	$10.65	$9,201,600	864,000	$10.65	$9,201,600
	New	2007	442,450	$75.19	$33,267,816	442,450	$75.19	$33,267,816
N/A	Demolition	2005	925,000	$8.83	$8,167,750	925,000	$8.83	$8,167,750
	Totals		**4,385,009**	**$106.60**	**$467,437,802**	**4,423,009**	**$107.29**	**$474,529,802**

[Source: Berkeley Investments, Inc.; Turner Construction Company and RKG Associates, Inc.

APPENDIX TABLE 2 - CITYSQUARE: ESTIMATED DIRECT & INDIRECT ECONOMIC BENEFITS FROM THE CONSTRUCTION BY YEAR

Alternative 1	2005	2006	2007	2008	2010	2012	**Total**
Estimated Construction Cost	$65,284,390	$60,506,383	$98,118,567	38,674,207	$139,939,083	$64,915,172	$467,437,802
Direct Wages for Labor [1]	$14,362,566	$13,311,404	$21,586,085	$8,508,326	$30,786,598	$14,281,338	$102,836,316
Direct Employment [2]	317	294	476	188	679	315	2,268
Taxable Building Materials [3]	$13,056,878	$12,101,277	$19,623,713	$7,734,841	$27,987,817	$12,983,034	$93,487,560
Direct State Benefits							
State Income Tax [4]	$761,216	$705,504	$1,144,062	$450,941	$1,631,690	$756,911	$5,450,325
State Unemployment Tax [5]	$287,251	$266,228	$431,722	$170,167	$615,732	$285,627	$2,056,726
Indirect State Benefits							
Indirect Wages [6, 7]	$11,035,621	$10,227,951	$16,585,884	$6,537,457	$23,655,191	$10,973,209	$79,015,312
Indirect Employment [6, 7]	268	248	403	159	574	266	1,919
State Income Taxes [4]	$584,888	$542,081	$879,052	$346,485	$1,253,725	$581,580	$4,187,812
State Unemployment Tax [5]	$220,712	$204,559	$331,718	$130,749	$473,104	$219,464	$1,580,306
Employment (Direct & Indirect)	585	542	879	346	1,253	581	4,187
State Income Taxes (Direct & Indirect)	$1,854,068	$1,718,373	$2,786,554	$1,098,342	$3,974,251	$1,843,582	$13,275,169
State Sales Tax on Materials [8]	$652,844	$605,064	$981,186	$386,742	$1,399,391	$649,152	$4,674,378
Alternative 2	2005	2006	2007	2008	2010	2012	**Total**
Estimated Construction Cost	$65,252,194	$60,498,336	$98,100,958	$110,242,864	$75,536,907	$64,898,543	$474,529,802
Direct Wages for Labor [1]	$14,355,483	$13,309,634	$21,582,211	$24,253,430	$16,618,119	$14,277,679	$104,396,556
Full Time Employment [2]	317	294	476	535	366	315	2,302
Taxable Building Materials [3]	$13,050,439	$12,099,667	$19,620,192	$22,048,573	$15,107,381	$12,979,709	$94,905,960
Direct State Benefits							
State Income Tax [4]	$760,841	$705,411	$1,143,857	$1,285,432	$880,760	$756,717	$5,533,017
State Unemployment Tax [5]	$287,110	$266,193	$431,644	$485,069	$332,362	$285,554	$2,087,931
Indirect State Benefits							
Indirect Wages [6, 7]	$11,030,179	$10,226,590	$16,582,907	$18,635,366	$12,768,698	$10,970,398	$80,214,138
Indirect Employment [6, 7]	268	248	403	453	310	266	1,948
State Income Taxes [4]	$584,599	$542,009	$878,894	$987,674	$676,741	$581,431	$4,251,349
State Unemployment Tax [5]	$220,604	$204,532	$331,658	$372,707	$255,374	$219,408	$1,604,283
Employment (Direct & Indirect)	584	542	879	987	677	581	4,250
State Income Taxes (Direct & Indirect)	$1,853,153	$1,718,144	$2,786,054	$3,130,882	$2,145,238	$1,843,110	$13,476,581
State Sales Tax on Materials [8]	$652,522	$604,983	$981,010	$1,102,429	$755,369	$648,985	$4,745,298

[1] 22% of construction cost is allocated to W-2 wages; [2] Factored on an average wage of $45,344/year
[3] 20% of construction cost is allocated as taxable building materials
[4] Factored at 5.3% of wages; [5] Factored at 2% of wages
[6] 60% of indirect employment & wages is estimated to stay within Massachusetts
[7] Factored on Regional Multiplier for Massachusetts from RIMS II (Wages-1.2806; Employment - 1.4101)
[8] Factored at 5% of Taxable Building Materials
Source: Turner Construction Company, Berkeley Investments, Inc., US Department of Commerce, MA Division of Employment and Training, MA Department of Revenue and RKG Associates, Inc.

Prepared for:

BERKELEY INVESTMENTS INC.
121 High Street
Boston, Massachusetts 02110

Prepared by:

URS CORPORATION
5 Industrial Way
Salem, NH 03079

Date: June 18, 2004
URS Job No.: 39741750

ASBESTOS OPERATIONS AND MAINTENANCE PROGRAM 120 FRONT STREET WORCESTER, MASSACHUSETTS

Douglas R. Lawson, Ph.D., CIH
Manager, Industrial Hygiene Services

TABLE OF CONTENTS

CHAPTER 1 - INTRODUCTION Page

1.0 INTRODUCTION 1

2.0 HISTORY OF ASBESTOS USES 3
2.1 Occurrence and Properties 3
2.2 Uses of Asbestos in Buildings 4
2.3 Exposure Potential 5

3.0 POTENTIAL HEALTH CONCERNS AND EFFECTS 7
3.1 The Respiratory System 7
3.2 Asbestosis 8
3.3 Lung Cancer 8
3.4 Mesothelioma 9
3.5 Other Diseases 9

4.0 ASBESTOS REGULATIONS 10
4.1 OSHA Asbestos Standards 10
4.2 National Emission Standards for Hazardous Air Pollution (NESHAP) 13
4.3 Other Federal Agencies 15
4.4 State and Local Agencies 15
4.4.1 Commonwealth of Massachusetts 16
4.5 Other Site-Specific Requirements 16

CHAPTER II - SITE-SPECIFIC O&M PROGRAM

5.0 BERKELEY INVESTMENTS INC. POLICY 18
5.1 Organization of Asbestos Management 20
5.2 Berkeley Investments Operations & Maintenance Asbestos Program Manager 21
5.3 Approved Independent Asbestos Consultant 21
5.4 Maintenance Personnel 21
5.5 Company Employees 21

6.0 AREAS CONTAINING ASBESTOS MATERIALS 23
6.1 ACM 23

7.0 NOTIFICATIONS 27
7.1 Regulatory Notifications for Operations and Maintenance and Renovation Projects 27
7.2 Regulatory Notifications for Planned and Emergency Asbestos Abatement 27
7.3 Program for Informing Building Occupants 27
7.4 Asbestos Awareness Training 28

8.0 COMMON MAINTENANCE ACTIVITIES AFFECTING ACM 29

TABLE OF CONTENTS (continued)

CHAPTER II - SITE-SPECIFIC O&M PROGRAM **Page**

9.0 LABELS AND SIGNS 30

10.0 TRAINING REQUIREMENTS 32
10.1 Custodian and Maintenance Personnel 32
10.2 Berkeley Investments O&M Program (APM) 32

11.0 CLEANING 34
11.1 Areas with Friable ACM.....35
11.2 Areas with Non-Friable ACM 35

12.0 SPECIAL WORK PRACTICES FOR MAINTENANCE ACTIVITIES 36

13.0 SPECIAL WORK PRACTICES FOR PLANNED RENOVATION WORK.....38

14.0 EMERGENCY RESPONSE PROCEDURES FOR EPISODIC EVENTS.....39

15.0 PERIODIC ACM SURVEILLANCE.....41
15.1 Assessment.....41

16.0 RECORD KEEPING 42

17.0 ASBESTOS-CONTAINING WASTE MATERIAL STORAGE AND TRANSPORTATION.....43

APPENDICES

Appendix A Inventory of Asbestos-Containing Material
Appendix B Glossary of Terms
Appendix C Licensed Abatement Contractor List
Appendix D Sample Waste Shipment Record
Appendix E Operations and Maintenance Forms
Appendix F Contractor Notification Letter and Employee Notification Letter
Appendix G Asbestos Regulations
Appendix H Building Drawings

CHAPTER I

INTRODUCTION

1.0 INTRODUCTION

This Asbestos Operations and Maintenance Program (O&M Program) provides Berkeley Investments, Inc., (Berkeley) with guidelines for conducting maintenance activities in building areas where friable and non-friable asbestos-containing material (ACM) is located. This program adopts guidelines from the United States Environmental Protection Agency (EPA) "Managing Asbestos in Place - A Building Owner's Guide to an Operations and Maintenance Program for Asbestos Containing Materials", U.S. Occupational Safety and Health Administration (OSHA) regulations, as well as state and local regulatory agency requirements. This manual is intended to provide the basis for the facility-specific implementation of the O&M program, based on asbestos survey results and historical information from previous survey and abatement projects.

The primary purpose of the O&M program is the protection of the health and safety of building occupants and staff. The goals of this program include monitoring of the condition of ACM over time, the minimization of fiber release episodes by minimizing disturbance of ACM, and abatement of asbestos when considered to be in a short-term actionable state.

This program addresses those procedures and practices required to safely perform activities, such as:

- Monitoring of the condition of ACM.
- Performing emergency asbestos abatement.
- Overseeing asbestos waste disposal.

This program is also designed to:

- Inform building management and maintenance staff of the presence of confirmed and presumed ACM at 120 Front Street, Worcester, Massachusetts and of precautions to be taken to prevent potential exposures.
- Provide guidelines for training of maintenance workers.
- Provide guidelines for notification to outside contractors regarding the presence and location of confirmed and presumed ACM.
- Establish schedules for periodic consultant surveillance activities.
- Provide guidelines for response to potential fiber-release episodes.
- Organize the documentation of these activities in conformance with applicable regulations and guidelines.

ACM was identified at 120 Front Street during an asbestos survey conducted during March and April of 2004 by URS Corporation (URS). Previous surveys also documented the presence of ACM at the site and certain inaccessible building areas were identified which contain presumed ACM. An inventory and the locations of materials identified as containing asbestos in this building is presented in Appendix A.

This Asbestos Operations & Maintenance Program manual is intended for use by an Asbestos Program Manager (APM) and trained workers. The title "Asbestos Program Manager" is the building owner or designated representative who supervises all aspects of the facility asbestos management and control program and is a term used throughout this manual. The EPA "*A Building Owner's Guide to Operations and Maintenance Programs for Asbestos-Containing Materials ("Green Book")* July, 1990, states that the Asbestos Program Manager should receive "EPA accreditation under the Asbestos Hazard Emergency Response Act (AHERA) or state certification as a Building Inspector/Management Planner". The program manager functions as the lead person in the management of the O&M program. The APM should obtain training in developing and managing an asbestos control program, including training in abatement techniques. The APM should have authority to direct the custodial and maintenance staffs and outside contractors regarding implementation of this O&M program.

In order to assure that the procedures and requirements specified in this manual will be followed, the APM identified for 120 Front Street will be Cathy Hamacher. The work practices described in this O&M program are applicable to projects qualifying as "repair" or "maintenance" operations as defined by OSHA. "Repair" means overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM or presumed ACM (PACM) attached to structures or substrates. "Maintenance" means the incidental cutting away of small amounts of ACM or PACM that could be limited to less than a single standard waste bag. The work practices are intended to assist building management in meeting current OSHA regulations applicable to O&M work. A glossary of asbestos terminology is presented in Appendix B.

A licensed Asbestos Abatement Contractor in accordance with generally recognized asbestos control techniques will perform projects including "repair" or "maintenance". Asbestos abatement contractors shall be properly licensed by the Commonwealth of Massachusetts. If ACM is in poor condition, O&M may not be appropriate and abatement may be necessary. O&M work practices are not to be used for activities requiring complete or significant abatement of ACM. Building maintenance and custodial staff will not be involved with any asbestos removal or repair operations.

Chapter I of this manual presents general information, including the history and uses of asbestos, health concerns and effects, and a summary of asbestos regulations.

Chapter II presents site-specific O&M practices and procedures. These procedures should be read and thoroughly understood and should be performed only by trained personnel.

2.0 HISTORY OF ASBESTOS USES

2.1 OCCURRENCE AND PROPERTIES

Asbestos, a naturally occurring mineral, is a fibrous hydrated silicate which possesses the unique characteristics of high tensile strength, flexibility, and chemical, electrical, and thermal resistance, and is relatively inexpensive. As a consequence of these properties, the commercial use of asbestos has been exceedingly widespread and is found in products ranging from cosmetics to insulation.

The earliest recorded use of asbestos was about 2500 B.C. in Finland, where the mineral was used to strengthen clay pots. More recently, modern industrial exploitation of this silicate dates from the 1880s when it was mined in Canada and the former U.S.S.R. The use of asbestos rapidly increased in England and France where the fibers were incorporated into cotton fabrics to produce noncombustible fabrics. Industrial applications, particularly in the West in the past 40 years, have accounted for the majority of the use of asbestos.

There are six asbestos minerals which are used in over 1,000 commercial applications:

Chrysotile is a white or greenish-colored hydrated magnesium silicate which is considered the softest of the asbestos fibers. In addition to use in insulation and fireproofing products, it is spun and woven into asbestos cloth and tape. Chrysotile is mined primarily in Canada, Africa, and the former U.S.S.R. It is believed by many scientists to be the least toxic of all asbestiform minerals.

Amosite is a fibrous, ferrous magnesium silicate which ranges in color from brownish-yellow to white, and has excellent properties for use in thermal insulation.

Crocidolite is a blue sodium iron silicate fiber which can be woven or spun into cloth or tape. It is mined mainly in South Africa and Australia and is believed to be the most toxic of the asbestiform minerals. Its use in the U.S. is very limited.

Anthophyllite is white magnesium silicate with various amounts of iron. This fiber has a harsh texture but has excellent resistance to chemicals and heat. Use of this asbestos type is limited in the U.S., but it has been found in decorative and acoustical material.

Tremolite is a white to yellow-colored calcium magnesium silicate which has been a major ingredient in industrial and commercial talc.

Actinolite is calcium iron magnesium silicate of greenish to white color. Its poor resistance to chemicals and its harsh texture are properties which limit its commercial use. However, it may be found in commercial and industrial talcs.

2.2 USES OF ASBESTOS IN BUILDINGS

Table 1 shows typical uses of asbestos in building materials and dates of use.

Table 1
Examples of Friable and Non-Friable Asbestos-Containing Material Found in Buildings*

Subdivision	Generic Name	Asbestos (%)	Dates of Use	Binder/Sizing
Surfacing Materials	Sprayed- or troweled-on	1-95	1936-1970	Portland Cement
Preformed thermal batts, blocks and insulation pipe covering products	85% magnesia	15	1926-1949	Magnesium carbonate
Textiles	Cloth	100	1910-present	None
	Blankets (fire)[a]	90-95	1920-present	Cotton/wool
	Cord/Rope/yarn[a]	80-100	1920-present	Cotton/wool
Paper Products	Corrugated, high temp.	90	1935-present	Sodium silicate
	Corrugated, moderate temp.	35-70	1910-present	Starch
	Indensed	98	1935-present	Cotton
	Millboard	80-85	1925-present	Starch, lime, clay
Roofing Felts	Smooth surface	10-15	1910-present	Asphalt
	Mineral surface	10-15	1910-present	Asphalt
	Shingles	1	1971-1974	Asphalt
	Pipeline	10	1920-present	Asphalt
Cementitious Cement	Extrusion panels	8	1965-1977	Portland
Concrete-like Cement Products	Corrugated	20-45	1930-present	Portland
	Flat	40-50	1930-present	Portland
	Flexible	30-50	1930-present	Portland
	Flexible perforated	30-50	1930-present	Portland
	Laminated	35-50	1930-present	Portland
	Roof tiles	20-30	1930-present	Portland
	Clapboard	12-15	1944-1945	Portland
	Siding shingles	12-14	Unknown-present	Portland
	Roofing shingles	20-32	Unknown-present	Portland
	Pipe	20-15	1935-present	Portland
Asbestos-containing compounds:	Caulking putties	30	1930-present	Linseed
	Adhesive (cold-applied)	5-25	1945-present	Asphalt

Subdivision	Generic Name	Asbestos (%)	Dates of Use	Binder/Sizing
	Joint compound	Unknown	1945-1975	Asphalt
	Roofing asphalt	5	Not reported	Asphalt
	Mastic	5-25	1920-present	Asphalt
	Asphalt tile cement	13-25	1959-present	Asphalt
	Roof putty	10-25	Unknown-present	Portland
	Plaster - stucco	2-10	Unknown-present	Portland
	Spackles	3-5	1930-1975	Starch
	Sealant (fire/water)	50-55	1935-present	Castor Oil
	Cement insulation	20-100	1920-1973	Clay
	Cement finishing	55	1920-1973	Clay
Flooring	Vinyl asbestos tile/polyvinylchloride	21	1950-present	Not reported
Sheet Goods	Asphalt, asbestos tile	26-33	1920-present	Asphalt
	Resilient sheet goods	30	1950-present	Dry oils
Wall Coverings	Vinyl wallpaper	6-8	Unknown-present	Asphalt

* The information in this table is taken, with modification, from: Lory EE, Coin DC, February 1981. Management Procedure for Assessment of Friable Asbestos Insulating Material, Port Hueneme, CA: Engineering Laboratory Naval Construction Battalion Center.

[a] Laboratory aprons, gloves, cord, rope, fire blankets and curtains may be common in schools.

2.3 EXPOSURE POTENTIAL

Construction materials containing friable (that which can be crumbled, pulverized or reduced to a powder by hand pressure) asbestos have been used extensively in commercial buildings, especially those built prior to 1975, although it has been found in buildings constructed in the early 1980s. Some non-friable (that which cannot be crumbled, pulverized or reduced to a powder by hand pressure) materials known to contain asbestos, such as floor tile, mastic, and joint compound, have been identified in buildings constructed after 1980). The concern about exposure to asbestos in commercial buildings is based on studies involving intensive occupational exposure to asbestos in the shipbuilding, mining, milling, and fabricating industries.

After performing numerous assessments of asbestos fiber levels in air, the USEPA found that average airborne asbestos fiber levels inside buildings containing asbestos products are essentially the same as those outside buildings. The USEPA determined that intact, undisturbed, asbestos materials do not pose a health risk, and that the mere presence of asbestos in a building does not mean that the health of the building occupants is endangered.

The presence of asbestos in a building does not mean that the occupants are at risk. If ACM remain in good condition and is unlikely to be disturbed, exposure should be negligible. However, when ACM is damaged or disturbed (for example, by maintenance, repairs, or renovations conducted without proper controls), asbestos fibers can be released to the ambient environment.

Friable ACM presents a potential source of exposure and must be carefully protected from damage or disturbance. Materials which contain asbestos fibers firmly encased in a solid matrix, such as cement asbestos pipe or vinyl asbestos floor tile, present a diminished potential for airborne asbestos fiber releases and exposures, except during cutting, demolition, drilling, grinding, and sanding these forms of ACM.

Risks associated with low level, non-occupational exposure have not been well defined. As a result, the USEPA has instituted measures for schools to control or eliminate children's exposure to asbestos. That regulation, the Asbestos Hazard Emergency Response Act (AHERA), is considered "state-of-the-art" for asbestos control, and is often used as a guideline by private industry. The requirements contained in the AHERA regulation have been selected for this program because of their effectiveness in limiting employee risk of asbestos exposure.

3.0 POTENTIAL HEALTH CONCERNS AND EFFECTS

The potential adverse health effects associated with asbestos exposure have been extensively studied for many years. Results of these studies and epidemiological investigations have demonstrated that extensive and intensive inhalation of asbestos fibers may lead to an increased risk of developing one or more diseases.

It is important to recognize that most people who have developed a disease as a result of asbestos exposure were asbestos workers (for example, miners, factory workers, and ship builders). These workers were frequently exposed to very high concentrations of asbestos fibers each working day with little or no protection.

Ambient airborne fiber levels in buildings today are typically tens of thousands times lower than those measured during mining, milling, and ship building activities (USEPA, 1990). Additionally, today's workers follow specific work practices and wear appropriate personal protection, including respirators, to minimize the risk of exposure.

3.1 THE RESPIRATORY SYSTEM

The health risks associated with exposure to asbestos are primarily due to excessive inhalation of high concentrations of asbestos fibers. As air is inhaled, it passes through the mouth and nose into the windpipe or trachea. The trachea splits into two smaller airways called bronchi. Each bronchus divides into smaller and smaller tubes which lead into air sacks, called alveoli. In these air sacks (alveoli), oxygen passes through the alveolar membrane and is absorbed by red blood cells in small blood vessels. Carbon dioxide and other waste gases pass out of the blood back into the alveoli where they are exhaled.

The lung is comprised of two lobes and sits in the pleural cavity. The lining of the cavity and the membranes around the lung are in contact with each other and are very moist. Like two panes of glass with a drop of water between them, these membranes slide easily across each other, but are very difficult to pull apart. Thus, as the chest cavity expands, the lungs do too, and air rushes in. If these linings (mesothelia) became damaged, one would not be able to inhale properly.

The body has several mechanisms by which it "filters" the air breathed. First, very large particles are removed in the nose and mouth. Smaller particles are caught on the mucous-coated walls of the airways. These airways have a hair-like lining (ciliated cells) which constantly beats upward. The ciliated cells sweep the particles up the airway and into the mouth where particles are either swallowed or expelled. Particles caught in the mucous are swept into the back of the mouth.

Cigarette smoking temporarily paralyzes these ciliated cells, inhibiting one of the body's natural defenses against unwanted dust. As the smoker sleeps, the hair-like cells start working again and

carry large amounts of mucous into the back of the mouth. This causes the so-called "smoker's hack" in the morning. After the first cigarette or two, the cleansing mechanism is paralyzed again and the coughing stops, allowing more particles to enter into the deeper airways and cause potential damage. For this reason, smokers who are exposed to asbestos appear to be at greater risk than nonsmokers. Other reasons will also be discussed in Section 3.3 (Lung Cancer).

Even with these natural defenses of the body, some dust particles inevitably reach the tiny air sacks. When this occurs, large cells (called macrophages) attempt to engulf the particle and "digest" it. For this reason, they are sometimes called the "lungs' garbage collectors". However, because asbestos is a mineral fiber, the macrophages are sometimes unsuccessful in digesting them. As a secondary defense mechanism, these macrophages deposit a coating on the fibers when they are unsuccessful in digesting them. This occurrence causes a series of chain reactions that ultimately result in the development of scar tissue on the lung. Where the presence of scar tissue disrupts normal respiratory function, asbestosis may develop.

3.2 ASBESTOSIS

Asbestosis is a disease characterized by fibrotic scarring of the lung. It is a restrictive disease that reduces the capacity of the lung and hampers its ability to exchange gases. The earliest symptom is coughing. Asbestosis is prevalent among workers who have been exposed to large doses of asbestos fibers over a long period of time. There is a clear dose-response relationship between asbestos exposure and development of this disease. This means that the greater the asbestos exposure, the more likely asbestosis will develop.

Asbestosis is irreversible and can progress even after exposure has ceased. As the disease progresses, shortness of breath is commonly observed along with changes in lung function, a crackling sound in the lower half of the lung, and clubbed fingers.

Although most people believe a threshold exposure level exists below which the disease does not occur, this threshold level has not yet been determined. All forms of asbestos have demonstrated the ability to cause asbestosis. Like all diseases associated with asbestos exposure, it may take many years for the disease to develop. The typical length of time for symptoms of disease to appear from the time of the exposure (latency period) for asbestosis is 15 to 30 years.

3.3 LUNG CANCER

There are many causes of lung cancer, of which asbestos is only one. While employees exposed to industrial concentrations of asbestos in years past have an increased risk of getting lung cancer five times the normal population, their risk is not as great as the cigarette smoker whose risk is ten times the normal rate. A cigarette smoker who also works with asbestos is 50 times more likely to contract lung cancer than the normal nonsmoking population. The cigarette smoking and asbestos exposure multiply the effects of each other. This is known as a "synergistic effect"

(Selikoff Studies, 1979).

Like asbestosis, there exists a long lag time between initial exposure and the occurrence of lung cancer which is typically 20 to 30 years. There appears to be a dose-response relationship between asbestos exposure and lung cancer although no "safe" lower exposure level has yet been determined. Again, these figures relate to past industrial situations where workers wore little or no personal protective equipment.

3.4 MESOTHELIOMA

The asbestos-associated disease of greatest concern in asbestos work is probably mesothelioma; it is also the rarest. It is considered to be a marker disease for asbestos exposure. Mesothelioma is a cancer of the chest or abdominal cavity linings (mesothelium). If it occurs in the chest cavity, it is called pleural mesothelioma. If it occurs in the abdominal cavity, it is called peritoneal mesothelioma. By the time cancer is diagnosed, it is almost always fatal and effective therapy does not currently exist.

There is no exposure threshold for mesothelioma. The exact mechanism of the disease remains unknown. Smokers do not appear to be at greater risk of getting mesothelioma nor does a dose-response relationship seem to exist between asbestos exposure and mesothelioma. Like other diseases caused by asbestos exposure, mesothelioma often takes 30-40 years after initial exposure to develop.

3.5 OTHER DISEASES

Other diseases and adverse health effects have been observed in conjunction with asbestos exposure. Increased incidence of gastrointestinal cancers, including cancers of the esophagus, stomach, colon-rectum, kidney, and pancreas have been observed in populations exposed to asbestos.

Pleural plaque (thickening of the chest cavity lining) has also been observed among people exposed to asbestos. This condition does not have any symptoms nor does it require treatment.

4.0 ASBESTOS REGULATIONS

To date, two federal agencies have been principally responsible for generating asbestos control regulations. These two agencies are the USEPA and the U. S. Occupational Safety and Health Administration (OSHA). In general, OSHA extends to all private sector employers and employees under federal jurisdiction. USEPA extends to all public and private work settings under federal jurisdiction. In addition, individual states and local townships have promulgated their own regulations. The following sections highlight some of these federal and state requirements.

4.1 OSHA ASBESTOS STANDARDS (See Appendix G)

OSHA has established three sets of regulations that address asbestos exposure:

29 CFR 1926.1101	Construction Industry Standard
29 CFR 1910.1001	General Industry Standard
29 CFR 1910.134	Respiratory Protection Standard

The Construction Industry Standard covers employees engaged in demolition and construction and the following related activities likely to involve asbestos exposure: removal, encapsulation, alteration, repair, maintenance, insulation, spill/emergency cleanup, transportation, disposal, and storage of ACM. The General Industry Standard covers all other operations where exposure to asbestos is possible, including occupant exposure to asbestos from buildings that contain ACM. In general, operations and maintenance asbestos-related work are covered by the Construction Standard.

To enforce its standards, OSHA is authorized to conduct workplace inspections. In addition, employees have the right to file an OSHA complaint without fear of punishment from the employer. In turn, employees have the responsibility to follow all safety and health rules. OSHA may not conduct a warrantless inspection without the employer's consent.

OSHA will issue a citation during an inspection if the Compliance Officer finds that a standard is being violated. The citation informs the employer and employees of the regulations or standard(s) alleged to have been violated and of the proposed length of time for correction. Monetary penalties may also be imposed.

OSHA published its final rule on asbestos in the Federal Register on August 10, 1994, updating its original 1970 standard. The new regulations amend the general industry (1910) and construction (1926) standards issued in 1986 and add a shipyard employment standard (1915). Highlights of the general industry and construction standards follow.

- The permissible exposure limit (PEL) has been lowered to 0.1 fibers per cubic centimeter (f/cc) of air as an 8-hour time-weighted average (TWA) for all asbestos work in all industries, effective October 11, 1994. There is no action level. The excursion limit remains at 1.0 f/cc, averaged over a 30-minute sampling period. Fiber concentrations above these standards trigger various worker protection and related requirements. If average airborne concentrations on an 8-hour time weighted basis are above 0.1 f/cc of air, a full compliance program must be undertaken. This includes engineering and work practice controls and, if needed, respiratory protection for exposed workers.

- The General Industry Standard regulates all activities related to asbestos, except agricultural, that are not covered by the construction and shipyard employment standards. Under this standard, employers must provide awareness training to employees who perform housekeeping activities in areas where ACM or PACM is located. They must also institute a training program for all employees who are exposed to airborne asbestos fibers at or above the PEL and/or excursion limit and ensure that they participate in the program. The program should be presented before the initial assignment and at least annually thereafter.

- OSHA has eliminated the term "small-scale short duration projects" in the construction standard. Instead OSHA classifies construction activity according to a descending degree of risk. Class I work presents the greatest risk potential and Class IV, the lowest:

  - Class I work involves the removal of thermal system insulation and surfacing ACM or PACM.

  - Class II work involves removal of any other ACM which is not thermal system insulation or surfacing ACM.

  - Class III work is defined as repair and maintenance activities where employees are likely to disturb ACM.

  - Class IV is defined as maintenance and custodial activities during which employees contact ACM and PACM and activities to clean up waste and debris containing ACM and PACM.

- Under the construction standard, employers must designate a "competent person" (for example, the Asbestos Consultant) who has the qualifications and authority for ensuring worker health and safety. This person must be capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy to reduce asbestos exposure and have the authority to take prompt corrective action. For Class I and II work, the competent person must be trained in accordance with EPA's Model Accreditation Plan (40 CFR 763) for project designer or supervisor, or its equivalent and,

for Class III and IV work, must have completed a 16-hour Operations and Maintenance (O&M) course developed by EPA (40 CFR 763.92 (a) (2)) or its equivalent.

- The competent person must be present on all construction work sites to supervise all asbestos work performed in regulated areas (an area where Class I, II, or III asbestos work is conducted, an adjoining area where debris and waste from the project may accumulate, and an area where airborne asbestos fiber concentrations exceed or have the potential to exceed the PEL), conduct frequent and regular inspections of the job sites, materials, and equipment as part of required safety and health program. Personal monitoring of workers must be performed unless (1) historical data for similar tasks show fiber concentrations consistently below the PEL, or (2) "objective data" show that the ACM being handled or disturbed will not cause exposure above the PEL.

- Employers must institute a training program for all workers who install asbestos-containing products and all workers who perform Class I, II, III, and IV work. Medical surveillance is required for all asbestos workers (for example, outside contractors) who engage in Class I, II, or III work for a combined total of 30 days or more a year or who are exposed above the PEL or the excursion limit of 1.0 f/cc.

- Employers must communicate the hazards of asbestos to employees if ACM or PACM is present in their facilities, or if their employees will work with ACM.

Some specific provisions should be implemented as soon as possible but no later than the following dates:

Issue	Date
Housekeeping	October 1, 1995
Medical Surveillance	October 1, 1995
Respiratory Protection	October 1, 1995
Hygiene Facilities and Practices for Employees	October 1, 1995
Communication of Hazards	October 1, 1995
Competent Person Designation and Training	October 1, 1995
Engineering and Work Practice Controls	October 1, 1995

Specific compliance requirements differ somewhat between the general and construction industries. Findings and actions must be fully documented, and records saved for specific periods of time, usually 30 years or more.

4.2 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP)

The USEPA National Emission Standards for Hazardous Air Pollutants (NESHAP, 40 CFR Part 61, Subpart M, as amended November 20, 1990) should be considered during maintenance, renovation, or demolition activities that might disturb ACM. NESHAP's rules apply to the application, removal, and disposal of ACM. Also included in NESHAP are rules concerning manufacturing, spraying and fabricating ACM.

Some highlights of the NESHAP requirements follow.

DEFINITIONS

NESHAP, as amended November 20, 1990, divides the types of ACM into three categories: regulated ACM (RACM), Category I non-friable ACM, and Category II non-friable ACM.

RACM

RACM is friable ACM that contains more than 1 percent asbestos that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

Category I

Category I non-friable ACM includes asbestos gaskets, resilient floor coverings, and asphalt roofing products containing more than 1 percent asbestos that cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Category I non-friable ACM that has been made friable or subjected to sanding, grinding, cutting, or abrading is considered RACM.

Category II

Category II non-friable ACM includes all other forms of non-friable ACM containing more than 1 percent asbestos that are not included in Category I. Examples include Transite® board and cement siding.

Category II non-friable ACM that will be or have a high probability of becoming crumbled, pulverized, or reduced to powder is also considered RACM.

SURVEYS

A survey is required to identify the forms of asbestos present in a facility prior to renovation or demolition activities. These include RACM and Category I and II non-friable ACM.

NOTIFICATION REQUIREMENTS

Demolition Projects

NESHAP defines demolition as the removal of a load supporting structural member of a facility or intentional burning.

- Notification must be given to the USEPA regional NESHAP's Coordinator 10 working days prior to demolition of a building regardless of the quantity of RACM present.

- Notification must also be provided 10 working days prior to demolition for any facility that does not contain asbestos.

Renovation Projects

NESHAP defines renovation as altering a facility or component in any way, including removal of ACM.

- Notification must be given 10 working days prior to renovation if quantities greater than 160 square feet or 260 linear feet of RACM are removed.

- Notification must be provided at least 10 working days before the end of the calendar year if the combined additive amount of friable RACM to be removed or stripped during planned renovations in the next calendar year is greater than 260 linear feet or 160 square feet.

REMOVAL REQUIREMENTS

- Removal is required of any RACM that will be affected prior to demolition. Prior to renovation if the activities would "break up or disturb" RACM, removal may be the only practical alternative.

- Friable RACM must be removed using wet removal techniques.

- With special approval from USEPA, dry removal is allowed under certain circumstances.

- No visible emissions to the outside air are permitted during removal or renovation.

DISPOSAL REQUIREMENTS

- No visible emissions to the outside air are allowed during collecting, packaging, transporting, or disposing of ACM waste.
- Wet ACM must be sealed in leak-tight containers.
- Containers must be properly labeled with OSHA labels and provide the generator's identification and facility location. A generator's number for hazardous waste is not required.

4.3 OTHER FEDERAL AGENCIES

Other federal agencies promulgating asbestos regulations include the Department of Transportation (DOT) on the transport of asbestos and the National Institute of Standards and Technology (NIST) on standards and protocols for laboratory accreditation.

The USEPA Asbestos School Hazard Abatement Reauthorization Act (ASHARA) rule concerns persons performing asbestos related work in public and commercial buildings. Under ASHARA, accreditation requirements and minimum training hours are established for inspectors in public and commercial buildings, and for persons who design or carry out response actions including project designers, contractor/supervisors, and workers.

4.4 STATE AND LOCAL AGENCIES

State and local agencies may have additional requirements than those required by federal agencies. Therefore, state and local regulations where the facility is located must be reviewed and complied with. Some of the state and local agencies in the Commonwealth of Massachusetts include the Department of Environmental Protection, Department of Health, Division of Occupational Safety, Department of Building Construction, Department of Transportation, etc.

4.4.1 Commonwealth of Massachusetts Regulatory Requirements

Commonwealth of Massachusetts Regulatory Requirements

Department of Environmental Protection:

Bureau of Waste Prevention

Scope of Regulations*:* Requires notification and work practices to avoid fiber release for asbestos handling, removal, storage, transport, and disposal; inspects demolition/renovation and manufacturing operations; regulates storage, handling, and special waste landfilling of asbestos and asbestos-containing material.

Regulations: 310 CMR 4.00 (Air Quality notification approval timelines and fees), 7.00, 7.09(5), 7.15 (AQ asbestos regulation) and 310 CMR 19.061 (disposal requirements) and 310 CMR 16.00 (landfill siting; asphalt-brick-concrete recycling).

Bureau of Waste Site Cleanup

Scope of Regulations*:* Regulates cleanup of oil and hazardous materials; material containing asbestos must be reported if released to the environment if it poses a threat of release.

Regulations: 310 CMR 40.0000.

Division of Occupational Safety (DOS)

Scope of Regulations*:* Prescribes training, certification and/or licensing requirements for persons and firms engaged in asbestos work, for inspectors, management planners, project designers and project monitors, laboratories and training providers. It also prescribes project notification and work practice requirements for asbestos work. The USEPA has delegated programs for AHERA and ASHARA enforcement to DOS.

Regulations: 453 CMR 6.00

4.5 OTHER SITE-SPECIFIC REQUIREMENTS

Not Applicable.

CHAPTER II

SITE-SPECIFIC O&M PROGRAM

5.0 BERKELEY INVESTMENTS, INC. O&M PROGRAM POLICY

Asbestos is a naturally occurring carcinogen once used in a wide variety of building products. ACM remains in commercial structures and other facilities, such as those managed by Berkeley. The presence of ACM within a building structure does not, in and of itself, pose a hazard to human health. This policy is designed to control the possible health risks that could be created if excessive asbestos fibers are released. This policy requires:

- Removing ACM prior to planned disturbance, including renovation, in accordance with applicable federal, state, and local laws and regulations.

- Confirming the existence of ACM by testing and removing or otherwise abating the existing ACM prior to any planned disturbance.

- Implementing operations and maintenance ("O&M") programs in accordance with applicable laws, to manage and periodically assess the condition of ACM or PACM.

- Minimizing disturbance of ACM or PACM through employee awareness training and other management practices.

- Informing and training affected employees, in accordance with applicable federal, state, and local laws and regulations.

ASBESTOS COORDINATION

The director of the O&M program is the Asbestos Program Manager (APM). The APM will implement Berkeley's O&M program by using certified environmental consultants and contractors. Berkeley's APM for the 120 Front Street building will be responsible for minimizing the risks caused by the presence of ACM in the building through proper execution of the O&M program.

All information regarding the identification of known or suspected ACM in an existing facility, or information relevant to a proposed new facility, must be maintained by and reported to the APM. The APM will provide for amendment, if necessary, of the O&M program to reflect new information and to disseminate information to the appropriate parties.

ASBESTOS CONSULTANT

Berkeley will retain a qualified and experienced asbestos consultant to assist the APM and other Berkeley staff, as needed. The consultant will be available to perform building surveys, assess condition of ACM and PACM, test and monitor airborne fiber concentration levels, coordinate ACM emergency procedures, conduct asbestos awareness training, aid in the implementation of the O&M program, and provide asbestos abatement design and monitoring services, as required. URS Corporation (URS) will fill the role of the Independent Asbestos Consultant for this property.

OCCUPIED PROPERTY

Periodic asbestos condition surveys will be performed, as necessary, to assess the condition and potential hazards posed by identified ACM or PACM. Within the limits of operational factors, and as may otherwise be required by applicable law, ACM abatement may be planned based upon results of the condition assessment surveys, and in conjunction with a planned alteration ("Planned Actionable"). Berkeley will strive immediately to abate any ACM or PACM that is damaged, accessible, and friable if the periodic condition assessment survey indicates that it is an immediate health threat ("Short-Term Actionable") in accordance with applicable laws and regulations.

Abatement must be performed by a qualified and licensed Asbestos Abatement Contractor prior to or in conjunction with any renovation or demolition work which could disturb ACM.

ASBESTOS ABATEMENT

Abatement and disposal of ACM will be conducted in accordance with applicable laws and regulations and within generally accepted standards of the asbestos abatement industry. Berkeley will retain the services of an Independent Asbestos Consultant to (1) design large abatement projects, (2) observe the work of abatement contractors, (3) inform applicable employees of the presence of ACM prior to the abatement work being performed, (4) conduct air monitoring before, during, and after abatement projects, as appropriate, and (5) prepare and submit final abatement project reports.

Preparation of a specification or detailed scope of work will be necessary for major asbestos abatement activities. The specification shall be site-specific and detailed for a particular project or operation. Specifications will be required for all major work by abatement contractors, except for routine operations conducted under the guidance of the designated Independent Asbestos Consultant.

Berkeley will only employ qualified and licensed Asbestos Abatement Contractors for abatement projects, independent of the Asbestos Consultant and the licensed laboratory.

OPERATIONS AND MAINTENANCE PROGRAM

URS has been retained to evaluate the condition of the identified ACM and PACM at 120 Front Street property**.** Information pertaining to ACM and PACM at the property was obtained through a limited building asbestos survey and records review conducted for Berkeley. As part of this O&M program, maintenance and other employees including outside contractors who come into contact with ACM or PACM at the facility will be notified of its presence, as required by law and, if the ACM or PACM will not be removed, be trained to detect and report episodic incidents of asbestos damage or fiber release, so as to allow for the proper abatement of Short-Term Actionable ACM.

Berkeley employees will be directed not to engage in any activity which will disturb friable ACM or PACM. Cleanup and maintenance of friable ACM or PACM will be conducted only by qualified and licensed asbestos abatement contractors. Asbestos Awareness Training will educate facility personnel in the care and treatment of non-friable ACM and PACM at the facility.

5.1 ORGANIZATION OF THE ASBESTOS MANAGEMENT TEAM

Members of the asbestos management team may include:

- Berkeley APM
- Independent Asbestos Consultant
- Maintenance Personnel
- Custodial Staff
- Office Personnel
- Asbestos Abatement Contractor.

This information should be dated and kept current. The APM will be responsible for providing updates to the Asbestos O&M Program, with assistance from the Independent Asbestos Consultant.

5.2 BERKELEY OPERATIONS & MAINTENANCE PROGRAM MANAGER (APM)

The Berkeley APM has the ultimate responsibility of implementation and enforcement authority for this O&M Program at the facility level. Deviation from this program must be pre-approved by the APM. The APM will direct the activities of the Independent Asbestos Consultant, with respect to ACM and PACM at the facility.

Any questions from employees, contractors or tenants regarding O&M program content or requirements should be directed to the APM, who will be responsible for program implementation and recordkeeping, although tasks may be delegated to other staff members for execution or evaluation.

5.3 APPROVED INDEPENDENT ASBESTOS CONSULTANT

An Independent Asbestos Consultant, approved by Berkeley, will be retained to perform visual assessments, air and/or bulk sampling and project oversight and will provide recommendations, as necessary. The Approved Independent Asbestos Consultant will work closely with the APM to assist in evaluating and implementing appropriate response actions.

5.4 MAINTENANCE PERSONNEL

Maintenance personnel will temporarily stop any activity and notify their supervisor when their work will potentially disturb ACM or PACM. The supervisor will notify the APM, who, along with the Independent Asbestos Consultant, will evaluate and implement the appropriate response actions.

5.5 COMPANY EMPLOYEES

All associates will notify the APM when they encounter damaged ACM or PACM. The APM, along with the Approved Independent Asbestos Consultant, will evaluate and implement the appropriate response action.

120 Front Street O&M Asbestos Program Manager (APM)

Name:	Cathy Hamacher
Address:	120 Front Street
City, State:	Worcester, Massachusetts
Voice:	(508) 890-8885
Cell:	
Fax:	(508) 890-8881

Independent Asbestos Consultant

Company: URS Corporation
Address: 5 Industrial Way
City, State: Salem, New Hampshire 03079
Manager: Douglas R. Lawson, Ph.D., CIH
Telephone: 603.893.0616

Asbestos Abatement Contractors

Company: Dec-Tam Corporation
Address: 50 Concord Street
City, State: North Reading, Massachusetts 01864
Telephone: 978.470.2860

Company: The Aulson Company, Inc.
Address: 49 Danton Drive
City, State: Methuen, Massachusetts 01844
Telephone: 800.542.0024

Company: MARCOR Environmental, Inc.
Address: 3-D Gill Street
City, State: Woburn, Massachusetts
Telephone: 800.545.5350

6.0 AREAS CONTAINING ASBESTOS MATERIALS

A summary of the areas where ACM and PACM were determined to be present and their condition is presented in this section. URS' bulk material assessment identified those materials that contain asbestos fibers in a concentration greater than one percent in accordance with federal, state and local regulations, as outlined in Appendix A. URS' survey was limited to building areas where readily accessible suspect ACM was located. Additional suspect ACM uncovered during operations, maintenance, renovation, and/or demolition activities that was not identified during URS' limited survey must be treated as an ACM until laboratory analysis proves otherwise.

6.1 ACM

Asbestos exists at the following locations:

ASBESTOS CONTAINING MATERIALS
LOCATIONS AND QUANTITIES

Floor	Material	Quantity
Lower Level (Basement)	Pipe Fitting Insulation (<6" diameter)	12 EA
Lower Level (Basement)	End Cap Mud	20 EA
Lower Level (Basement)	12" x 12" Pitted Floor Tile	4,200 SF
Lower Level (Basement)	12" x 12" Pitted Floor Tile Mastic	4,200 SF
Lower Level (Basement)	Covebase Mastic	332 LF
Lower Level (Basement)	Joint Compound	4,700 SF
Lower Level (Basement)	Red Duct Mastic	Not Quantified (Estimate 20 LF)
Lower Level (Basement)	Spray-Applied Fireproofing (Presumed at Perimeter)	1,800 SF
1st Floor	Covebase Mastic	1,045 LF

ASBESTOS CONTAINING MATERIALS LOCATIONS AND QUANTITIES (Continued)

Floor	Material	Quantity
1st Floor	12” x 12” Pitted Floor Tile	50 SF
1st Floor	12” x 12” Pitted Floor Tile Mastic	50 SF
1st Floor	Joint Compound	3,920 SF
1st Floor	Red Duct Mastic	Not Quantified (Estimate 20 LF)
1st Floor	Expansion Mastic	690 LF
1st Floor	Spray-Applied Fireproofing (Presumed at Perimeter)	1,800 SF
2nd Floor	Covebase Mastic	140 LF
2nd Floor	Joint Compound	1,400 SF
2nd Floor	Red Duct Mastic	Not Quantified (Estimate 20 LF)
2nd Floor	Expansion Mastic	690 LF
2nd Floor	Spray-Applied Fireproofing (Presumed at Perimeter)	2,070 SF
3rd Floor	12” x 12” Pitted Floor Tile	75 SF
3rd Floor	12” x 12” Pitted Floor Tile Mastic	75 SF
3rd Floor	Covebase Mastic	200 LF
3rd Floor	Joint Compound	3,770 SF
3rd Floor	Red Duct Mastic	Not Quantified (Estimate 20 LF)
3rd Floor	Expansion Mastic	690 LF
3rd Floor	Spray-Applied Fireproofing	2,000 SF
3rd Floor	Spray-Applied Fireproofing (Presumed at Perimeter)	2,070 SF
4th Floor	12” x 12” Pitted Floor Tile	200 SF
4th Floor	12” x 12” Pitted Floor Tile Mastic	200 SF
4th Floor	Covebase Mastic	200 LF

ASBESTOS CONTAINING MATERIALS LOCATIONS AND QUANTITIES (Continued)

Floor	Material	Quantity
4th Floor	Joint Compound	3,770 SF
4th Floor	Red Duct Mastic	Not Quantified (Estimate 20 LF)
4th Floor	Expansion Mastic	690 LF
4th Floor	Spray-Applied Fireproofing	6,286 SF
4th Floor	Contaminated Ceiling Tile	6,286 SF
4th Floor	Spray-Applied Fireproofing (Presumed at Perimeter)	2,070 SF
5th Floor	Covebase Mastic	200 LF
5th Floor	12” x 12” Pitted Floor Tile	200 SF
5th Floor	12” x 12” Pitted Floor Tile Mastic	200 SF
5th Floor	Joint Compound – Tan	3,770 SF
5th Floor	Red Duct Mastic	Not Quantified (Estimate 20 LF)
5th Floor	Expansion Mastic	690 LF
5th Floor	Spray-Applied Fireproofing (Presumed at Perimeter)	2,070 SF
6th Floor	12” x 12” Pitted Floor Tile	200 SF
6th Floor	12” x 12” Pitted Floor Tile Mastic	200 SF
6th Floor	Covebase Mastic	200 LF
6th Floor	Red Duct Mastic	Not Quantified (Estimate 20 LF)
6th Floor	Joint Compound – Tan	3,770 SF
6th Floor	Expansion Mastic	690 LF
6th Floor	Spray-Applied Fireproofing (Presumed at Perimeter)	2,070 SF
7th Floor	Floor Tile Mastic (Bottom Layer)	75 SF
7th Floor	Joint Compound – Tan	3,770 SF

ASBESTOS CONTAINING MATERIALS LOCATIONS AND QUANTITIES (Continued)

Floor	Material	Quantity
7th Floor	12” x 12” Brown Floor Tile	400 SF
7th Floor	12” x 12” Brown Floor Tile Mastic	400 SF
7th Floor	12” x 12” Pitted Floor Tile	100 SF
7th Floor	12” x 12” Pitted Floor Tile Mastic	100 SF
7th Floor	Red Duct Mastic	Not Quantified (Estimate 20 LF)
7th Floor	Covebase Mastic	200 LF
7th Floor	Expansion Mastic	690 LF
7th Floor	Spray-Applied Fireproofing (Presumed at Perimeter)	2,070 SF
8th Floor	Tan Joint Compound	2,726 SF
8th Floor	Spray-Applied Fireproofing	2,170 SF
8th Floor	Floor Tile	150 SF
8th Floor	Floor Tile Mastic	150 SF
8th Floor	Covebase Mastic	200 LF
8th Floor	Expansion Mastic	690 LF
8th Floor	Spray-Applied Fireproofing (Presumed at Perimeter)	2,070 SF
8th Floor	Red Duct Mastic	Not Quantified (Estimate 20 LF)
9th Floor	Red Duct Mastic	Not Quantified (Estimate 10 LF)
9th Floor	Expansion Mastic	251 LF
9th Floor	Glue Dots	Not Quantified (Estimate 20 SF)
9th Floor	Joint Compound	250 SF
9th Floor	Covebase Mastic	150 LF

ASBESTOS CONTAINING MATERIALS LOCATIONS AND QUANTITIES (Continued)

Floor	Material	Quantity
9th Floor	Spray-Applied Fireproofing (Presumed at Perimeter)	750 SF
9th Floor	12” x 12” Pitted Floor Tile	200 SF
9th Floor	12” x 12” Pitted Floor Tile Mastic	200 SF
9th Floor (Mechanical Space)	Spray-Applied Fireproofing	9,698 SF
9th Floor (Mechanical Space)	Asbestos Contaminated Floor Space	9,698 SF
9th Floor (Mechanical Space)	Red Duct Mastic	Not Quantified (Estimate 10 LF)
9th Floor (Mechanical Space)	Expansion Mastic	439 LF
9th Floor (Mechanical Space)	Joint Compound	1,215 SF
9th Floor (Mechanical Space)	Covebase Mastic	150 LF
9th Floor (Mechanical Space)	12” x 12” Pitted Floor Tile	400 SF
9th Floor (Mechanical Space)	12” x 12” Pitted Floor Tile Mastic	

7.0 NOTIFICATIONS

7.1 REGULATORY NOTIFICATIONS FOR OPERATIONS, MAINTENANCE AND RENOVATION PROJECTS

Federal, state, and local regulatory notifications are not typically required for O&M activities affecting less than three square or three linear feet of ACM. However, if the total cumulative amount of ACM, per location, for the calendar year is above 160 square feet or 260 linear feet of ACM, then, blanket notification for the full year must be provided to the USEPA. The consultant or asbestos abatement contractor performing the work is required to complete a Fiber Release Episode Report form (Appendix E) and to submit it to the APM for review and record-keeping.

7.2 REGULATORY NOTIFICATIONS FOR PLANNED AND EMERGENCY ASBESTOS ABATEMENT

The EPA, state, and local jurisdictional authorities must be notified in writing of each scheduled and emergency asbestos abatement project. The asbestos consultant or contractor will ensure that this notification is completed within the required notification period.

7.3 PROGRAM FOR INFORMING BUILDING OCCUPANTS

Once the presence of ACM or PACM has been established in a facility, a notification program must be initiated. The notification program serves two primary purposes: (1) it alerts affected parties to the presence of ACM and PACM in the facility, and (2) it provides basic information on avoiding the unnecessary disturbance of ACM or PACM. This notification program is based on USEPA and OSHA requirements.

Notification of some building occupants, as necessary and/or required, and other affected individuals, including outside contractors, can be accomplished in several ways. Two common methods are:

- Distributing notices/letters, or
- Holding awareness or informational seminars.

The distribution of notices is an effective means of alerting facility occupants about the presence of asbestos. Memos or letters can be tailored to specific parties, and verification that notification was received is easily accomplished. Sample Contractor and Employee Notification Letters are attached as Appendix F.

7.4 ASBESTOS AWARENESS TRAINING

OSHA requires that all in-house trade workers (for example, carpenters and engineers) and maintenance housekeeping personnel who work in facilities that contain friable and non-friable ACM or PACM receive asbestos awareness training. At the 120 Front Street Street, maintenance and custodial staff have access to building areas where ACM or PACM are located. These maintenance workers will require asbestos awareness training. In addition, outside contractors who work in the facility should be notified, in writing, of the presence of ACM and PACM in the building, and made aware of their obligations to their employees.

The APM will provide notification to applicable employees and outside contractors regarding asbestos-related repair or abatement activities occurring within the building, as necessary and/or as required by applicable laws and regulations.

8.0 COMMON MAINTENANCE ACTIVITIES AFFECTING ACM OR PACM

Maintenance personnel may perform various general maintenance activities throughout the facility. Some examples of maintenance activities performed in specific locations which may impact suspect or confirmed ACM are listed below. This work must be performed by taking the proper care and precautions, so as to not disturb the ACM or PACM.

Examples of Maintenance Activities that Impact ACM	**Type of Material Being Impacted**
Heavy duty buffing, stripping or drilling holes	Floor tile/mastic
Removal for plumbing repairs	Pipe insulation
Gaining access to plenum space	Spray-applied fireproofing
Removing and replacing ceiling tiles	Spray-applied fireproofing
Alterations and repair of drywall	Joint compound
Alteration or Repair of perimeter heating units	Red duct sealant

9.0 LABELS AND SIGNS

As required by applicable Federal, State and/or local laws and regulations, Berkeley will inform occupants about the location and physical condition of ACM or PACM by posting signs or labels in a central location where affected occupants can see them, or by holding awareness or information sessions. Labels, where necessary, will be prominently displayed and remain posted until ACM or PACM are removed. Specifically, labels will be placed on doors outside entrances to mechanical areas where ACM or PACM are known or suspected to exist. This labeling will serve to alert and remind maintenance personnel and outside contractors of the presence of ACM and PACM so that they may avoid inadvertently disturbing these materials.

The warning label print should be readily visible, in large letter size, or a bright color. The label should read as follows:

CAUTION

ASBESTOS
CANCER AND LUNG DISEASE HAZARD
DO NOT DISTURB WITHOUT
PROPER TRAINING AND EQUIPMENT

Warning signs should also be posted in areas where the airborne fiber concentration can be reasonably expected to exceed the OSHA PEL of 0.1 f/cc. They serve to prevent unprotected individuals from entering those areas. The warning signs should read as follows:

DANGER

ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

If during removal and repair operations, airborne fiber concentrations are not reasonably expected to exceed the OSHA PEL, OSHA signs are not required. However, warning signs should be affixed to barriers to warn any bystanders of the potential danger in the area. The signs should read as follows:

POTENTIAL ASBESTOS
HAZARD AREA

DO NOT ENTER

During asbestos remediation performed by trained personnel, the APM shall be responsible for posting signs as required by OSHA regulations. The Independent Asbestos Consultant will be available to provide assistance to the APM in these tasks.

10.0 TRAINING REQUIREMENTS

Berkeley employees and/or their representatives who perform routine maintenance or custodial activities will be trained to the awareness level.

10.1 CUSTODIAL AND MAINTENANCE PERSONNEL

Custodial, maintenance and other trades personnel will receive the 2-hour asbestos awareness training. The training will consist of information regarding:

- Asbestos and its various uses and forms.
- Health effects associated with asbestos exposure.
- Locations of ACM and PACM identified within the Building.
- Recognition of damage, deterioration, and/or delamination of ACM or PACM.
- The O&M program for the building.
- Proper response to fiber release episodes.

Custodial activities may be limited to cleaning and simple maintenance tasks where ACM or PACM may have the potential to be accidentally disturbed. Generally, custodial employees will not directly contact friable ACM or PACM but must be directed to use the proper equipment when performing custodial maintenance (for example, cleaning asbestos-containing floor tile with nonabrasive brushes).

10.2 BERKELEY O&M PROGRAM APM

The APM will be responsible for the development and implementation of the O&M program. The APM and other key executives will be trained in the management of asbestos. The training will include detailed information on the following:

- **Asbestos Regulations**

  The APM should be aware of all relevant regulations including those of OSHA and the USEPA. If reporting is required, it is the APM's responsibility; therefore, he/she must know when to report, where to report, and what information is required.

➢ Specifications for and Notification of Outside Contractors

Berkeley hires outside contractors for renovation and maintenance work in the building. Not only must the APM notify the contractor of the presence of ACM or PACM, but he/she should also oversee the work practices to ensure that renovation and maintenance activities do not result in exposures of building occupants or employees. A copy of the Contractor Notification (Appendix F) should be sent by the APM to the outside contractor prior to the initiation of any renovation activities.

11.0 CLEANING

Cleaning within specific areas of the building is one of the primary objectives of the O&M program. The APM will retain a licensed Asbestos Abatement Contractor, approved by Berkeley, to conduct initial cleaning in building areas of building areas where damaged friable ACM or PACM is present as soon as the O&M program is in place and before the initiation of a response action.

In areas of the property where damaged asbestos-containing thermal system insulation or surfacing material is present, (i.e., an episodic event), the APM will retain a prequalified licensed Asbestos Abatement Contractor to clean all areas in the immediate vicinity. All cleaning activities are to be recorded and included in the O&M manual (see Appendix E).

Subsequent minor repair and routine maintenance will also be conducted by a prequalified and licensed Asbestos Abatement Contractor retained by the APM and monitored by the Independent Asbestos Consultant.

Initial Cleaning

When damaged friable ACM is present, the Asbestos Abatement Contractor must HEPA vacuum and, if possible, wet clean all areas in the immediate vicinity. This includes the cleaning of all surfaces, such as shelves, walls, light fixtures, equipment housing and the exteriors of ducts, with damp cloths or a HEPA vacuum.

All mop heads, damp cloths, liquid wastes, debris, filters, or vacuum bags must be disposed of as asbestos-contaminated waste.

Periodic Cleaning

The APM should evaluate with the assistance of the Independent Asbestos Consultant when periodic cleaning is needed, based on the rate of dust buildup. This evaluation should be made as part of the periodic assessment (see Section 15.0 of this program for information related to periodic ACM/PACM surveillance).

If cleaning is necessary, the APM will retain a licensed Asbestos Abatement Contractor, approved by the Independent Asbestos Consultant, to clean areas. The Asbestos Abatement Contractor shall remove any debris found near friable damaged ACM or PACM using a HEPA vacuum or wet methods. The Asbestos Abatement Contractor shall HEPA vacuum or steam clean all carpets in rooms with damaged ACM or PACM and wet wipe all surfaces in the area. If steam-cleaning is used, the liquid waste generated during the process must be disposed as

asbestos-contaminated waste. The Asbestos Abatement Contractor must dispose of debris, filters, and/or vacuum bags as asbestos-contaminated waste.

11.1 AREAS WITH FRIABLE ACM/PACM

Friable ACM or PACM should not be disturbed by anyone other than the Berkeley approved Asbestos Abatement Contractors. If material dislodges because of the accidental disturbance or water leak, the APM should be contacted as soon as possible after the area is secured. The APM will contact the Independent Asbestos Consultant and approved Abatement Contractor to respond to the emergency.

11.2 AREAS WITH NON-FRIABLE ACM/PACM

Non-friable ACM/PACM (i.e., mastic or floor tile) typically release fibers only when damaged or disturbed. Fiber releases can occur when workers drill, cut, abrade, break, or saw vinyl asbestos floor tile or other non-friable material. General cleaning and maintenance (i.e., applying a wax coating), however, should not damage these materials.

12.0 SPECIAL WORK PRACTICES FOR MAINTENANCE ACTIVITIES

Before conducting maintenance or repair work which will damage or disturb ACM/PACM, the Berkeley APM shall visually inspect the area, evaluate and select the appropriate course of action. Whenever the potential for release of asbestos fibers from ACM or PACM exists (i.e., sanding floor tile or repairing a pipe leak) the APM will retain an Asbestos Abatement Contractor, approved by Berkeley Investments, to perform the work procedures in the aforementioned sections.

Basic O&M procedures to minimize and/or contain asbestos fibers may include wet methods, use of mini-enclosures, use of portable power tools equipped with special local exhaust ventilation attachments, and avoidance of certain activities, such as sawing, sanding and drilling of ACM/PACM.

NOTE: During O&M procedures, personal air monitoring must be performed by the licensed Asbestos Abatement Contractor. All asbestos waste (generated during these activities) must be handled in accordance with all local, state, and federal requirements.

Maintenance activities can be divided into three categories with regard to their potential for disturbing ACM/PACM:

Contact with ACM/PACM Unlikely - In-house Employees

Maintenance activities or repairs which can be performed **without** contacting or disturbing the ACM/PACM require little more than normal care and good workmanship and can be performed by in-house personnel. These include, but are not limited to:

- Repairing non-ACM insulated pipes or valves without disturbing other ACM/PACM.
- Routine cleaning activities.

All surfaces should be isolated to remove any settled fibers in the event that ACM or PACM are disturbed. An Asbestos Abatement Contractor will respond to the asbestos fiber release episode.

Contact with ACM/PACM Not Likely but Possible - In-house Employees

Maintenance activities or repairs that may have the potential to cause accidental disturbance of ACM/PACM require some precautions. This work may be performed by in-house personnel only if the proper precautions are instituted to minimize the potential for ACM/PACM disturbance. For example, special cleaning, possibly area isolation and respiratory protection,

may be needed if the chance of disturbance is likely. Activities that fall into this category include, but are not limited to:

- Working on a fixture near thermal system ACM/PACM.

- Repairing of a pipe that is not insulated with ACM, but will disturb ACM/PACM on nearby pipes.

The APM should review the scope of work and the work area to assess whether the Independent Asbestos Consultant should be contacted to discuss and/or evaluate cleanup, repair, or removal requirements prior to allowing maintenance activities to commence.

Contact with ACM/PACM Likely or Intended - Only by an Asbestos Abatement Contractor

Maintenance activities or repairs that involve intentional small scale manipulation or disturbance of ACM/PACM require special work practices, as outlined in this O&M manual. ACM/PACM must be removed by a prequalified and approved Asbestos Abatement Contractor before in-house personnel perform their duties. Personal protective equipment, including respirators and Tyvek suits, and personal air monitoring are required when ACM/PACM will be disturbed (see Appendix E).

Typical activities include but are not limited to:

- Removing a small segment of thermal system insulation to repair a pipe leak or replace a valve.

Prior to performing any maintenance activities that will disturb ACM or PACM, the APM shall contact an Independent Asbestos Consultant to provide area air monitoring before, during, and after the ACM disturbance, if necessary.

13.0 SPECIAL WORK PRACTICES FOR PLANNED RENOVATION WORK

Future renovations may involve disturbing ACM or PACM and may also uncover building materials previously hidden that may contain asbestos. Work, such as moving walls, adding wings, and replacing heating or air-conditioning systems may involve breaking, cutting, or otherwise disturbing known, or as yet unidentified, ACM.

When building renovations are scheduled, it will be the responsibility of the APM to notify the designated Independent Asbestos Consultant of any planned alteration or renovation activity such that the consultant can assist in identifying ACM or PACM which may be impacted by testing, visual assessment and review of as-built construction drawings. The Independent Asbestos Consultant will provide necessary assistance and/or recommendations to the APM, as necessary.

All parties must be aware of potential ACM/PACM disturbance early in the project planning stage to evaluate appropriate response actions. Partial or full removal of the ACM/PACM may be necessary before renovation activities can commence.

- If partial or full removal is necessary, the APM shall select an Asbestos Abatement Contractor.

- The Independent Asbestos Consultant shall develop guideline specifications or work plans in accordance with USEPA, OSHA, state, and local regulations, if necessary, for use by the Asbestos Abatement Contractor.

- The Independent Asbestos Consultant shall require that the Asbestos Abatement Contractor perform all work in compliance with applicable federal, state, and local laws and regulations.

- The APM shall maintain records of work, including copies of the specifications and closeout documentation provided by the Independent Asbestos Consultant. A copy shall remain at the facility and one copy should be sent to the Berkeley Administrative offices.

14.0 EMERGENCY RESPONSE PROCEDURES FOR EPISODIC EVENTS

As long as ACM/PACM remains in the building, a fiber release episode could occur if the ACM/PACM is inadvertently disturbed. Maintenance personnel and custodial staff should immediately report to the APM the presence of suspect asbestos-containing debris on the floor, or physical damage to the ACM/PACM, or other evidence of a fiber release.

The APM may then take the following steps:

- Evaluate the extent of ACM/PACM damage.
- Barricade and/or seal off contaminated areas against entry by unauthorized personnel.
- Isolate the contaminated area by sealing doors and vents with polyethylene sheeting and duct tape and shutting off or modifying air handling systems or any other notification appropriate to restrict access or prevent exposure in other areas of the building.
- Post a warning sign outside the contaminated area.
- Contact the Independent Asbestos Consultant. The Independent Asbestos Consultant will assess the situation and recommend further courses of actions.
- Contact Berkeley's pre-qualified and approved Asbestos Abatement Contractor.
- If significant damage or delamination of ACM/PACM has occurred, consider total removal of the ACM/PACM by the Asbestos Abatement Contractor in the affected areas and replacement with a non-asbestos-containing substitute.
- Keep all records associated with the fiber release episode, including Asbestos Abatement Contractor submittals (medical information, waste shipment records, etc.), Independent Asbestos Consultant's reports (air sampling data), and a fiber release episode report (Appendix E). Send a copy of all records to the Berkeley Investments Administrative offices.

NOTE: **The Independent Asbestos Consultant will secure and maintain the necessary documentation and records associated with the work.**

To respond to fiber release episodes, the following materials will be available at the building, and accessible to trained maintenance and custodial staff for the purpose of isolating areas of damaged ACM/PACM.

Fiber Release Episode Supplies

Item	Recommended Quantity
Barricade Tape (3 inches x 1,000 feet)	1 roll
Duct Tape (3-inch x 60-yard roll)	3 rolls
Polyethylene Sheet (6-mil) (20 feet x 100 feet)	1 roll
Sign – DANGER (14 inches x 20 inches)	5
Sign - KEEP OUT	5
Surfactant	1 gallon
Sprayer	1 each

Additional response action for fiber release episodes will be evaluated by the Independent Asbestos Consultant and conducted by a prequalified Asbestos Abatement Contractor who is licensed in the Commonwealth of Massachusetts.

15.0 PERIODIC ACM SURVEILLANCE

15.1 ASSESSMENT

Periodic review of the O&M Program is essential to see that the program objectives are being met. ***A key feature of the review is periodic assessment of all ACM/PACM in the facility***. The assessment, combined with ongoing reports of changes in the condition of the ACM/PACM made by employees, will ensure that any damage or deterioration of the ACM/PACM will be detected and corrective action taken. The periodic assessment should be conducted, at a minimum, annually, and more frequently where necessary, as determined by the APM. Highly friable and deteriorated material, such as sprayed-on ACM/PACM and highly accessible ACM/PACM, may require evaluation every 6 months to assess changes in material condition.

The APM will conduct the periodic assessments.

The APM will develop an assessment schedule which will be repeated annually, or until such time as the ACM/PACM has been removed from the building.

Forms which can be used to document the reassessment of materials previously determined to contain asbestos are provided in Appendix E. Completed forms should be retained in the site manual with other periodic surveillance materials.

16.0 RECORDKEEPING

The APM and the Independent Asbestos Consultant will retain all records related to the O&M Program, such as:

- The written O&M Program itself, including work practices.
- Plans and drawings (As-built if available).
- Assessment data (location of ACM/PACM).
- Copies of notification and warning programs.
- Descriptions of times, dates, attendees of training programs, and all outlines and written materials disseminated.
- Copies of all permits and documentation of maintenance, renovation, and emergency response actions associated with ACM/PACM.
- Periodic ACM/PACM surveillance records.
- Bulk and air sampling and analysis reports.
- Chain of custody for laboratory samples.
- Asbestos abatement contractor insurance forms, if applicable.
- Asbestos waste disposal permits and asbestos waste shipment records.

Berkeley shall maintain all records associated with asbestos-related activities (for example, testing and medical records) for a period of at least 30 years.

17.0 ASBESTOS-CONTAINING WASTE MATERIAL STORAGE AND TRANSPORTATION

Asbestos-containing waste materials generated during operations and maintenance procedures should be stored and transported as follows:

- In leak-tight containers with the following warning labels:

DANGER

CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

- Waste should also be labeled with the name and location of the building where the waste was generated, and the initial accumulation date.

- Waste should not be stored at the building longer than 90 days from initial accumulation.

- Waste materials should be temporarily stored on the premises in a secured container or storage area, for example, a trash can with a locking top or behind a locked cage or closet.

- All waste must be stored wet.

- All waste should be transported by a licensed asbestos waste hauler. A copy of this license issued by the state agency should be retained in the permanent files.

- The waste hauling vehicle should be enclosed or utilize a canvas covering sufficient to contain the transported waste.

- An ACM waste shipment record must accompany all waste materials transported to a USEPA-approved landfill.

The completed waste shipment record must be received by Berkeley through the Independent Asbestos Consultant from the disposal site within 35 days of the date the waste was accepted by the initial waste hauler. If it is not received within this time frame, the APM must contact the transporter and/or the operator of the landfill to determine the status of the waste shipment record.

If the completed waste shipment record is not received within 45 days, a report must be submitted to the local USEPA Regional Office responsible for administering NESHAP regulations.

APPENDIX A

INVENTORY OF ASBESTOS-CONTAINING MATERIAL

120 Front STREET

APPENDIX B

GLOSSARY OF TERMS

APPENDIX B

GLOSSARY OF TERMS

ABATEMENT

Procedures to control fiber release from asbestos material. This includes removal, encapsulation, enclosure, repair disturbance of friable asbestos or any handling of asbestos material that may result in the release of asbestos fibers.

ACCREDITED LABORATORY

An analytical laboratory accredited for analysis of asbestos samples by the American Industrial Hygiene Association (AIHA).

AIRLOCK

"Airlock" means serial arrangement of rooms whose doors are spaced a minimum of 4 feet apart to permit ingress or egress through one room without interfering with the next and constructed in such a manner to prevent or restrict the free flow of air in either direction. Polyethylene sheeting, 6-mil full weight or greater, crossover doors shall be triple flapped and weighted to fall into place when people pass through this area.

AMENDED WATER

Water to which a surfactant is added.

APPROVED RESPIRATOR

The combination of elements (mask, air purifier, breathing air source) approved by NIOSH/Mine Safety and Health Administration (MSHA) for the category of use.

AREA AIR SAMPLING

Air sampling is the process of measuring the suspended fiber content in a specific volume of air collected over a period of time. Analysis of collected samples shall be by PCM in accordance with NIOSH Method 7400, Revision 3, A Rules.

ASBESTOS CLEARANCE LEVEL

The clearance level in the airborne fiber concentration, which must be achieved within the containment enclosure prior to dismantling the enclosure. This clearance level shall be 0.01 f/cc under aggressive air sampling conditions.

The sampling volume shall be from 1,200 to 3,000 liters of air, and analysis shall be performed by TEM or PCM.

CERTIFIED INDUSTRIAL HYGIENIST

An Industrial Hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene (ABIH).

CLEAN ROOM

An uncontaminated area or room, which is part of the decontamination enclosure system with provisions for storage of workers' or visitors' street clothing, protective equipment, and uncontaminated materials and equipment. Curtained doorways are required at all entrances.

CONTAINMENT BARRIER

A room or temporary enclosure to contain the asbestos material within the work area during abatement.

CURTAINED DOORWAY

A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms, typically constructed by placing three overlapping sheets of polyethylene over an existing or temporarily framed doorway and by securing each along the top of the doorway, the vertical side of the opposite vertical side. Two curtained doorways spaced a minimum of 4 feet a part form an airlock. Plastic sheet overlapping width shall be a minimum of 2 feet.

DECONTAMINATION ENCLOSURE SYSTEM

A series of connected rooms with curtained doorways between any two adjacent rooms for the decontamination of workers or of materials and equipment. A decontamination enclosure system must contain airlocks.

EQUIPMENT ROOM

A contaminated area or room, which is part of the decontamination enclosure system with provisions for storage of contaminated clothing and equipment and cleaning supplies for decontamination of equipment. Curtained doorways are required at all entrances.

FIXED OBJECT

A unit of equipment or furniture in the work area which cannot be removed from the work area.

HEPA VACUUM EQUIPMENT

High efficiency particulate air (HEPA)-filtered vacuuming equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be of 99.97 percent efficiency for retaining particles of 0.3 microns or larger.

MOVABLE OBJECT

A unit of equipment or furniture in the work area, which can be removed from the work area.

OSHA 30-MINUTE EXCURSION LIMIT

OSHA has established a 30-minute excursion limit for airborne asbestos fibers of 1.0 f/cc.

OWNER

All references to "Owner" shall mean authorized Berkeley Investments & Co., Inc. employees.

PEL

OSHA has established a permissible exposure limit (PEL) for employee exposure to airborne asbestos fibers of 0.1 f/cc as an 8-hour time-weighted average (TWA).

PERSONAL PROTECTIVE EQUIPMENT

That equipment, which may consist of coveralls, shoes, gloves, helmet, goggles, and respirator.

PLANNED ACTIONABLE

ACM which has begun to lose structural integrity or covering, is partially crushed, punctured, water-damaged, or otherwise may not be completely intact or which may lack some fiber cohesion or adhesion qualities or is partially damaged and may be located in areas of low occupancy, accessibility or has deteriorated significantly as a result of factors within its close proximity. This material does not pose an immediate potential health concern, but should be planned to be abated in future years, as a precaution. This material should be managed with an operations and maintenance program to minimize further damage to the material and potential health effects of employees.

PLASTIC SHEETING

Translucent polyethylene sheet material of 6-mil-thickness, full weight or greater.

REMOVAL

The act of removing asbestos-containing or contaminated materials from the building to an approved disposal site.

SEALANT

A material sprayed on after the wet removal of the existing asbestos. The purpose is to prevent the release of residual asbestos fibers remaining after removal and cleaning operations. Also used to encapsulate asbestos fibers in remaining insulation.

SHORT-TERM ACTIONABLE

ACM which has lost structural integrity or covering is crushed, punctured, severely water-damaged or otherwise not intact or which lacks fiber cohesion or adhesion qualities, is significantly damaged and may be located in areas of high occupancy, accessibility or has deteriorated significantly as a result of factors within its close proximity. This material should be abated within a reasonably short time frame.

STABLE

ACM which is not "planned" or “short-term" actionable, not considered an immediate potential health concern and can be classified as one of the following conditions:

- Fair) ACM which has lost small amounts of structural integrity or covering is partially crushed, punctured, water-damaged, or otherwise not fully intact or which may lack some small amounts of fiber or cohesion or adhesion qualities or accessibility or has started to deteriorate as a result of factors within its immediate proximity and can be isolated cost effectively, is damaged less than 3 continuous square feet or 3 continuous linear feet.

- (Good) ACM which has not lost structural integrity or covering is not crushed, punctured, water-damaged, or otherwise intact or which does not lack fiber cohesion or adhesion qualities is not damaged and may be located in area of high occupancy, accessibility and has not deteriorated significantly as a result of factors within its immediate proximity is damaged less than 1 continuous square foot or 1 continuous linear foot.

SURFACTANT

A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

WET CLEANING

The process of eliminating asbestos contamination from facility surfaces and objects by using cloths, mops, or other cleaning tools which have been dampened with water and by disposing of the water and these cleaning tools afterwards as asbestos-contaminated waste.

APPENDIX C

LICENSED ABATEMENT CONTRACTOR LIST

APPENDIX C

APPROVED LICENSED ABATEMENT CONTRACTORS

The APM should contact the Independent Asbestos Consultant to respond to episodic fiber release incidents. The Independent Asbestos Consultant will recommend one of the approved Asbestos Abatement Contractors and coordinate air sampling activities during the cleanup.

For 120 Front Street, the approved licensed Asbestos Abatement Contractors are as follows:

Asbestos Abatement Contractors

Company: Dec-Tam Corporation
Address: 50 Concord Street
City, State: North Reading, Massachusetts 01864
Telephone: 978.470.2860

Company: The Aulson Company, Inc.
Address: 49 Danton Drive
City, State: Methuen, Massachusetts 01844
Telephone: 800.542.0024

Company: MARCOR Environmental, Inc.
Address: 3-D Gill Street
City, State: Woburn, Massachusetts
Telephone: 800.545.5350

APPENDIX D

SAMPLE WASTE SHIPMENT RECORD

APPENDIX E

OPERATIONS & MAINTENANCE FORMS

PERIODIC SURVEILLANCE FORM

Periodic Surveillance of Asbestos-Containing Materials

Locations of asbestos-containing material (building, floor, wing, or general description)

_____

_____

_____

Type of Asbestos-Containing Material(s):

1. Sprayed- or troweled-on fireproofing, on ceilings or walls
2. Sprayed- or troweled-on fireproofing, on structural members
3. Thermal system insulation on pipes, tanks, or boiler
4. Other (describe):

_____

_____

Abatement Status:

1. The material has been encapsulated ____, enclosed ____, neither ____, removed ____.

Assessment:

1. Evidence of physical damage: _____

_____

2. Evidence of water damage:_____

_____

3. Evidence of delamination of other damage:_____

_____

4. Degree of accessibility of the material:_____

_____

5. Degree of activity near the material:_____

_____

6. Location in an air plenum, airshaft, or airstream: _____

_____

7. Other observations (including the condition of the encapsulant or enclosure, if any): _____

_____

Recommended Action: _____

_____

Signed: _____ Date: _____

(Asbestos Building Inspector)

FIBER RELEASE EPISODE REPORT

1. Address, building, and room number(s) (or description of area) where episode occurred: _____

_____

_____

_____

_____

_____

2. The release episode was reported by _____

_____ (date).

3. Described the episode: _____

_____

_____

_____

_____

_____

4. The ACM was ____/was not____ cleaned up according to approved procedures. Described the cleanup:

_____

_____

_____

_____

_____

Signed: _____ Date: _____
(Asbestos Program Manager)

APPENDIX F

CONTRACTOR NOTIFICATION LETTER
AND
EMPLOYEE NOTIFICATION LETTER

APPENDIX F

120 Front STREET

EMPLOYEE INFORMATION BROCHURE ON ASBESTOS

Consistent with U. S. Occupational Safety and Health Administration (OSHA) regulations, Berkeley Investments, Inc. has established a policy to identify, manage and, where necessary, remove ACM where they are found to be present. As many buildings constructed prior to the late 1970s, the facility where you work was built with some materials that contain asbestos. Over the years, asbestos has been used in over 3,000 commercial products, because it possesses several properties that make it very useful:

- It insulates against heat.
- It resists wear and abrasion.
- It resists chemical corrosion.
- It improves the strength of spackling, plaster and joint compound.
- It improves the acoustical properties of plasters.
- It insulates against electricity.

ACM was commonly used as spray-applied fireproofing on structural beams, in some floor tiles, and in canvas-encased pipe and elbow insulation.

Asbestos is a general name for a group of naturally occurring minerals that have a tendency to break down into smaller and smaller fibers. Under certain circumstances, asbestos may become a potential health concern. **Asbestos does not become a health problem until it becomes airborne**. If the ACM at the facility is not disturbed, asbestos fibers do not become airborne and do not pose a health concern. Generally, health concerns from asbestos are predominantly associated with workers who were exposed to high concentrations of asbestos for long durations of time, such as in the ship building and insulation industries. There has been no clearly determined medical effect resulting from exposure to low levels of airborne asbestos.

The specific locations of ACM, description and conclusions of known surveys conducted are summarized on the attached page(s).

To assure that the air quality in the building is within applicable standards, Berkeley Investments has performed air monitoring and/or bulk sample surveys. Numerous air samples are also performed during abatement work. For additional information please see the APM.

WHAT YOU CAN DO

The thrust of the Berkeley Investments Asbestos Management Program is to minimize the potential for disturbing ACM by increasing your awareness. So long as the ACM is not disturbed and remains intact, ACM does not pose a health concern.

NOTICE TO OUTSIDE CONTRACTORS AND LICENSEES ON ASBESTOS

TO: _____ DATE: _____

_____

Asbestos-containing Material ("ACM") is often found in buildings constructed prior to the late 1970s, and was commonly used in floor tiles, and in canvas-encased pipe and elbow insulation.

Work that may involve the removal or physical disturbance of ACM, which may cause the release of asbestos fibers into the air, must be done by a licensed asbestos abatement contractor or other trained personnel with the proper equipment, and under no circumstances by any employee of Berkeley Investments & Co., Inc. or its contractors, subcontractors, agents or unauthorized person.

So long as asbestos-containing materials remain intact, the asbestos does not pose a health hazard. Therefore, if you notice any ACM that is broken or crumbling, please avoid contact and notify Berkeley Investments, Inc.'s APM immediately, since studies show that inhalation of airborne asbestos fibers could be hazardous to one's health.

Please be advised that no person is permitted to disturb any suspect ACM without prior testing to determine whether or not the material is asbestos-containing. Since this facility contains ACM, it is your responsibility (i.e. as required by applicable federal, state, and local laws and regulations) to inform any worker employed by your firm that will work in this facility of the presence and locations of ACM and provide required asbestos awareness training. It is also your responsibility to inform your subcontractors of the presence and locations of ACM in this facility and of their obligations.

Based on survey reports received by Berkeley Investments, Inc., asbestos-containing construction materials have been identified in the locations in this facility listed in the annexed Attachment. You may also contact the APM for more detailed information.

_____	_____	_____
(NAME)	**(TITLE)**	**(PHONE)**
_____	_____	_____
(NAME)	**(TITLE)**	**(PHONE)**

APPENDIX G

ASBESTOS REGULATIONS

APPENDIX G
Applicable FEDERAL, STATE AND LOCAL Regulations

U.S. Environmental Protection Agency (EPA) Webpage: http://www.epa.gov

- Asbestos Hazard Emergency Response Act (AHERA); Title 40 CFR, Part 763.

  http://www.access.gpo.gov/nara/cfr/cfrhtml_00/Title_40/40cfr763_00.html

- National Emission Standards for Hazardous Air Pollutants (NESHAP); Asbestos, 40 CFR Part 61.

  http://www.access.gpo.gov/nara/cfr/cfrhtml_00/Title_40/40cfr61_00.html

U.S. Occupational Safety & Health Administration (OSHA) Webpage: http://www.osha-slc.gov

- Occupational Exposure to Asbestos: 29 CFR 1910.134, 1910.1001 and 1926.1101.

  http://www.osha-slc.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=12716&p_text_version=FALSE

  http://www.osha-slc.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9995&p_text_version=FALSE

  http://www.osha-slc.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10862&p_text_version=FALSE

Massachusetts Asbestos Web Links

Massachusetts Department of Environmental Protection: General Website:

http://www.state.ma.us/dep/

Massachusetts Department of Environmental Protection: Asbestos Program

http://www.state.ma.us/dep/bwp/asbestos/asbhome.htm

Air Pollution Control Regulations includes requirements for Dust, Odor, Construction and Demolition. January 2002. 310 CMR 7.09:

http://www.state.ma.us/dep/bwp/daqc/files/regs/7b.htm#09

Air Pollution Control Regulations describes the requirements for the removal and disposal of asbestos. January 2002. 310 CMR 7.15:

http://www.state.ma.us/dep/bwp/daqc/files/regs/7b.htm#15

Solid Waste Regulations includes the special waste disposal requirements for asbestos. October 1999. 310CMR 19.061:

http://www.state.ma.us/dep/bwp/dswm/files/310cmr19.htm#061

Massachusetts Division of Occupational Safety: Asbestos Program

http://www.state.ma.us/dos/pages/asbestos.htm

453 CMR 1.00 - 7.00 Employment of Aliens; the Removal, Containment or Encapsulation of Asbestos; Apprentice Training. (Order Information $4.35 per copy)

http://www.state.ma.us/sec/spr/sprcat/agencies/453.htm

APPENDIX A

ASBESTOS-CONTAINING MATERIALS
WORECESTER CENTER
WORCESTER, MASSACHUSETTS

120 FRONT STREET

Location	Material Type	Sample Number	Asbestos Percent and Type
Lower Level	Pipe Fitting Insulation	120-B-5A	15% Chrysotile, 1% Amosite
Lower Level	End Cap Insulation	120-B-6A	2% Chrysotile
Lower Level	Floor Tile	120-B-9A	2% Chrysotile
Lower Level	Covebase Mastic	120-B-10A	2% Tremolite
Lower Level	Joint Compound	ATC: 120-LL-01A	5% Chrysotile
Lower Level	Joint Compound	ATC: 120-LL-01B	2% Chrysotile
1st Floor	Covebase Mastic	120-1-1A	2% Tremolite
1st Floor	Joint Compound	ATC: 120-1-02A	2% Chrysotile
2nd Floor	12” x 12” Pitted Floor Tile	120-C-6A	2% Chrysotile
2nd Floor	Floor Tile Mastic	120-C-7A	3% Chrysotile
2nd Floor	Covebase Mastic	120-C-5A	2% Tremolite
2nd Floor	Joint Compound	ATC: 120-2-02B	2% Chrysotile
2nd Floor	Joint Compound	ATC: 120-2-02C	2% Chrysotile
3rd Floor	Spray-Applied Fireproofing	120-C-3D	2% Chrysotile
3rd Floor	Joint Compound	ATC: 120-3-02E	2% Chrysotile
3rd Floor	Joint Compound	ATC: 120-3-01A	2% Chrysotile

Location	Material Type	Sample Number	Asbestos Percent and Type
3rd Floor	Joint Compound	ATC: 120-3-01B	2% Chrysotile
4th Floor	Spray-Applied Fireproofing	120-4-FA	2% Chrysotile
4th Floor	Spray-Applied Fireproofing	120-4-FD	11% Chrysotile
4th Floor	Joint Compound	ATC: 120-4-02B	2% Chrysotile
4th Floor	Joint Compound	ATC: 120-4-01A	2% Chrysotile
4th Floor	Joint Compound	ATC: 120-4-01B	2% Chrysotile
4th Floor	Joint Compound	ATC: 120-4-01C	2% Chrysotile
4th Floor	Joint Compound	ATC: 120-4-01D	2% Chrysotile
5th Floor	Covebase Mastic	120-5-3A	2% Tremolite
5th Floor	Covebase Mastic	120-5-3B	2% Tremolite
5th Floor	Joint Compound	ATC: 120-5-01A	2% Chrysotile
5th Floor	Joint Compound	ATC: 120-5-01B	2% Chrysotile
5th Floor	Joint Compound	ATC: 120-5-01C	2% Chrysotile
6th Floor	Joint Compound	120-C-1A	3% Chrysotile
6th Floor	Joint Compound	ATC: 120-6-02A	2% Chrysotile
6th Floor	Joint Compound	ATC: 120-6-02B	2% Chrysotile
6th Floor	Joint Compound	ATC: 120-6-02C	2% Chrysotile
6th Floor	Joint Compound	ATC: 120-6-02D	2% Chrysotile
7th Floor	Floor Tile Mastic	120-7-6A	3% Chrysotile
7th Floor	Tan Joint Compound	120-7-12A	2% Chrysotile

Location	Material Type	Sample Number	Asbestos Percent and Type
7th Floor	12” x 12” Floor Tile	120-7-14A	2% Chrysotile
7th Floor	Floor Tile Mastic	120-7-15A	3% Chrysotile
7th Floor	Joint Compound	ATC: 120-7-01A	2% Chrysotile
7th Floor	Joint Compound	ATC: 120-7-01B	2% Chrysotile
7th Floor	Joint Compound	ATC: 120-7-01C	2% Chrysotile
7th Floor	Joint Compound	ATC: 120-7-01D	2% Chrysotile
7th Floor	Joint Compound	ATC: 120-7-01C	2% Chrysotile
8th Floor	Joint Compound	120-8-6A	2% Chrysotile
8th Floor	Joint Compound	120-8-6B	2% Chrysotile
8th Floor	Joint Compound	120-8-6C	2% Chrysotile
8th Floor	Spray-Applied Fireproofing	120-8-8A	10% Chrysotile
8th Floor	Spray-Applied Fireproofing	120-8-8B	10% Chrysotile
8th Floor	12” x 12” Floor Tile	120-8-9A	2% Chrysotile
8th Floor	Floor Tile Mastic	120-8-10A	2% Chrysotile
8th Floor	Covebase	120-8-13A	2% Chrysotile
8th Floor	Covebase	120-8-13B	2% Chrysotile
8th Floor	Covebase	120-8-13C	2% Chrysotile
9th Floor	Red Duct Sealant	120-9-2A	3% Chrysotile
9th Floor	Red Duct Sealant	120-9-2B	3% Chrysotile
9th Floor	Red Duct Sealant	120-9-2C	3% Chrysotile
9th Floor	Expansion Mastic	120-9-5A	10% Chrysotile

Location	Material Type	Sample Number	Asbestos Percent and Type
9th Floor	Spray-Applied Fireproofing	120-9-6A	7% Chrysotile
9th Floor	Glue Dots	120-9-10A	7% Chrysotile
9th Floor	Tan Joint Compound	120-9-12A	2% Chrysotile
9th Floor	Covebase Mastic	120-9-15A	2% Chrysotile
9th Floor (Mechanical)	Joint Compound	ATC: 120-9MF-01A	2% Chrysotile
9th Floor (Mechanical)	Joint Compound	ATC: 120-9MF-01B	2% Chrysotile
9th Floor (Mechanical)	Joint Compound	ATC: 120-9MF-01C	2% Chrysotile
9th Floor (Mechanical)	Spray-Applied Fireproofing	ATC: 120-9MF-02C	10% Chrysotile

Generator	1. Work site name and mailing address	Owner's name	Owner's telephone no.
	2. Operator's name and address		Owner's telephone no.
	3. Waste disposal site (WDS) name, mailing address, and physical site location		WDS phone no.
	4. Name, and address of responsible agency		
	5. Description of material	6. Containers No. / Type	7. Total quantity m^3 (yd^3)
	8. Special handling instructions and additional information		
	9. OPERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled , and are in all respects in proper condition for transport by highway according to applicable international and government regulations.		
Transporter	Printed / typed name & title	Signature	Mo. / Day / Year
	10. Transporter 1 (Acknowledgment of receipt of materials)		
	Printed/typed name, title, address and telephone no.	Signature	Mo. / Day / Year
	11. Transporter 2 (Acknowledgment of receipt of materials)		
	Printed/typed name, title, address and telephone no.	Signature	Mo. / Day / Year
Disposal Site	12. Discrepancy indication space		
	13. Waste disposal site owner of operator: Certification of receipt of asbestos materials covered by this manifest except as noted in item 12.		
	Printed/typed name & title	Signature	Mo. / Day / Year

Waste Shipment Record

Instructions

Waste Generator Section (Items 1-9)

1. Enter the name of the facility at which asbestos waste is generated and the address where the facility is located. In the appropriate spaces, also enter the name of the owner of the facility and the owner's phone number.

2. If a demolition or renovation, enter the name and address of the company and authorized agent responsible for performing the asbestos removal. In the appropriate spaces, also enter the phone number of the operator.

3. Enter the name, address, and physical site location of the waste disposal site (WDS) that will be receiving the asbestos materials. In the appropriate spaces, also enter the phone number of the WDS. Enter "on-site" if the waste will be disposed of on the generator's property.

4. Provide the name and address of the local, State, or EPA Regional office responsible for administering the asbestos NESHAP program.

5. Indicate the types of asbestos waste materials generated. If from a demolition or renovation, indicate the amount of asbestos that is

   * Friable asbestos material
   * Nonfriable asbestos materials

6. Enter the number of containers used to transport the asbestos materials listed in item 5. Also enter one of the following container codes used in transporting each type of asbestos material (specify any other type of container used if not listed below):

   * DM- Metal drums, barrels
   * DP- Plastic drums, barrels
   * BA- 6 mil plastic bags or wrapping

7. Enter the quantities of each type of asbestos material removed in units of cubic meters (cubic yards).

8. Use this space to indicate special transportation, treatment, storage or disposal or Bill of Lading information. If an alternate waste disposal site is designated, note it here. Emergency response telephone numbers or similar information may be included here.

9. The authorized agent of the waste generator must read and then sign and date this certification. The date is the date of receipt by transporter.

NOTE: The waste generator must retain a copy of this form

Waste Shipment Record

Transporter Section (Items 10 & 11)

10 & 11 Enter name, address, and telephone number of each transporter used, if applicable. Print or type the full name and title of person accepting responsibility and acknowledging receipt of materials as listed on this waste shipment record for transport. Enter date of receipt and signature.

NOTE: The transporter must retain copy of this form.

Disposal Site Section (Items 12 & 13)

12. The authorized representative of the WDS must note in this space any discrepancy between waste described on this manifest and waste actually received as well as any improperly enclosed or contained waste. Any rejected materials should be listed and destination of those materials provided. A site converts asbestos containing waste nonasbestos material is considered a WDS.

13. The signature (by hand) of the authorized WDS agent indicates acceptance and agreement with statement on this manifest except as noted in item 12. The date is the date of signature and receipt of shipment.

NOTE: The WDS must retain a completed copy of this form. The WDS must also send a completed copy to the operator listed in item 2.

Waste Shipment Record

Prepared for:

BERKELEY INVESTMENTS, INC.
121 High Street
Boston, Massachusetts, 02110

Prepared by:

URS CORPORATION
5 Industrial Way
Salem, NH 03079

Date: July 13, 2004
URS Job No. 39741750

ASBESTOS OPERATIONS AND MAINTENANCE PROGRAM WORCESTER COMMONS MALL WORCESTER, MASSACHUSETTS

Douglas R. Lawson, Ph.D., CIH
Manager, Industrial Hygiene Services

TABLE OF CONTENTS

CHAPTER 1 - INTRODUCTION Page

1.0 INTRODUCTION 1

2.0 HISTORY OF ASBESTOS USES 4
2.1 Occurrence and Properties 4
2.2 Uses of Asbestos in Buildings 5
2.3 Exposure Potential 6

3.0 POTENTIAL HEALTH CONCERNS AND EFFECTS 8
3.1 The Respiratory System 8
3.2 Asbestosis 9
3.3 Lung Cancer 9
3.4 Mesothelioma 10
3.5 Other Diseases 10

4.0 ASBESTOS REGULATIONS 11
4.1 OSHA Asbestos Standards 11
4.2 National Emission Standards for Hazardous Air Pollution (NESHAP) 14
4.3 Other Federal Agencies 16
4.4 State and Local Agencies 16
4.4.1 Commonwealth of Massachusetts 17
4.5 Other Site-Specific Requirements 17

CHAPTER II - SITE-SPECIFIC O&M PROGRAM

5.0 BERKELEY INVESTMENTS INC. POLICY 18
5.1 Organization of Asbestos Management 20
5.2 Berkeley Investments Operations & Maintenance Asbestos Program Manager 21
5.3 Approved Independent Asbestos Consultant 21
5.4 Maintenance Personnel 21
5.5 Company Employees 21

6.0 AREAS CONTAINING ASBESTOS MATERIALS 23
6.1 ACM 23
6.2 Presumed Asbestos-Containing Materials 25

7.0 NOTIFICATIONS 25
7.1 Regulatory Notifications for Operations and Maintenance and Renovation Projects 25
7.2 Regulatory Notifications for Planned and Emergency Asbestos Abatement 25
7.3 Program for Informing Building Occupants 26
7.4 Asbestos Awareness Training 26

TABLE OF CONTENTS (continued)

CHAPTER II - SITE-SPECIFIC O&M PROGRAM **Page**

8.0 COMMON MAINTENANCE ACTIVITIES AFFECTING ACM....27

9.0 LABELS AND SIGNS....28

10.0 TRAINING REQUIREMENTS....30
10.1 Custodian and Maintenance Personnel....30
10.2 Berkeley Investments O&M Program (APM)....30

11.0 CLEANING....32
11.1 Areas with Friable ACM....33
11.2 Areas with Non-Friable ACM....33

12.0 SPECIAL WORK PRACTICES FOR MAINTENANCE ACTIVITIES....34

13.0 SPECIAL WORK PRACTICES FOR PLANNED RENOVATION WORK....36

14.0 EMERGENCY RESPONSE PROCEDURES FOR EPISODIC EVENTS....37

15.0 PERIODIC ACM SURVEILLANCE....39
15.1 Assessment....39

16.0 RECORD KEEPING....40

17.0 ASBESTOS-CONTAINING WASTE MATERIAL STORAGE AND TRANSPORTATION....41

APPENDICES

Appendix A Inventory of Asbestos-Containing Material
Appendix B Glossary of Terms
Appendix C Licensed Abatement Contractor List
Appendix D Sample Waste Shipment Record
Appendix E Operations and Maintenance Forms
Appendix F Contractor Notification Letter and Employee / Tenant Notification Letter
Appendix G Asbestos Regulations

CHAPTER I

INTRODUCTION

1.0 INTRODUCTION

This Asbestos Operations and Maintenance Program (O&M Program) provides Berkeley Investments, Inc., (Berkeley) with guidelines for conducting maintenance activities in building areas where friable and non-friable asbestos-containing materials (ACM) are located. This program adopts guidelines from the United States Environmental Protection Agency (EPA) "Managing Asbestos in Place - A Building Owner's Guide to an Operations and Maintenance Program for Asbestos Containing Materials", U.S. Occupational Safety and Health Administration (OSHA) regulations, as well as state and local regulatory agency requirements. This manual is intended to provide the basis for the facility-specific implementation of the O&M program, based on asbestos survey results and historical information from previous survey and abatement projects.

The primary purpose of the O&M program is the protection of the health and safety of building occupants and staff. The goals of this program include monitoring of the condition of ACM over time, the minimization of fiber release episodes by minimizing disturbance of ACM, and abatement of asbestos when considered to be in a short-term actionable state.

This program addresses those procedures and practices required to safely perform activities, such as:

- Monitoring of the condition of ACM.
- Performing emergency asbestos abatement.
- Overseeing asbestos waste disposal.

This program is also designed to:

- Inform building management and maintenance staff of the presence of confirmed and presumed ACM at Worcester Commons Mall, Worcester, Massachusetts and of precautions to be taken to prevent potential exposures.
- Provide guidelines for training of maintenance workers.
- Provide guidelines for notification to outside contractors regarding the presence and location of confirmed and presumed ACM.
- Establish schedules for periodic consultant surveillance activities.
- Provide guidelines for responses to potential fiber-release episodes.

- Organize the documentation of these activities in conformance with applicable regulations and guidelines.

Asbestos was identified at Worcester Commons Mall during a limited asbestos survey conducted during March and April of 2004 by URS Corporation (URS). Previous surveys also documented the presence of ACM at the site and certain inaccessible building areas were identified which contain presumed ACM. An inventory and the locations of materials identified as containing asbestos in this building is presented in Appendix A.

This Asbestos O&M Program manual is intended for use by an Asbestos Program Manager (APM) and trained workers. The title "Asbestos Program Manager" is the building owner or designated representative who supervises all aspects of the facility asbestos management and control program and is a term used throughout this manual. The EPA *"A Building Owner's Guide to Operations and Maintenance Programs for Asbestos-Containing Materials ("Green Book")* July, 1990, states that the Asbestos Program Manager should receive "EPA accreditation under the Asbestos Hazard Emergency Response Act (AHERA) or state certification as a Building Inspector/Management Planner". The program manager functions as the lead person in the management of the O&M program. The APM should obtain training in developing and managing an asbestos control program, including training in abatement techniques. The APM should have authority to direct the custodial and maintenance staffs and outside contractors regarding implementation of this O&M program.

In order to assure that the procedures and requirements specified in this manual will be followed, the APM identified for Worcester Commons Mall will be Cathy Hamacher. The work practices described in this O&M program are applicable to projects qualifying as "repair" or "maintenance" operations as defined by OSHA. "Repair" means overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM or presumed ACM (PACM) attached to structures or substrates. "Maintenance" means the incidental cutting away of small amounts of ACM or PACM that could be limited to less than a single standard waste bag. The work practices are intended to assist building management in meeting current OSHA regulations applicable to O&M work. A glossary of asbestos terminology is presented in Appendix B.

A licensed Asbestos Abatement Contractor, in accordance with generally recognized asbestos control techniques, will perform projects including "repair" or "maintenance". Asbestos abatement contractors shall be properly licensed by the Commonwealth of Massachusetts. If ACM is in poor condition, O&M may not be appropriate and abatement may be necessary. O&M work practices are not to be used for activities requiring complete or significant abatement of ACM. Building maintenance and custodial staff will not be involved with any asbestos removal or repair operations.

Chapter I of this manual presents general information, including the history and uses of asbestos, health concerns and effects, and a summary of asbestos regulations.

Chapter II presents site-specific O&M practices and procedures. These procedures should be read and thoroughly understood and should be performed only by trained personnel.

2.0 HISTORY OF ASBESTOS USES

2.1 OCCURRENCE AND PROPERTIES

Asbestos, a naturally occurring mineral, is a fibrous hydrated silicate which possesses the unique characteristics of high tensile strength, flexibility, and chemical, electrical, and thermal resistance, and is relatively inexpensive. As a consequence of these properties, the commercial use of asbestos has been exceedingly widespread and is found in products ranging from cosmetics to insulation.

The earliest recorded use of asbestos was about 2500 B.C. in Finland, where the mineral was used to strengthen clay pots. More recently, modern industrial exploitation of this silicate dates from the 1880s when it was mined in Canada and the former U.S.S.R. The use of asbestos rapidly increased in England and France where the fibers were incorporated into cotton fabrics to produce noncombustible fabrics. Industrial applications, particularly in the West in the past 40 years, have accounted for the majority of the use of asbestos.

There are six asbestos minerals which are used in over 1,000 commercial applications:

Chrysotile is a white or greenish-colored hydrated magnesium silicate which is considered the softest of the asbestos fibers. In addition to use in insulation and fireproofing products, it is spun and woven into asbestos cloth and tape. Chrysotile is mined primarily in Canada, Africa, and the former U.S.S.R. It is believed by many scientists to be the least toxic of all asbestiform minerals.

Amosite is a fibrous, ferrous magnesium silicate which ranges in color from brownish-yellow to white, and has excellent properties for use in thermal insulation.

Crocidolite is a blue sodium iron silicate fiber which can be woven or spun into cloth or tape. It is mined mainly in South Africa and Australia and is believed to be the most toxic of the asbestiform minerals. Its use in the U.S. is very limited.

Anthophyllite is white magnesium silicate with various amounts of iron. This fiber has a harsh texture but has excellent resistance to chemicals and heat. Use of this asbestos type is limited in the U.S., but it has been found in decorative and acoustical material.

Tremolite is a white to yellow-colored calcium magnesium silicate which has been a major ingredient in industrial and commercial talc.

Actinolite is a calcium iron magnesium silicate of greenish to white color. Its poor resistance to chemicals and its harsh texture are properties which limit its commercial use. However, it may be found in commercial and industrial talcs.

2.2 USES OF ASBESTOS IN BUILDINGS

Table 1 shows typical uses of asbestos in building materials and dates of use.

Table 1
Examples of Friable and Non-Friable Asbestos-Containing Material Found in Buildings*

Subdivision	Generic Name	Asbestos (%)	Dates of Use	Binder/Sizing
Surfacing Materials	Sprayed- or troweled-on	1-95	1936-1970	Portland Cement
Preformed thermal batts, blocks and insulation pipe covering products	85% magnesia	15	1926-1949	Magnesium carbonate
Textiles	Cloth	100	1910-present	None
	Blankets (fire)[a]	90-95	1920-present	Cotton/wool
	Cord/Rope/yarn[a]	80-100	1920-present	Cotton/wool
Paper Products	Corrugated, high temp.	90	1935-present	Sodium silicate
	Corrugated, moderate temp.	35-70	1910-present	Starch
	Indensed	98	1935-present	Cotton
	Millboard	80-85	1925-present	Starch, lime, clay
Roofing Felts	Smooth surface	10-15	1910-present	Asphalt
	Mineral surface	10-15	1910-present	Asphalt
	Shingles	1	1971-1974	Asphalt
	Pipeline	10	1920-present	Asphalt
Cementitious Cement	Extrusion panels	8	1965-1977	Portland
Concrete-like Cement Products	Corrugated	20-45	1930-present	Portland
	Flat	40-50	1930-present	Portland
	Flexible	30-50	1930-present	Portland
	Flexible perforated	30-50	1930-present	Portland
	Laminated	35-50	1930-present	Portland
	Roof tiles	20-30	1930-present	Portland
	Clapboard	12-15	1944-1945	Portland
	Siding shingles	12-14	Unknown-present	Portland
	Roofing shingles	20-32	Unknown-present	Portland
	Pipe	20-15	1935-present	Portland

Subdivision	Generic Name	Asbestos (%)	Dates of Use	Binder/Sizing
Asbestos-containing compounds:	Caulking putties	30	1930-present	Linseed
	Adhesive (cold-applied)	5-25	1945-present	Asphalt
	Joint compound	Unknown	1945-1975	Asphalt
	Roofing asphalt	5	Not reported	Asphalt
	Mastic	5-25	1920-present	Asphalt
	Asphalt tile cement	13-25	1959-present	Asphalt
	Roof putty	10-25	Unknown-present	Portland
	Plaster - stucco	2-10	Unknown-present	Portland
	Spackles	3-5	1930-1975	Starch
	Sealant (fire/water)	50-55	1935-present	Castor Oil
	Cement insulation	20-100	1920-1973	Clay
	Cement finishing	55	1920-1973	Clay
Flooring	Vinyl asbestos tile/polyvinylchloride	21	1950-present	Not reported
Sheet Goods	Asphalt, asbestos tile	26-33	1920-present	Asphalt
	Resilient sheet goods	30	1950-present	Dry oils
Wall Coverings	Vinyl wallpaper	6-8	Unknown-present	Asphalt

* The information in this table is taken, with modification, from: Lory EE, Coin DC, February 1981. Management Procedure for Assessment of Friable Asbestos Insulating Material, Port Hueneme, CA: Engineering Laboratory Naval Construction Battalion Center.

[a] Laboratory aprons, gloves, cord, rope, fire blankets and curtains may be common in schools.

2.3 EXPOSURE POTENTIAL

Construction materials containing friable (that which can be crumbled, pulverized or reduced to a powder by hand pressure) asbestos have been used extensively in commercial buildings, especially those built prior to 1975, although it has been found in buildings constructed in the early 1980s. (Some non-friable (that which cannot be crumbled, pulverized or reduced to a powder by hand pressure) materials known to contain asbestos, such as floor tile, mastic, and joint compound, have been identified in buildings constructed after 1980). The concern about exposure to asbestos in commercial buildings is based on studies involving intensive occupational exposure to asbestos in the shipbuilding, mining, milling, and fabricating industries.

After performing numerous assessments of asbestos fiber levels in air, the USEPA found that average airborne asbestos fiber levels inside buildings containing asbestos products are

essentially the same as those outside buildings. The USEPA determined that intact, undisturbed, asbestos materials do not pose a health risk, and that the mere presence of asbestos in a building does not mean that the health of the building occupants is endangered.

The presence of asbestos in a building does not mean that the occupants are at risk. If ACM remains in good condition and is unlikely to be disturbed, exposure should be negligible. However, when ACM is damaged or disturbed (for example, by maintenance, repairs, or renovations conducted without proper controls), asbestos fibers can be released to the ambient environment.

Friable ACM presents a potential source of exposure and must be carefully protected from damage or disturbance. Materials which contain asbestos fibers firmly encased in a solid matrix, such as cement asbestos pipe or vinyl asbestos floor tile, present a diminished potential for airborne asbestos fiber releases and exposures, except during cutting, demolition, drilling, grinding, and sanding of these forms of ACM.

Risks associated with low level, non-occupational exposure have not been well defined. As a result, the USEPA has instituted measures for schools to control or eliminate children's exposure to asbestos. That regulation, the Asbestos Hazard Emergency Response Act (AHERA), is considered "state-of-the-art" for asbestos control, and is often used as a guideline by private industry. The requirements contained in the AHERA regulation have been selected for this program because of their effectiveness in limiting employee risk of asbestos exposure.

3.0 POTENTIAL HEALTH CONCERNS AND EFFECTS

The potential adverse health effects associated with asbestos exposure have been extensively studied for many years. Results of these studies and epidemiological investigations have demonstrated that extensive and intensive inhalation of asbestos fibers may lead to an increased risk of developing one or more diseases.

It is important to recognize that most people who have developed a disease as a result of asbestos exposure were asbestos workers (for example, miners, factory workers, and ship builders). These workers were frequently exposed to very high concentrations of asbestos fibers each working day with little or no protection.

Ambient airborne fiber levels in buildings today are typically tens of thousands times lower than those measured during mining, milling, and ship building activities (USEPA, 1990). Additionally, today's workers follow specific work practices and wear appropriate personal protection, including respirators, to minimize the risk of exposure.

3.1 THE RESPIRATORY SYSTEM

The health risks associated with exposure to asbestos are primarily due to excessive inhalation of high concentrations of asbestos fibers. As air is inhaled, it passes through the mouth and nose into the windpipe or trachea. The trachea splits into two smaller airways called bronchi. Each bronchus divides into smaller and smaller tubes which lead into air sacks, called alveoli. In these air sacks (alveoli), oxygen passes through the alveolar membrane and is absorbed by red blood cells in small blood vessels. Carbon dioxide and other waste gases pass out of the blood back into the alveoli where they are exhaled.

The lung is comprised of two lobes and sits in the pleural cavity. The lining of the cavity and the membranes around the lung are in contact with each other and are very moist. Like two panes of glass with a drop of water between them, these membranes slide easily across each other, but are very difficult to pull apart. Thus, as the chest cavity expands, the lungs do too, and air rushes in. If these linings (mesothelia) became damaged, one would not be able to inhale properly.

The body has several mechanisms by which it "filters" the air breathed. First, very large particles are removed in the nose and mouth. Smaller particles are caught on the mucous-coated walls of the airways. These airways have a hair-like lining (ciliated cells) which constantly beats upward. The ciliated cells sweep the particles up the airway and into the mouth where particles are either swallowed or expelled. Particles caught in the mucous are swept into the back of the mouth.

Cigarette smoking temporarily paralyzes these ciliated cells, inhibiting one of the body's natural defenses against unwanted dust. As the smoker sleeps, the hair-like cells start working again and carry large amounts of mucous into the back of the mouth. This causes the so-called "smoker's hack" in the morning. After the first cigarette or two, the cleansing mechanism is paralyzed again and the coughing stops, allowing more particles to enter into the deeper airways and cause potential damage. For this reason, smokers who are exposed to asbestos appear to be at greater risk than nonsmokers. Other reasons will also be discussed in Section 3.3 (Lung Cancer).

Even with these natural defenses of the body, some dust particles inevitably reach the tiny air sacks. When this occurs, large cells (called macrophages) attempt to engulf the particle and "digest" it. For this reason, they are sometimes called the "lungs' garbage collectors". However, because asbestos is a mineral fiber, the macrophages are sometimes unsuccessful in digesting them. As a secondary defense mechanism, these macrophages deposit a coating on the fibers when they are unsuccessful in digesting them. This occurrence causes a series of chain reactions that ultimately result in the development of scar tissue on the lung. Where the presence of scar tissue disrupts normal respiratory function, asbestosis may develop.

3.2 ASBESTOSIS

Asbestosis is a disease characterized by fibrotic scarring of the lung. It is a restrictive disease that reduces the capacity of the lung and hampers its ability to exchange gases. The earliest symptom is coughing. Asbestosis is prevalent among workers who have been exposed to large doses of asbestos fibers over a long period of time. There is a clear dose-response relationship between asbestos exposure and development of this disease. This means that the greater the asbestos exposure, the more likely asbestosis will develop.

Asbestosis is irreversible and can progress even after exposure has ceased. As the disease progresses, shortness of breath is commonly observed along with changes in lung function, a crackling sound in the lower half of the lung, and clubbed fingers.

Although most people believe a threshold exposure level exists below which the disease does not occur, this threshold level has not yet been determined. All forms of asbestos have demonstrated the ability to cause asbestosis. Like all diseases associated with asbestos exposure, it may take many years for this disease to develop. The typical length of time for symptoms of disease to appear from the time of the exposure (latency period) for asbestosis is 15 to 30 years.

3.3 LUNG CANCER

There are many causes of lung cancer, of which asbestos is only one. While employees exposed to industrial concentrations of asbestos in years past have an increased risk of getting lung cancer five times the normal population, their risk is not as great as the cigarette smoker whose risk is

ten times the normal rate. A cigarette smoker who also works with asbestos is 50 times more likely to contract lung cancer than the normal nonsmoking population. The cigarette smoking and asbestos exposure multiply the effects of each other. This is known as a "synergistic effect" (Selikoff Studies, 1979).

Like asbestosis, there exists a long lag time between initial exposure and the occurrence of lung cancer which is typically 20 to 30 years. There appears to be a dose-response relationship between asbestos exposure and lung cancer although no "safe" lower exposure level has yet been determined. Again, these figures relate to past industrial situations where workers wore little or no personal protective equipment.

3.4 MESOTHELIOMA

The asbestos-associated disease of greatest concern in asbestos work is probably mesothelioma; it is also the rarest. It is considered to be a marker disease for asbestos exposure. Mesothelioma is a cancer of the chest or abdominal cavity linings (mesothelium). If it occurs in the chest cavity, it is called pleural mesothelioma. If it occurs in the abdominal cavity, it is called peritoneal mesothelioma. By the time cancer is diagnosed, it is almost always fatal and effective therapy does not currently exist.

There is no exposure threshold for mesothelioma. The exact mechanism of the disease remains unknown. Smokers do not appear to be at greater risk of getting mesothelioma nor does a dose-response relationship seem to exist between asbestos exposure and mesothelioma. Like other diseases caused by asbestos exposure, mesothelioma often takes 30-40 years after initial exposure to develop.

3.5 OTHER DISEASES

Other diseases and adverse health effects have been observed in conjunction with asbestos exposure. Increased incidence of gastrointestinal cancers, including cancers of the esophagus, stomach, colon-rectum, kidney, and pancreas have been observed in populations exposed to asbestos.

Pleural plaque (thickening of the chest cavity lining) has also been observed among people exposed to asbestos. This condition does not have any symptoms nor does it require treatment.

4.0 ASBESTOS REGULATIONS

To date, two federal agencies have been principally responsible for generating asbestos control regulations. These two agencies are the USEPA and the U. S. Occupational Safety and Health Administration (OSHA). In general, OSHA extends to all private sector employers and employees under federal jurisdiction. USEPA extends to all public and private work settings under federal jurisdiction. In addition, individual states and local townships have promulgated their own regulations. The following sections highlight some of these federal and state requirements.

4.1 OSHA ASBESTOS STANDARDS (See Appendix G)

OSHA has established three sets of regulations that address asbestos exposure:

29 CFR 1926.1101	Construction Industry Standard
29 CFR 1910.1001	General Industry Standard
29 CFR 1910.134	Respiratory Protection Standard

The Construction Industry Standard covers employees engaged in demolition and construction and the following related activities likely to involve asbestos exposure: removal, encapsulation, alteration, repair, maintenance, insulation, spill/emergency cleanup, transportation, disposal, and storage of ACM. The General Industry Standard covers all other operations where exposure to asbestos is possible, including occupant exposure to asbestos from buildings that contain ACM. In general, operations and maintenance asbestos-related work are covered by the Construction Standard.

To enforce its standards, OSHA is authorized to conduct workplace inspections. In addition, employees have the right to file an OSHA complaint without fear of punishment from the employer. In turn, employees have the responsibility to follow all safety and health rules. OSHA may not conduct a warrantless inspection without the employer's consent.

OSHA will issue a citation during an inspection if the Compliance Officer finds that a standard is being violated. The citation informs the employer and employees of the regulations or standard(s) alleged to have been violated and of the proposed length of time for correction. Monetary penalties may also be imposed.

OSHA published its final rule on asbestos in the Federal Register on August 10, 1994, updating its original 1970 standard. The new regulations amend the general industry (1910) and construction (1926) standards issued in 1986 and add a shipyard employment standard (1915). Highlights of the general industry and construction standards follow.

- The permissible exposure limit (PEL) has been lowered to 0.1 fibers per cubic centimeter (f/cc) of air as an 8-hour time-weighted average (TWA) for all asbestos work in all industries, effective October 11, 1994. There is no action level. The excursion limit remains at 1.0 f/cc, averaged over a 30-minute sampling period. Fiber concentrations above these standards trigger various worker protection and related requirements. If average airborne concentrations on an 8-hour time weighted basis are above 0.1 f/cc of air, a full compliance program must be undertaken. This includes engineering and work practice controls and, if needed, respiratory protection for exposed workers.

- The General Industry Standard regulates all activities related to asbestos, except agricultural, that are not covered by the construction and shipyard employment standards. Under this standard, employers must provide awareness training to employees who perform housekeeping activities in areas where ACM or PACM is located. They must also institute a training program for all employees who are exposed to airborne asbestos fibers at or above the PEL and/or excursion limit and ensure that they participate in the program. The program should be presented before the initial assignment and at least annually thereafter.

- OSHA has eliminated the term "small-scale short duration projects" in the construction standard. Instead OSHA classifies construction activity according to a descending degree of risk. Class I work presents the greatest risk potential and Class IV, the lowest:

  - Class I work involves the removal of thermal system insulation and surfacing ACM or PACM.

  - Class II work involves removal of any other ACM which is not thermal system insulation or surfacing ACM.

  - Class III work is defined as repair and maintenance activities where employees are likely to disturb ACM.

  - Class IV is defined as maintenance and custodial activities during which employees contact ACM and PACM and activities to clean up waste and debris containing ACM and PACM.

- Under the construction standard, employers must designate a "competent person" (for example, the Asbestos Consultant) who has the qualifications and authority for ensuring worker health and safety. This person must be capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy to reduce asbestos exposure and have the authority to take prompt corrective action. For Class I and II work, the competent person must be trained in accordance with EPA's Model

Accreditation Plan (40 CFR 763) for project designer or supervisor, or its equivalent and, for Class III and IV work, must have completed a 16-hour Operations and Maintenance (O&M) course developed by EPA (40 CFR 763.92 (a) (2)) or its equivalent.

- The competent person must be present on all construction work sites to supervise all asbestos work performed in regulated areas (an area where Class I, II, or III asbestos work is conducted, an adjoining area where debris and waste from the project may accumulate, and an area where airborne asbestos fiber concentrations exceed or have the potential to exceed the PEL), conduct frequent and regular inspections of the job sites, materials, and equipment as part of required safety and health program. Personal monitoring of workers must be performed unless (1) historical data for similar tasks show fiber concentrations consistently below the PEL, or (2) "objective data" show that the ACM being handled or disturbed will not cause exposure above the PEL.

- Employers must institute a training program for all workers who install asbestos-containing products and all workers who perform Class I, II, III, and IV work. Medical surveillance is required for all asbestos workers (for example, outside contractors) who engage in Class I, II, or III work for a combined total of 30 days or more a year or who are exposed above the PEL or the excursion limit of 1.0 f/cc.

- Employers must communicate the hazards of asbestos to employees if ACM or PACM is present in their facilities, or if their employees will work with ACM.

Some specific provisions should be implemented as soon as possible but no later than the following dates:

Issue	Date
Housekeeping	October 1, 1995
Medical Surveillance	October 1, 1995
Respiratory Protection	October 1, 1995
Hygiene Facilities and Practices for Employees	October 1, 1995
Communication of Hazards	October 1, 1995
Competent Person Designation and Training	October 1, 1995
Engineering and Work Practice Controls	October 1, 1995

Specific compliance requirements differ somewhat between the general and construction industries. Findings and actions must be fully documented, and records saved for specific periods of time, usually 30 years or more.

4.2 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP)

The USEPA National Emission Standards for Hazardous Air Pollutants (NESHAP, 40 CFR Part 61, Subpart M, as amended November 20, 1990) should be considered during maintenance, renovation, or demolition activities that might disturb ACM. NESHAP's rules apply to the application, removal, and disposal of ACM. Also included in NESHAP are rules concerning manufacturing, spraying and fabricating ACM.

Some highlights of the NESHAP requirements follow.

DEFINITIONS

NESHAP, as amended November 20, 1990, divides the types of ACM into three categories: regulated ACM (RACM), Category I non-friable ACM, and Category II non-friable ACM.

RACM

RACM is friable ACM that contains more than 1 percent asbestos that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

Category I

Category I non-friable ACM includes asbestos gaskets, resilient floor coverings, and asphalt roofing products containing more than 1 percent asbestos that cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Category I non-friable ACM that has been made friable or subjected to sanding, grinding, cutting, or abrading is considered RACM.

Category II

Category II non-friable ACM includes all other forms of non-friable ACM containing more than 1 percent asbestos that are not included in Category I. Examples include Transite® board and cement siding.

Category II non-friable ACM that will be or have a high probability of becoming crumbled, pulverized, or reduced to powder is also considered RACM.

SURVEYS

A survey is required to identify the forms of asbestos present in a facility prior to renovation or demolition activities. These include RACM and Category I and II non-friable ACM.

NOTIFICATION REQUIREMENTS

Demolition Projects

NESHAP defines demolition as the removal of a load supporting structural member of a facility or intentional burning.

- Notification must be given to the USEPA regional NESHAP's Coordinator 10 working days prior to demolition of a building regardless of the quantity of RACM present.

- Notification must also be provided 10 working days prior to demolition for any facility that does not contain asbestos.

Renovation Projects

NESHAP defines renovation as altering a facility or component in any way, including removal of ACM.

- Notification must be given 10 working days prior to renovation if quantities greater than 160 square feet or 260 linear feet of RACM are removed.

- Notification must be provided at least 10 working days before the end of the calendar year if the combined additive amount of friable RACM to be removed or stripped during planned renovations in the next calendar year is greater than 260 linear feet or 160 square feet.

REMOVAL REQUIREMENTS

- Removal is required of any RACM that will be affected prior to demolition. Prior to renovation if the activities would "break up or disturb" RACM, removal may be the only practical alternative.

- Friable RACM must be removed using wet removal techniques.

- With special approval from USEPA, dry removal is allowed under certain circumstances.

- No visible emissions to the outside air are permitted during removal or renovation.

DISPOSAL REQUIREMENTS

- No visible emissions to the outside air are allowed during collecting, packaging, transporting, or disposing of ACM waste.

- Wet ACM must be sealed in leak-tight containers.

- Containers must be properly labeled with OSHA labels and provide the generator's identification and facility location. A generator's number for hazardous waste is not required.

4.3 OTHER FEDERAL AGENCIES

Other federal agencies promulgating asbestos regulations include the Department of Transportation (DOT) on the transport of asbestos and the National Institute of Standards and Technology (NIST) on standards and protocols for laboratory accreditation.

The USEPA Asbestos School Hazard Abatement Reauthorization Act (ASHARA) rule concerns persons performing asbestos related work in public and commercial buildings. Under ASHARA, accreditation requirements and minimum training hours are established for inspectors in public and commercial buildings, and for persons who design or carry out response actions including project designers, contractor/supervisors, and workers.

4.4 STATE AND LOCAL AGENCIES

State and local agencies may have additional requirements than those required by federal agencies. Therefore, state and local regulations where the facility is located must be reviewed and complied with. Some of the state and local agencies in the Commonwealth of Massachusetts include the Department of Environmental Protection, Department of Health, Department of Labor, Division of Occupational Safety, Department of Building Construction, Department of Transportation, etc.

4.4.1 Commonwealth of Massachusetts Regulatory Requirements

Commonwealth of Massachusetts Regulatory Requirements

Department of Environmental Protection:

Bureau of Waste Prevention

Scope of Regulations*:* Requires notification and work practices to avoid fiber release for asbestos handling, removal, storage, transport, and disposal; inspects demolition/renovation and manufacturing operations; regulates storage, handling, and special waste landfilling of asbestos and asbestos-containing material.

Regulations: 310 CMR 4.00 (Air Quality notification approval timelines and fees), 7.00, 7.09(5), 7.15 (AQ asbestos regulation) and 310 CMR 19.061 (disposal requirements) and 310 CMR 16.00 (landfill siting; asphalt-brick-concrete recycling).

Bureau of Waste Site Cleanup

Scope of Regulations*:* Regulates cleanup of oil and hazardous materials; material containing asbestos must be reported if released to the environment or if it poses a threat of release.

Regulations: 310 CMR 40.0000.

Division of Occupational Safety (DOS)

Scope of Regulations*:* Prescribes training, certification and/or licensing requirements for persons and firms engaged in asbestos work, for inspectors, management planners, project designers and project monitors, laboratories and training providers. It also prescribes project notification and work practice requirements for asbestos work. The USEPA has delegated programs for AHERA and ASHARA enforcement to DOS.

Regulations: 453 CMR 6.00

4.5 OTHER SITE-SPECIFIC REQUIREMENTS

Not Applicable.

CHAPTER II

SITE-SPECIFIC O&M PROGRAM

5.0 BERKELEY INVESTMENTS, INC. O&M PROGRAM POLICY

Asbestos is a naturally occurring carcinogen once used in a wide variety of building products. ACM remains in commercial structures and other facilities, such as those managed by Berkeley. The presence of ACM within a building structure does not, in and of itself, pose a hazard to human health. This policy is designed to control the possible health risks that could be created if excessive asbestos fibers are released. This policy requires:

- Removing ACM prior to planned disturbance, including renovation, in accordance with applicable federal, state, and local laws and regulations.

- Confirming the existence of ACM by testing and removing or otherwise abating the existing ACM prior to any planned disturbance.

- Implementing operations and maintenance ("O&M") programs in accordance with applicable laws, to manage and periodically assess the condition of ACM or PACM.

- Minimizing disturbance of ACM or PACM through employee awareness training and other management practices.

- Informing and training affected employees, in accordance with applicable federal, state, and local laws and regulations.

ASBESTOS COORDINATION

The director of the O&M program is the APM. The APM will implement Berkeley's O&M program by using certified environmental consultants and contractors. Berkeley's APM for the Worcester Commons Mall will be responsible for minimizing the risks caused by the presence of ACM in the building through proper execution of the O&M program.

All information regarding the identification of known or suspected ACM in an existing facility, or information relevant to a proposed new facility, must be maintained by and reported to the APM. The APM will provide for amendment, if necessary, of the O&M program to reflect new information and to disseminate information to the appropriate parties.

ASBESTOS CONSULTANT

Berkeley will retain a qualified and experienced Independent Asbestos Consultant to assist the APM and other Berkeley staff, as needed. The consultant will be available to perform building surveys, assess the condition of ACM and PACM, test and monitor airborne fiber concentration levels, coordinate ACM emergency procedures, conduct asbestos awareness training, aid in the implementation of the O&M program, and provide asbestos abatement design and monitoring services, as required. URS Corporation (URS) will fill the role of the Independent Asbestos Consultant for this property.

OCCUPIED PROPERTY

Periodic asbestos condition surveys will be performed, as necessary, to assess the condition and potential hazards posed by identified ACM or PACM. Within the limits of operational factors, and as may otherwise be required by applicable law, ACM abatement may be planned based upon results of the condition assessment surveys, and in conjunction with a planned alteration ("Planned Actionable"). Berkeley will strive immediately to abate any ACM or PACM that is damaged, accessible, and friable if the periodic condition assessment survey indicates that it is an immediate health threat ("Short-Term Actionable") in accordance with applicable laws and regulations.

Abatement must be performed by a qualified and licensed Asbestos Abatement Contractor prior to or in conjunction with any renovation or demolition work which could disturb ACM or PACM.

ASBESTOS ABATEMENT

Abatement and disposal of ACM will be conducted in accordance with applicable laws and regulations and within generally accepted standards of the asbestos abatement industry. Berkeley will retain the services of an Independent Asbestos Consultant to (1) design large abatement projects, (2) observe the work of abatement contractors, (3) inform applicable employees of the presence of ACM prior to the abatement work being performed, (4) conduct air monitoring before, during, and after abatement projects, as appropriate, and (5) prepare and submit final abatement project reports.

Preparation of a specification or detailed scope of work will be necessary for major asbestos abatement activities. The specification shall be site-specific and detailed for a particular project or operation. Specifications will be required for all major work by abatement contractors, except for routine operations conducted under the guidance of the Independent Asbestos Consultant.

Berkeley will only employ qualified and licensed Asbestos Abatement Contractors for abatement projects, independent of the Asbestos Consultant and the licensed laboratory.

OPERATIONS AND MAINTENANCE PROGRAM

URS has been retained to evaluate the condition of the identified ACM and PACM at the Worcester Commons Mall**.** Information pertaining to ACM and PACM at the property was obtained through a limited building asbestos survey and records review conducted for Berkeley. As part of this O&M program, maintenance and other employees, including outside contractors, who come into contact with ACM or PACM at the facility will be notified of its presence, as required by law and, if the ACM or PACM will not be removed, be trained to detect and report episodic incidents of asbestos damage or fiber release, so as to allow for the proper abatement of Short-Term Actionable ACM.

Berkeley employees will be directed not to engage in any activity which will disturb friable ACM or PACM. Cleanup and maintenance of friable ACM or PACM will be conducted only by qualified and licensed asbestos abatement contractors. Asbestos Awareness Training will educate facility personnel in the care and treatment of non-friable ACM and PACM at the facility.

5.1 ORGANIZATION OF THE ASBESTOS MANAGEMENT TEAM

Members of the asbestos management team may include:

- Berkeley APM
- Independent Asbestos Consultant
- Maintenance Personnel
- Custodial Staff
- Office Personnel
- Asbestos Abatement Contractor.

This information should be dated and kept current. The APM will be responsible for providing updates to the Asbestos O&M Program, with assistance from the Independent Asbestos Consultant.

5.2 BERKELEY OPERATIONS & MAINTENANCE PROGRAM MANAGER (APM)

The Berkeley APM has the ultimate responsibility of implementation and enforcement authority for this O&M Program at the facility level. Deviation from this program must be pre-approved by the APM. The APM will direct the activities of the Independent Asbestos Consultant, with respect to ACM and PACM at the facility.

Any questions from employees, contractors or tenants regarding O&M program content or requirements should be directed to the APM, who will be responsible for program implementation and recordkeeping, although tasks may be delegated to other staff members for execution or evaluation.

5.3 APPROVED INDEPENDENT ASBESTOS CONSULTANT

An Independent Asbestos Consultant, approved by Berkeley, will be retained to perform visual assessments, air and/or bulk sampling and project oversight and will provide recommendations, as necessary. The Approved Independent Asbestos Consultant will work closely with the APM to assist in evaluating and implementing appropriate response actions.

5.4 MAINTENANCE PERSONNEL

Maintenance personnel will temporarily stop any activity and notify their supervisor when their work will potentially disturb ACM or PACM. The supervisor will notify the APM, who, along with the Independent Asbestos Consultant, will evaluate and implement the appropriate response actions.

5.5 COMPANY EMPLOYEES

All associates will notify the APM when they encounter damaged ACM or PACM. The APM, along with the Approved Independent Asbestos Consultant, will evaluate and implement the appropriate response action.

Worcester Commons Mall O&M Asbestos Program Manager (APM)

Name:	Cathy Hamacher
Address:	120 Front Street
City, State:	Worcester, Massachusetts
Voice:	(508) 890-8885
Cell:	
Fax:	(508) 890-8881

Independent Asbestos Consultant

Company: URS Corporation
Address: 5 Industrial Way
City, State: Salem, New Hampshire 03079
Manager: Douglas R. Lawson, Ph.D., CIH
Telephone: 603.893.0616

Asbestos Abatement Contractors

Company: Dec-Tam Corporation
Address: 50 Concord Street
City, State: North Reading, Massachusetts 01864
Telephone: 978.470.2860

Company: The Aulson Company, Inc.
Address: 49 Danton Drive
City, State: Methuen, Massachusetts 01844
Telephone: 800.542.0024

Company: MARCOR Environmental, Inc.
Address: 3-D Gill Street
City, State: Woburn, Massachusetts
Telephone: 800.545.5350

6.0 AREAS CONTAINING ASBESTOS MATERIALS

A summary of the building areas where ACM and PACM were determined to be present and their condition is presented in this section. URS' bulk material assessment identified those materials that contain asbestos fibers in a concentration greater than one percent in accordance with federal, state and local regulations, as outlined in Appendix A. URS' survey was limited to building areas where readily accessible suspect ACM was located. Additional suspect ACM uncovered during operations, maintenance, renovation, and/or demolition activities, that was not identified during URS' limited survey, must be treated as ACM until laboratory analysis proves otherwise.

6.1 ASBESTOS-CONTAINING MATERIALS

Asbestos exists in the following locations:

ASBESTOS CONTAINING MATERIALS
LOCATIONS AND QUANTITIES

Floor	Material	Quantity
Lower Level (Basement)	Spray-Applied Fireproofing	40,000 SF (Throughout Lower Level)
Lower Level (Basement)	Pipe Fitting Insulation (>12" diameter)	10 EA
Lower Level (Basement)	End Cap Insulation	100 EA
Lower Level (Basement)	12" x 12" Olive Floor Tile	9,435 SF
Lower Level (Basement)	12" x 12" Olive Floor Tile Mastic	9,435 sf
Lower Level (Basement)	2' x 4' Ceiling Tile	400 SF
Lower Level (Basement)	Residual Mastic	1,500 SF
Lower Level (Basement)	Brown Linoleum	100 SF
Lower Level (Basement)	12" x 12" Cream Floor Tile	55 SF
Lower Level (Basement)	Floor Tile Mastic	55 sf
Lower Level (Basement)	12" x 12" Brown Floor Tile	420 SF
Lower Level (Basement)	12" x 12" Brown Floor Tile Mastic	420 sf
Service Corridors	Residual Floor Tile Mastic	2,500 SF
Service Corridors	Residual Floor Tile	565 SF
Service Corridors	Residual Covebase Mastic	2,000 LF
Service Corridor	Pipe Fitting Insulation	12 EA

Retail Space	Residual Floor Tile Mastic	5,000 SF (Throughout Store Space)
Retail Space	Spray-Applied Fireproofing	10,000 SF
Sports Authority	Floor Tile Mastic	16,800 SF
Former Jordan Marsh	Residual Flooring Material	<10 SF
W-228	Floor Tile Mastic	425 SF
E-203	Floor Tile Mastic	620 SF
Plaza Level	Spray-Applied Fireproofing	32,396 SF
Plaza Level	Duct Insulation	40 SF
Common Level	Spray-Applied Fireproofing	39,164 SF
Common Level	Duct Insulation	40 SF
Roof Level	Spray-Applied Fireproofing	263 SF
Red Parking Garage Office	12 x12 Beige Floor Tile Mastic	1,250 SF
Red Parking Garage Office	12 x12 Beige Floor Tile	1,250 sf
Yellow Parking Garage Office	Covebase Mastic	250 LF

6.2 PRESUMED ASBESTOS-CONTAINING MATERIALS

Due to the nature of the limited asbestos survey in the shopping mall portion of this complex, the table in Section 6.1 cannot be considered to be comprehensive. Building materials not previously sampled must be considered to be presumed asbestos-containing materials (PACM). Please refer to the "Report of Asbestos Screening Survey, Worcester Center, Front Street, Worcester Massachusetts" issued by URS in May 2004 for a complete listing of materials tested and analyzed. To rebut presumption as an ACM, an accredited asbestos inspector, licensed in the Commonwealth of Massachusetts, must collect bulk samples in accordance with the EPA's AHERA Regulation (40 CFR 763.86). Samples must then be analyzed by a Commonwealth of Massachusetts licensed asbestos laboratory with proficiency demonstrated by current successful participation in a nationally recognized testing program such as the National Voluntary Laboratory Accreditation Program (NVLAP).

7.0 NOTIFICATIONS

7.1 REGULATORY NOTIFICATIONS FOR OPERATIONS, MAINTENANCE AND RENOVATION PROJECTS

Federal, state, and local regulatory notifications are not typically required for O&M activities affecting less than three square or three linear feet of ACM. However, if the total cumulative amount of ACM, per location, for the calendar year is above 160 square feet or 260 linear feet of ACM, then, blanket notification for the full year must be provided to the USEPA. The consultant or asbestos abatement contractor performing the work is required to complete a Fiber Release Episode Report form (Appendix E) and to submit it to the APM for review and record-keeping.

7.2 REGULATORY NOTIFICATIONS FOR PLANNED AND EMERGENCY ASBESTOS ABATEMENT

The EPA, state, and local jurisdictional authorities must be notified in writing of each scheduled and emergency asbestos abatement project. The asbestos consultant or contractor will ensure that this notification is completed within the required notification period.

7.3 PROGRAM FOR INFORMING BUILDING OCCUPANTS

Once the presence of ACM or PACM has been established in a facility, a notification program must be initiated. The notification program serves two primary purposes: (1) it alerts affected parties to the presence of ACM and PACM in the facility, and (2) it provides basic information on avoiding the unnecessary disturbance of ACM or PACM. This notification program is based on USEPA and OSHA requirements.

Notification of some building occupants, as necessary and/or required, and other affected individuals, including outside contractors, can be accomplished in several ways. Two common methods are:

- Distributing notices/letters, or
- Holding awareness or informational seminars.

The distribution of notices is an effective means of alerting facility occupants about the presence of asbestos. Memos or letters can be tailored to specific parties, and verification that notification was received is easily accomplished. Sample Contractor and Employee Notification Letters are attached as Appendix F.

7.4 ASBESTOS AWARENESS TRAINING

OSHA requires that all in-house trade workers (for example, carpenters and engineers) and maintenance housekeeping personnel who work in facilities that contain friable and non-friable ACM or PACM receive asbestos awareness training. At the Worcester Commons Mall, maintenance and custodial staff have access to building areas where ACM and PACM are located. These maintenance workers will require asbestos awareness training. In addition, outside contractors who work in the facility should be notified, in writing, of the presence of ACM or PACM in the building, and made aware of their obligations to their employees.

The APM will provide notification to applicable employees and outside contractors regarding asbestos-related repair or abatement activities occurring within the building, as necessary and/or as required by applicable laws and regulations.

8.0 COMMON MAINTENANCE ACTIVITIES AFFECTING ACM OR PACM

Maintenance personnel may perform various general maintenance activities throughout the facility. Some examples of maintenance activities performed in specific locations which may impact suspect or confirmed ACM are listed below. This work must be performed by taking the proper care and precautions, so as to not disturb the ACM or PACM.

Examples of Maintenance Activities that Impact ACM	**Type of Material Being Impacted**
Heavy duty buffing, stripping or drilling holes	Floor tile/mastic
Removal for plumbing repairs	Pipe insulation
Alterations and repair of flooring materials	Floor tile / mastic
Removal and alterations to existing walls	Spray-applied fireproofing
Removal or replacement of ceiling tiles (Bijou Theater)	Ceiling tiles

9.0 LABELS AND SIGNS

As required by applicable Federal, State and/or local laws and regulations, Berkeley will inform occupants about the location and physical condition of ACM or PACM by posting signs or labels in a central location where affected occupants can see them, or by holding awareness or information sessions. Labels, where necessary, will be prominently displayed and remain posted until ACM or PACM are removed. Specifically, labels will be placed on doors outside entrances to mechanical areas where ACM or PACM are known or suspected to exist. This labeling will serve to alert and remind maintenance personnel and outside contractors of the presence of ACM or PACM so that they may avoid inadvertently disturbing these materials.

The warning label print should be readily visible, in large letter size, or a bright color. The label should read as follows:

CAUTION

ASBESTOS
CANCER AND LUNG DISEASE HAZARD
DO NOT DISTURB WITHOUT
PROPER TRAINING AND EQUIPMENT

Warning signs should also be posted in areas where the airborne fiber concentration can be reasonably expected to exceed the OSHA PEL of 0.1 f/cc. They serve to prevent unprotected individuals from entering those areas. The warning signs should read as follows:

DANGER

ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

If during removal and repair operations, airborne fiber concentrations are not reasonably expected to exceed the OSHA PEL, OSHA signs are not required. However, warning signs should be affixed to barriers to warn any bystanders of the potential danger in the area. The signs should read as follows:

POTENTIAL ASBESTOS
HAZARD AREA

DO NOT ENTER

During asbestos remediation performed by trained personnel, the APM shall be responsible for posting signs as required by OSHA regulations. The Independent Asbestos Consultant will be available to provide assistance to the APM in these tasks.

10.0 TRAINING REQUIREMENTS

Berkeley employees and/or their representatives who perform routine maintenance or custodial activities will be trained to the awareness level.

10.1 CUSTODIAL AND MAINTENANCE PERSONNEL

Custodial, maintenance and other trades personnel will receive the 2-hour asbestos awareness training. The training will consist of information regarding:

- Asbestos and its various uses and forms.
- Health effects associated with asbestos exposure.
- Locations of ACM and PACM identified within the Building.
- Recognition of damage, deterioration, and/or delamination of ACM or PACM.
- The O&M program for the building.
- Proper response to fiber release episodes.

Custodial activities may be limited to cleaning and simple maintenance tasks where ACM or PACM may have the potential to be accidentally disturbed. Generally, custodial employees will not directly contact friable ACM or PACM but must be directed to use the proper equipment when performing custodial maintenance (for example, cleaning asbestos-containing floor tile with nonabrasive brushes).

10.2 BERKELEY O&M PROGRAM APM

The APM will be responsible for the development and implementation of the O&M program. The APM and other key executives will be trained in the management of asbestos. The training will include detailed information on the following:

- **Asbestos Regulations**

  The APM should be aware of all relevant regulations including those of OSHA and the USEPA. If reporting is required, it is the APM's responsibility; therefore, he/she must know when to report, where to report, and what information is required.

➢ Specifications for and Notification of Outside Contractors

Berkeley hires outside contractors for renovation and maintenance work in the building. Not only must the APM notify the contractor of the presence of ACM or PACM, but he/she should also oversee the work practices to ensure that renovation and maintenance activities do not result in exposures of building occupants or employees. A copy of the Contractor Notification (Appendix F) should be sent by the APM to the outside contractor prior to the initiation of any renovation activities.

11.0 CLEANING

Cleaning within specific areas of the building is one of the primary objectives of the O&M program. The APM will retain a licensed Asbestos Abatement Contractor, approved by Berkeley, to conduct initial cleaning in building areas where damaged friable ACM or PACM is present as soon as the O&M program is in place and before the initiation of a response action.

In areas of the property where damaged asbestos-containing thermal system insulation or surfacing material is present, (i.e., an episodic event), the APM will retain a prequalified licensed Asbestos Abatement Contractor to clean all areas in the immediate vicinity. All cleaning activities are to be recorded and included in the O&M manual (see Appendix E).

Subsequent minor repair and routine maintenance will also be conducted by a prequalified and licensed Asbestos Abatement Contractor retained by the APM and monitored by the Independent Asbestos Consultant.

Initial Cleaning

When damaged friable ACM is present, the Asbestos Abatement Contractor must HEPA vacuum and, if possible, wet clean all areas in the immediate vicinity. This includes the cleaning of all surfaces, such as shelves, walls, light fixtures, equipment housing and the exteriors of ducts, with damp cloths or a HEPA vacuum.

All mop heads, damp cloths, liquid wastes, debris, filters, or vacuum bags must be disposed of as asbestos-contaminated waste.

Periodic Cleaning

The APM should evaluate with the assistance of the Independent Asbestos Consultant when periodic cleaning is needed, based on the rate of dust buildup. This evaluation should be made as part of the periodic assessment (see Section 15.0 of this program for information related to periodic ACM/PACM surveillance).

If cleaning is necessary, the APM will retain a licensed Asbestos Abatement Contractor, approved by the Independent Asbestos Consultant, to clean areas. The Asbestos Abatement Contractor shall remove any debris found near friable damaged ACM or PACM using a HEPA vacuum or wet methods. The Asbestos Abatement Contractor shall HEPA vacuum or steam clean all carpets in rooms with damaged ACM or PACM and wet wipe all surfaces in the area. If steam-cleaning is used, the liquid waste generated during the process must be disposed as asbestos-contaminated waste. The Asbestos Abatement Contractor must dispose of debris, filters, and/or vacuum bags as asbestos-contaminated waste.

11.1 AREAS WITH FRIABLE ACM/PACM

Friable ACM or PACM should not be disturbed by anyone other than the Berkeley approved Asbestos Abatement Contractor. If material dislodges because of accidental disturbance or water leak, the APM should be contacted as soon as possible after the area is secured. The APM will contact the Independent Asbestos Consultant and approved Asbestos Abatement Contractor to respond to the emergency.

11.2 AREAS WITH NON-FRIABLE ACM/PACM

Non-friable ACM/PACM (i.e., mastic or floor tile) typically release fibers only when damaged or disturbed. Fiber releases can occur when workers drill, cut, abrade, break, or saw vinyl asbestos floor tile or other non-friable material. General cleaning and maintenance (i.e., applying a wax coating), however, should not damage these materials.

12.0 SPECIAL WORK PRACTICES FOR MAINTENANCE ACTIVITIES

Before conducting maintenance or repair work which will damage or disturb ACM/PACM, the Berkeley APM shall visually inspect the area, evaluate and select the appropriate course of action. Whenever the potential for release of asbestos fibers from ACM or PACM exists (i.e., sanding floor tile or repairing a pipe leak) the APM will retain an Asbestos Abatement Contractor to perform the work procedures in the aforementioned sections.

Basic O&M procedures to minimize and/or contain asbestos fibers may include wet methods, use of mini-enclosures, use of portable power tools equipped with special local exhaust ventilation attachments, and avoidance of certain activities, such as sawing, sanding and drilling of ACM/PACM.

NOTE: During O&M procedures, personal air monitoring must be performed by the licensed Asbestos Abatement Contractor. All asbestos waste (generated during these activities) must be handled in accordance with all local, state, and federal requirements.

Maintenance activities can be divided into three categories with regard to their potential for disturbing ACM/PACM:

Contact with ACM/PACM Unlikely - In-house Employees

Maintenance activities or repairs which can be performed **without** contacting or disturbing ACM/PACM require little more than normal care and good workmanship and can be performed by in-house personnel. These include, but are not limited to:

- Repairing non-ACM insulated pipes or valves without disturbing other ACM/PACM.
- Routine cleaning activities.

All surfaces should be isolated to remove any settled fibers in the event that ACM or PACM are disturbed. An Asbestos Abatement Contractor will respond to the asbestos fiber release episode.

Contact with ACM/PACM Not Likely but Possible - In-house Employees

Maintenance activities or repairs that may have the potential to cause accidental disturbance of ACM/PACM require some precautions. This work may be performed by in-house personnel only if the proper precautions are instituted to minimize the potential for ACM/PACM disturbance. For example, special cleaning, possibly area isolation and respiratory protection, may be needed if the chance of disturbance is likely. Activities that fall into this category include, but are not limited to:

- Working on a fixture near thermal system ACM/PACM.

- Repairing of a pipe that is not insulated with ACM, but will disturb ACM/PACM on nearby pipes.

The APM should review the scope of work and the work area to assess whether the Independent Asbestos Consultant should be contacted to discuss and/or evaluate cleanup, repair, or removal requirements prior to allowing maintenance activities to commence.

Contact with ACM/PACM Likely or Intended - Only by an Asbestos Abatement Contractor

Maintenance activities or repairs that involve intentional small scale manipulation or disturbance of ACM/PACM require special work practices, as outlined in this O&M manual. ACM/PACM must be removed by a prequalified and approved Asbestos Abatement Contractor before in-house personnel perform their duties. Personal protective equipment, including respirators and Tyvek suits, and personal air monitoring are required when ACM/PACM will be disturbed (see Appendix E).

Typical activities include but are not limited to:

- Removing a small segment of thermal system insulation to repair a pipe leak or replace a valve.

Prior to performing any maintenance activities that will disturb ACM or PACM, the APM shall contact an Independent Asbestos Consultant to provide area air monitoring before, during, and after the ACM disturbance, if necessary.

13.0 SPECIAL WORK PRACTICES FOR PLANNED RENOVATION WORK

Future renovations may involve disturbing ACM or PACM and may also uncover building materials previously hidden that may contain asbestos. Work, such as moving walls, adding wings, and replacing heating or air-conditioning systems may involve breaking, cutting, or otherwise disturbing known, or as yet unidentified, ACM.

When building renovations are scheduled, it will be the responsibility of the APM to notify the designated Independent Asbestos Consultant of any planned alteration or renovation activity such that the consultant can assist in identifying ACM or PACM which may be impacted by testing, visual assessment and review of as-built construction drawings. The Independent Asbestos Consultant will provide necessary assistance and/or recommendations to the APM, as necessary.

All parties must be aware of potential ACM/PACM disturbance early in the project planning stage to evaluate appropriate response actions. Partial or full removal of the ACM/PACM may be necessary before renovation activities can commence.

- If partial or full removal is necessary, the APM shall select an Asbestos Abatement Contractor.

- The Independent Asbestos Consultant shall develop guideline specifications or work plans in accordance with USEPA, OSHA, state, and local regulations, if necessary, for use by the Asbestos Abatement Contractor.

- The Independent Asbestos Consultant shall require that the Asbestos Abatement Contractor perform all work in compliance with applicable federal, state, and local laws and regulations.

- The APM shall maintain records of work, including copies of the specifications and closeout documentation provided by the Independent Asbestos Consultant. A copy shall remain at the facility and one copy should be sent to the Berkeley Administrative offices.

14.0 EMERGENCY RESPONSE PROCEDURES FOR EPISODIC EVENTS

As long as ACM/PACM remains in the building, a fiber release episode could occur if the ACM/PACM is inadvertently disturbed. Maintenance personnel and custodial staff should immediately report to the APM the presence of suspect asbestos-containing debris on the floor, or physical damage to the ACM/PACM, or other evidence of a fiber release.

The APM may then take the following steps:

- Evaluate the extent of ACM/PACM damage.
- Barricade and/or seal off contaminated areas against entry by unauthorized personnel.
- Isolate the contaminated area by sealing doors and vents with polyethylene sheeting and duct tape and shutting off or modifying air handling systems or any other notification appropriate to restrict access or prevent exposure in other areas of the building.
- Post a warning sign outside the contaminated area.
- Contact the Independent Asbestos Consultant. The Independent Asbestos Consultant will assess the situation and recommend further courses of actions.
- Contact Berkeley's pre-qualified and approved Asbestos Abatement Contractor.
- If significant damage or delamination of ACM/PACM has occurred, consider total removal of the ACM/PACM by the Asbestos Abatement Contractor in the affected areas and replacement with a non-asbestos-containing substitute.
- Keep all records associated with the fiber release episode, including Asbestos Abatement Contractor submittals (medical information, waste shipment records, etc.), Independent Asbestos Consultant's reports (air sampling data), and a fiber release episode report (Appendix E). Send a copy of all records to the Berkeley Investments Administrative offices.

NOTE: **The Independent Asbestos Consultant will secure and maintain the necessary documentation and records associated with the work.**

To respond to fiber release episodes, the following materials will be available at the building, and accessible to trained maintenance and custodial staff for the purpose of isolating areas of damaged ACM/PACM.

Fiber Release Episode Supplies

Item	Recommended Quantity
Barricade Tape (3 inches x 1,000 feet)	1 roll
Duct Tape (3-inch x 60-yard roll)	3 rolls
Polyethylene Sheet (6-mil) (20 feet x 100 feet)	1 roll
Sign – DANGER (14 inches x 20 inches)	5
Sign - KEEP OUT	5
Surfactant	1 gallon
Sprayer	1 each

Additional response actions for fiber release episodes will be evaluated by the Independent Asbestos Consultant and conducted by a prequalified Asbestos Abatement Contractor who is licensed in the Commonwealth of Massachusetts.

15.0 PERIODIC ACM SURVEILLANCE

15.1 ASSESSMENT

Periodic review of the O&M Program is essential to see that the program objectives are being met. ***A key feature of the review is periodic assessment of all ACM/PACM in the facility***. The assessment, combined with ongoing reports of changes in the condition of the ACM/PACM made by employees, will ensure that any damage or deterioration of the ACM/PACM will be detected and corrective action taken. The periodic assessment should be conducted, at a minimum, annually, and more frequently where necessary, as determined by the APM. Highly friable and deteriorated material, such as sprayed-on ACM/PACM and highly accessible ACM/PACM, may require evaluation every 6 months to assess changes in material condition.

The APM will conduct the periodic assessments.

The APM will develop an assessment schedule which will be repeated annually, or until such time as the ACM/PACM has been removed from the building.

Forms which can be used to document the reassessment of materials previously determined to contain asbestos are provided in Appendix E. Completed forms should be retained in the site manual with other periodic surveillance materials.

16.0 RECORDKEEPING

The APM and the Independent Asbestos Consultant will retain all records related to the O&M Program, such as:

- The written O&M Program itself, including work practices.
- Plans and drawings (As-built if available).
- Assessment data (location of ACM/PACM).
- Copies of notification and warning programs.
- Descriptions of times, dates, attendees of training programs, and all outlines and written materials disseminated.
- Copies of all permits and documentation of maintenance, renovation, and emergency response actions associated with ACM/PACM.
- Periodic ACM/PACM surveillance records.
- Bulk and air sampling and analysis reports.
- Chain of custody for laboratory samples.
- Asbestos abatement contractor insurance forms, if applicable.
- Asbestos waste disposal permits and asbestos waste shipment records.

Berkeley shall maintain all records associated with asbestos-related activities (for example, testing and medical records) for a period of at least 30 years.

17.0 ASBESTOS-CONTAINING WASTE MATERIAL STORAGE AND TRANSPORTATION

Asbestos-containing waste materials generated during operations and maintenance procedures should be stored and transported as follows:

- In leak-tight containers with the following warning labels:

DANGER

CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

- Waste should also be labeled with the name and location of the building where the waste was generated, and the initial accumulation date.

- Waste should not be stored at the building longer than 90 days from initial accumulation.

- Waste materials should be temporarily stored on the premises in a secured container or storage area, for example, a trash can with a locking top or behind a locked cage or closet.

- All waste must be stored wet.

- All waste should be transported by a licensed asbestos waste hauler. A copy of this license issued by the state agency should be retained in the permanent files.

- The waste hauling vehicle should be enclosed or utilize a canvas covering sufficient to contain the transported waste.

- An ACM waste shipment record must accompany all waste materials transported to a USEPA-approved landfill.

The completed waste shipment record must be received by Berkeley through the Independent Asbestos Consultant from the disposal site within 35 days of the date the waste was accepted by the initial waste hauler. If it is not received within this time frame, the APM must contact the transporter and/or the operator of the landfill to determine the status of the waste shipment record.

If the completed waste shipment record is not received within 45 days, a report must be submitted to the local USEPA Regional Office responsible for administering NESHAP regulations.

APPENDIX A

INVENTORY OF ASBESTOS-CONTAINING MATERIAL

WORCESTER COMMONS MALL

APPENDIX B

GLOSSARY OF TERMS

APPENDIX B

GLOSSARY OF TERMS

ABATEMENT

Procedures to control fiber release from asbestos material. This includes removal, encapsulation, enclosure, repair disturbance of friable asbestos or any handling of asbestos material that may result in the release of asbestos fibers.

ACCREDITED LABORATORY

An analytical laboratory accredited for analysis of asbestos samples by the American Industrial Hygiene Association (AIHA).

AIRLOCK

"Airlock" means serial arrangement of rooms whose doors are spaced a minimum of 4 feet apart to permit ingress or egress through one room without interfering with the next and constructed in such a manner to prevent or restrict the free flow of air in either direction. Polyethylene sheeting, 6-mil full weight or greater, crossover doors shall be triple flapped and weighted to fall into place when people pass through this area.

AMENDED WATER

Water to which a surfactant is added.

APPROVED RESPIRATOR

The combination of elements (mask, air purifier, breathing air source) approved by NIOSH/Mine Safety and Health Administration (MSHA) for the category of use.

AREA AIR SAMPLING

Air sampling is the process of measuring the suspended fiber content in a specific volume of air collected over a period of time. Analysis of collected samples shall be by PCM in accordance with NIOSH Method 7400, Revision 3, A Rules.

ASBESTOS CLEARANCE LEVEL

The clearance level in the airborne fiber concentration, which must be achieved within the containment enclosure prior to dismantling the enclosure. This clearance level shall be 0.01 f/cc under aggressive air sampling conditions.

The sampling volume shall be from 1,200 to 3,000 liters of air, and analysis shall be performed by TEM or PCM.

CERTIFIED INDUSTRIAL HYGIENIST

An Industrial Hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene (ABIH).

CLEAN ROOM

An uncontaminated area or room, which is part of the decontamination enclosure system with provisions for storage of workers' or visitors' street clothing, protective equipment, and uncontaminated materials and equipment. Curtained doorways are required at all entrances.

CONTAINMENT BARRIER

A room or temporary enclosure to contain the asbestos material within the work area during abatement.

CURTAINED DOORWAY

A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms, typically constructed by placing three overlapping sheets of polyethylene over an existing or temporarily framed doorway and by securing each along the top of the doorway, the vertical side of the opposite vertical side. Two curtained doorways spaced a minimum of 4 feet a part form an airlock. Plastic sheet overlapping width shall be a minimum of 2 feet.

DECONTAMINATION ENCLOSURE SYSTEM

A series of connected rooms with curtained doorways between any two adjacent rooms for the decontamination of workers or of materials and equipment. A decontamination enclosure system must contain airlocks.

EQUIPMENT ROOM

A contaminated area or room, which is part of the decontamination enclosure system with provisions for storage of contaminated clothing and equipment and cleaning supplies for decontamination of equipment. Curtained doorways are required at all entrances.

FIXED OBJECT

A unit of equipment or furniture in the work area which cannot be removed from the work area.

HEPA VACUUM EQUIPMENT

High efficiency particulate air (HEPA)-filtered vacuuming equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be of 99.97 percent efficiency for retaining particles of 0.3 microns or larger.

MOVABLE OBJECT

A unit of equipment or furniture in the work area, which can be removed from the work area.

OSHA 30-MINUTE EXCURSION LIMIT

OSHA has established a 30-minute excursion limit for airborne asbestos fibers of 1.0 f/cc.

OWNER

All references to "Owner" shall mean authorized Berkeley Investments & Co., Inc. employees.

PEL

OSHA has established a permissible exposure limit (PEL) for employee exposure to airborne asbestos fibers of 0.1 f/cc as an 8-hour time-weighted average (TWA).

PERSONAL PROTECTIVE EQUIPMENT

That equipment, which may consist of coveralls, shoes, gloves, helmet, goggles, and respirator.

PLANNED ACTIONABLE

ACM which has begun to lose structural integrity or covering, is partially crushed, punctured, water-damaged, or otherwise may not be completely intact or which may lack some fiber cohesion or adhesion qualities or is partially damaged and may be located in areas of low occupancy, accessibility or has deteriorated significantly as a result of factors within its close proximity. This material does not pose an immediate potential health concern, but should be planned to be abated in future years, as a precaution. This material should be managed with an operations and maintenance program to minimize further damage to the material and potential health effects of employees.

PLASTIC SHEETING

Translucent polyethylene sheet material of 6-mil-thickness, full weight or greater.

REMOVAL

The act of removing asbestos-containing or contaminated materials from the building to an approved disposal site.

SEALANT

A material sprayed on after the wet removal of the existing asbestos. The purpose is to prevent the release of residual asbestos fibers remaining after removal and cleaning operations. Also used to encapsulate asbestos fibers in remaining insulation.

SHORT-TERM ACTIONABLE

ACM which has lost structural integrity or covering is crushed, punctured, severely water-damaged or otherwise not intact or which lacks fiber cohesion or adhesion qualities, is significantly damaged and may be located in areas of high occupancy, accessibility or has deteriorated significantly as a result of factors within its close proximity. This material should be abated within a reasonably short time frame.

STABLE

ACM which is not "planned" or “short-term" actionable, not considered an immediate potential health concern and can be classified as one of the following conditions:

- Fair) ACM which has lost small amounts of structural integrity or covering is partially crushed, punctured, water-damaged, or otherwise not fully intact or which may lack some small amounts of fiber or cohesion or adhesion qualities or accessibility or has started to deteriorate as a result of factors within its immediate proximity and can be isolated cost effectively, is damaged less than 3 continuous square feet or 3 continuous linear feet.

- (Good) ACM which has not lost structural integrity or covering is not crushed, punctured, water-damaged, or otherwise intact or which does not lack fiber cohesion or adhesion qualities is not damaged and may be located in area of high occupancy, accessibility and has not deteriorated significantly as a result of factors within its immediate proximity is damaged less than 1 continuous square foot or 1 continuous linear foot.

SURFACTANT

A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

WET CLEANING

The process of eliminating asbestos contamination from facility surfaces and objects by using cloths, mops, or other cleaning tools which have been dampened with water and by disposing of the water and these cleaning tools afterwards as asbestos-contaminated waste.

APPENDIX C

LICENSED ABATEMENT CONTRACTOR LIST

APPENDIX C

APPROVED LICENSED ABATEMENT CONTRACTORS

The APM should contact the Independent Asbestos Consultant to respond to episodic fiber release incidents. The Independent Asbestos Consultant will recommend one of the approved Asbestos Abatement Contractors and coordinate air sampling activities during the cleanup.

For Worcester Commons Mall, the approved licensed Asbestos Abatement Contractors are as follows:

Asbestos Abatement Contractors

Company: Dec-Tam Corporation
Address: 50 Concord Street
City, State: North Reading, Massachusetts 01864
Telephone: 978.470.2860

Company: The Aulson Company, Inc.
Address: 49 Danton Drive
City, State: Methuen, Massachusetts 01844
Telephone: 800.542.0024

Company: MARCOR Environmental, Inc.
Address: 3-D Gill Street
City, State: Woburn, Massachusetts
Telephone: 800.545.5350

APPENDIX D

SAMPLE WASTE SHIPMENT RECORD

APPENDIX E

OPERATIONS & MAINTENANCE FORMS

PERIODIC SURVEILLANCE FORM

Periodic Surveillance of Asbestos-Containing Materials

Locations of asbestos-containing material (building, floor, wing, or general description)

_____

_____

_____

Type of Asbestos-Containing Material(s):

1. Sprayed- or troweled-on fireproofing, on ceilings or walls
2. Sprayed- or troweled-on fireproofing, on structural members
3. Thermal system insulation on pipes, tanks, or boiler
4. Other (describe):

_____

_____

Abatement Status:

1. The material has been encapsulated ____, enclosed ____, neither ____, removed ____.

Assessment:

1. Evidence of physical damage: _____

_____

2. Evidence of water damage:_____

_____

3. Evidence of delamination of other damage:_____

_____

4. Degree of accessibility of the material:_____

_____

5. Degree of activity near the material:_____

_____

6. Location in an air plenum, air shaft, or airstream: _____

_____

7. Other observations (including the condition of the encapsulant or enclosure, if any): _____

_____

Recommended Action: _____

_____

Signed: _____ Date: _____

(Asbestos Building Inspector)

FIBER RELEASE EPISODE REPORT

1. Address, building, and room number(s) (or description of area) where episode occurred: _____

_____

_____

_____

_____

_____

2. The release episode was reported by _____

_____ (date).

3. Described the episode: _____

_____

_____

_____

_____

_____

4. The ACM was ____/was not____ cleaned up according to approved procedures. Described the cleanup:

_____

_____

_____

_____

_____

Signed: _____ Date: _____
(Asbestos Program Manager)

APPENDIX F

CONTRACTOR NOTIFICATION LETTER
AND
EMPLOYEE / TENANT NOTIFICATION LETTER

APPENDIX F

WORCESTER COMMONS MALL

EMPLOYEE / TENANT INFORMATION BROCHURE ON ASBESTOS

Consistent with U. S. Occupational Safety and Health Administration (OSHA) regulations, Berkeley Investments, Inc. has established a policy to identify, manage and, where necessary, remove ACM where they are found to be present. As many buildings constructed prior to the late 1970s, the facility where you work was built with some materials that contain asbestos. Over the years, asbestos has been used in over 3,000 commercial products, because it possesses several properties that make it very useful:

- It insulates against heat.
- It resists wear and abrasion.
- It resists chemical corrosion.
- It improves the strength of spackling, plaster and joint compound.
- It improves the acoustical properties of plasters.
- It insulates against electricity.

ACM was commonly used as spray-applied fireproofing on structural beams, in some floor tiles, and in canvas-encased pipe and elbow insulation.

Asbestos is a general name for a group of naturally occurring minerals that have a tendency to break down into smaller and smaller fibers. Under certain circumstances, asbestos may become a potential health concern. **Asbestos does not become a health problem until it becomes airborne**. If the ACM at the facility is not disturbed, asbestos fibers do not become airborne and do not pose a health concern. Generally, health concerns from asbestos are predominantly associated with workers who were exposed to high concentrations of asbestos for long durations of time, such as in the ship building and insulation industries. There has been no clearly determined medical effect resulting from exposure to low levels of airborne asbestos.

The specific locations of ACM and PACM, descriptions and conclusions of known surveys conducted are summarized on the attached page(s).

To assure that the air quality in the building is within applicable standards, Berkeley Investments has performed air monitoring and/or bulk sample surveys. Numerous air samples are also performed during abatement work. For additional information please see the APM.

WHAT YOU CAN DO

The thrust of the Berkeley Investments Asbestos Management Program is to minimize the potential for disturbing ACM or PACM by increasing your awareness. So long as the ACM/PACM is not disturbed and remains intact, it does not pose a health concern.

NOTICE TO OUTSIDE CONTRACTORS AND LICENSEES ON ASBESTOS

TO: _____ DATE: _____

_____

Asbestos-containing Material ("ACM") is often found in buildings constructed prior to the late 1970s, and was commonly used in floor tiles, and in canvas-encased pipe and elbow insulation.

Work that may involve the removal or physical disturbance of ACM, which may cause the release of asbestos fibers into the air, must be done by a licensed asbestos abatement contractor or other trained personnel with the proper equipment, and under no circumstances by any employee of Berkeley Investments & Co., Inc. or its contractors, subcontractors, agents or unauthorized person.

So long as asbestos-containing materials remain intact, the asbestos does not pose a health hazard. Therefore, if you notice any ACM that is broken or crumbling, please avoid contact and notify Berkeley Investments, Inc.'s APM immediately, since studies show that inhalation of airborne asbestos fibers could be hazardous to one's health.

Please be advised that no person is permitted to disturb any suspect ACM without prior testing to determine whether or not the material is asbestos-containing. Since this facility contains ACM, it is your responsibility (i.e. as required by applicable federal, state, and local laws and regulations) to inform any worker employed by your firm that will work in this facility of the presence and locations of ACM and provide required asbestos awareness training. It is also your responsibility to inform your subcontractors of the presence and locations of ACM in this facility and of their obligations.

Based on survey reports received by Berkeley Investments, Inc., asbestos-containing construction materials have been identified in the locations in this facility listed in the annexed Attachment. You may also contact the APM for more detailed information.

_____	_____	_____
(NAME)	**(TITLE)**	**(PHONE)**
_____	_____	_____
(NAME)	**(TITLE)**	**(PHONE)**

APPENDIX G

ASBESTOS REGULATIONS

APPENDIX G
Applicable FEDERAL, STATE AND LOCAL Regulations

U.S. Environmental Protection Agency (EPA) Webpage: http://www.epa.gov

- Asbestos Hazard Emergency Response Act (AHERA); Title 40 CFR, Part 763.

  http://www.access.gpo.gov/nara/cfr/cfrhtml_00/Title_40/40cfr763_00.html

- National Emission Standards for Hazardous Air Pollutants (NESHAP); Asbestos, 40 CFR Part 61.

  http://www.access.gpo.gov/nara/cfr/cfrhtml_00/Title_40/40cfr61_00.html

U.S. Occupational Safety & Health Administration (OSHA) Webpage: http://www.osha-slc.gov

- Occupational Exposure to Asbestos: 29 CFR 1910.134, 1910.1001 and 1926.1101.

  http://www.osha-slc.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=12716&p_text_version=FALSE

  http://www.osha-slc.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9995&p_text_version=FALSE

  http://www.osha-slc.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10862&p_text_version=FALSE

Massachusetts Asbestos Web Links

Massachusetts Department of Environmental Protection: General Website:

http://www.state.ma.us/dep/

Massachusetts Department of Environmental Protection: Asbestos Program

http://www.state.ma.us/dep/bwp/asbestos/asbhome.htm

Air Pollution Control Regulations includes requirements for Dust, Odor, Construction and Demolition. January 2002. 310 CMR 7.09:

http://www.state.ma.us/dep/bwp/daqc/files/regs/7b.htm#09

Air Pollution Control Regulations describes the requirements for the removal and disposal of asbestos. January 2002. 310 CMR 7.15:

http://www.state.ma.us/dep/bwp/daqc/files/regs/7b.htm#15

Solid Waste Regulations includes the special waste disposal requirements for asbestos. October 1999. 310CMR 19.061:

http://www.state.ma.us/dep/bwp/dswm/files/310cmr19.htm#061

Massachusetts Division of Occupational Safety: Asbestos Program

http://www.state.ma.us/dos/pages/asbestos.htm

453 CMR 1.00 - 7.00 Employment of Aliens; the Removal, Containment or Encapsulation of Asbestos; Apprentice Training. (Order Information $4.35 per copy)

http://www.state.ma.us/sec/spr/sprcat/agencies/453.htm

APPENDIX A

ASBESTOS-CONTAINING MATERIALS
WORCESTER COMMONS MALL
WORCESTER, MASSACHUSETTS

Location	Material Type	Sample Number	Asbestos Percent and Type
Lower Level	Spray-Applied Fireproofing	M-B-2A	2% Chrysotile
Lower Level	Spray-Applied Fireproofing	M-B-2B	2% Chrysotile
Lower Level	Pipe Fitting Insulation	M-B-3A	2% Chrysotile
Lower Level	End Cap Insulation	M-B-6A	12% Chrysotile
Lower Level	Floor Tile	M-B-7A	2% Chrysotile
Lower Level	Floor Tile Mastic	M-B-8A	2% Chrysotile
Lower Level (Bijou Cinema Projection Room)	Ceiling Tile	M-B-11A	2% Chrysotile
Lower Level	Mastic	M-B-12A	2% Chrysotile
Lower Level	Linoleum Flooring	M-B-12A	20% Chrysotile
Lower Level	Floor Tile	M-B-14A	2% Chrysotile
Lower Level	Floor Tile Mastic	M-B-15A	2% Chrysotile
Lower Level	12” x 12” Brown Floor Tile	M-B-22A	2% Chrysotile
Lower Level	Floor Tile Mastic	M-B-23A	2% Chrysotile
Service Corridor	Floor Tile	SCI-1A	2% Chrysotile
Service Corridor	Floor Tile Mastic	SCI-2A	2% Chrysotile
Service Corridor	Floor Tile Mastic	M-2-3-1A	2% Chrysotile
Service Corridor	Pipe Fitting Insulation	M-2-3-2B	2% Chrysotile

Location	Material Type	Sample Number	Asbestos Percent and Type
Service Corridor	Floor Tile	M-2-3-4A	2% Chrysotile
Retail Space: W220	Mastic	S220-1A	2% Chrysotile
Retail Space: W220	Spray-Applied Fireproofing	S220-2B	12% Chrysotile
Retail Space: W220	Spray-Applied Fireproofing	S220-2C	10% Chrysotile
Retail Space: Former Jordan Marsh	Residual Flooring Material	JM-1A	20% Chrysotile
Retail Space: W228	Floor Tile Mastic	W-228-2A	2% Chrysotile
Retail Space: E203	Floor Tile Mastic	E-203-2A	2% Chrysotile
Retail Space: Vacant Area Adjacent to S209	Spray-Applied Fireproofing	M-V-3A	2% Chrysotile
Retail Space: Vacant Area Adjacent to S209	Spray-Applied Fireproofing	M-V-3B	2% Chrysotile
Retail Space: Sports Authority	Floor Tile Mastic	M-SA-2A	2% Chrysotile
Red Garage Office	Floor Tile Mastic	G-2A	2% Chrysotile
Red Garage Office	Floor Tile	G-3A	2% Chrysotile
Yellow Garage Office	Covebase Mastic	YG-3A	1% Chrysotile; 1% Tremolite

Generator	1. Work site name and mailing address	Owner's name	Owner's telephone no.
	2. Operator's name and address		Owner's telephone no.
	3. Waste disposal site (WDS) name, mailing address, and physical site location		WDS phone no.
	4. Name, and address of responsible agency		
	5. Description of material	6. Containers No. / Type	7. Total quantity m^3 (yd^3)
	8. Special handling instructions and additional information		
	9. OPERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations.		
Transporter	Printed / typed name & title	Signature	Mo. / Day / Year
	10. Transporter 1 (Acknowledgment of receipt of materials)		
	Printed/typed name, title, address and telephone no.	Signature	Mo. / Day / Year
	11. Transporter 2 (Acknowledgment of receipt of materials)		
	Printed/typed name, title, address and telephone no.	Signature	Mo. / Day / Year
Disposal Site	12. Discrepancy indication space		
	13. Waste disposal site owner of operator: Certification of receipt of asbestos materials covered by this manifest except as noted in item 12.		
	Printed/typed name & title	Signature	Mo. / Day / Year

Waste Shipment Record

Instructions

Waste Generator Section (Items 1-9)

1. Enter the name of the facility at which asbestos waste is generated and the address where the facility is located. In the appropriate spaces, also enter the name of the owner of the facility and the owner's phone number.

2. If a demolition or renovation, enter the name and address of the company and authorized agent responsible for performing the asbestos removal. In the appropriate spaces, also enter the phone number of the operator.

3. Enter the name, address, and physical site location of the waste disposal site (WDS) that will be receiving the asbestos materials. In the appropriate spaces, also enter the phone number of the WDS. Enter "on-site" if the waste will be disposed of on the generator's property.

4. Provide the name and address of the local, State, or EPA Regional office responsible for administering the asbestos NESHAP program.

5. Indicate the types of asbestos waste materials generated. If from a demolition or renovation, indicate the amount of asbestos that is

   * Friable asbestos material
   * Nonfriable asbestos materials

6. Enter the number of containers used to transport the asbestos materials listed in item 5. Also enter one of the following container codes used in transporting each type of asbestos material (specify any other type of container used if not listed below):

   * DM- Metal drums, barrels
   * DP- Plastic drums, barrels
   * BA- 6 mil plastic bags or wrapping

7. Enter the quantities of each type of asbestos material removed in units of cubic meters (cubic yards).

8. Use this space to indicate special transportation, treatment, storage or disposal or Bill of Lading information. If an alternate waste disposal site is designated, note it here. Emergency response telephone numbers or similar information may be included here.

9. The authorized agent of the waste generator must read and then sign and date this certification. The date is the date of receipt by transporter.

NOTE: The waste generator must retain a copy of this form

Waste Shipment Record

Transporter Section (Items 10 & 11)

10 & 11 Enter name, address, and telephone number of each transporter used, if applicable. Print or type the full name and title of person accepting responsibility and acknowledging receipt of materials as listed on this waste shipment record for transport. Enter date of receipt and signature.

NOTE: The transporter must retain copy of this form.

Disposal Site Section (Items 12 & 13)

12. The authorized representative of the WDS must note in this space any discrepancy between waste described on this manifest and waste actually received as well as any improperly enclosed or contained waste. Any rejected materials should be listed and destination of those materials provided. A site converts asbestos containing waste nonasbestos material is considered a WDS.

13. The signature (by hand) of the authorized WDS agent indicates acceptance and agreement with statement on this manifest except as noted in item 12. The date is the date of signature and receipt of shipment.

NOTE: The WDS must retain a completed copy of this form. The WDS must also send a completed copy to the operator listed in item 2.

Waste Shipment Record

REPORT
PHASE II ENVIRONMENTAL SITE ASSESSMENT

WORCESTER CENTER
WORCESTER, MASSACHUSETTS 01608

PREPARED FOR:
BERKELEY INVESTMENTS, INC.
URS JOB NO. 15260048

June 10, 2004

Marilyn Wade
Licensed Site Professional

Brent B. Jacobs
Senior Project Manager

REPORT
LIMITED PHASE II ENVIRONMENTAL SITE ASSESSMENT

Worcester Center
Worcester, Massachusetts

Prepared for:

Berkeley Investments, Inc.
121 High Street
Boston, Massachusetts 02110

Prepared by:

URS Corporation
400 Northpark Town center, Ste 900
400 Abernathy Road, N.E.
Atlanta, Georgia 30328
Telephone (678) 808-8800, Fax (678) 808-8400

June 10, 2004

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1

1.1 BACKGROUND INFORMATION 1
1.2 PURPOSE 1
1.3 SCOPE OF WORK 1

2.0 SITE DESCRIPTION 3

2.1 ENVIRONMENTAL SETTING 3
2.1.1 Topography 3
2.1.2 Soils / Geology 3
2.1.3 Hydrogeology 3

3.0 PHASE II ENVIRONMENTAL SITE ASSESSMENT 4

3.1 SCOPE OF WORK 4
3.2 FIELD INVESTIGATION 4
3.2.1 Geophysical Survey 4
3.2.2 Location of Borings 4
3.2.3 Sampling Procedures 5
3.2.4 Soil Sampling 6
3.2.5 Groundwater Sampling 7
3.2.6 Temporary Well Installation 7

4.0 SUMMARY OF FINDINGS AND CONCLUSIONS 8

4.1 GEOPHYSICAL SURVEY 8
4.2 FIELD SCREENING RESULTS 8
4.3 SUBSURFACE CONDITIONS 8
4.4 GROUNDWATER FLOW DIRECTION 8
4.5 SOIL SAMPLE ANALYTICAL RESULTS 9
4.6 GROUNDWATER ANALYTICAL RESULTS 9
4.7 REGULATORY FRAMEWORK 11
4.2.1 Soils 11
4.2.2 Groundwater 12
4.8 CONCLUSIONS 12
4.9 RECOMMENDATIONS 13

5.0 ENVIRONMENTAL LIABILITY ESTIMATE 15

FIGURES

Figure 1 Site Location Map
Figure 2 Boring Location Map
Figure 3 Water Level Contour Map

TABLES

Table 1 Temporary Well Construction Details
Table 2 Summary of Soil Analytical Results – VPH Aliphatic/Aromatic Hydrocarbons and VPH Target Analytes
Table 3 Summary of Soil Analytical Results – VOCs by Method 8260
Table 4 Summary Of Soil Analytical Results – Total Metals
Table 5 Summary of Groundwater Analytical Results - Summary of Soil Analytical Results – VPH Aliphatic/Aromatic Hydrocarbons and VPH Target Analytes
Table 6 Summary of Groundwater Analytical Results – VOCs by Method 8260
Table 7 Summary of Groundwater analytical Results – Priority Pollutant Metals

APPENDICES

Appendix A Geophysical Survey Report
Appendix B Soil Boring Logs
Appendix C May 4, 2004 Soil and Groundwater Analytical Data
Appendix D May 18, 2004 Soil and Groundwater Analytical Data
Appendix E May 19, 2004 Soil and Groundwater Analytical Data
Appendix F May 20, 2004 Soil and Groundwater Analytical Data

EXECUTIVE SUMMARY

URS Corporation (URS) was retained by Berkeley Investments, Inc. to conduct a Phase II Environmental Site Assessment of an office building at 100 Front Street, an office building at 120 Front Street, an outlet mall with two parking garages and a two-acre parking lot at 110 Front Street, and a vacant building at 36 Washington Square in Worcester, Worcester County, Massachusetts (site or subject property). The purpose of URS' Phase II Environmental Site Assessment was to evaluate whether current or historical activities on or near the subject property may have resulted in significant contamination by hazardous substances or wastes, also known as a "Recognized Environmental Condition."

The Limited Phase II ESA was performed in two Stages. The first was performed on May 3 and May 4, 2004. The second stage was performed on May 18, 19, and 20, 2004. Thirteen (13) soil borings were installed at various locations at the subject property that may have been impacted by former operations at the site. During the first stage, six soil borings (B1, B2, B3, B4, B5, and B6) were installed in the parking lot area of the subject property to evaluate the soils and groundwater (Figure 2). Five of the six borings (B1, B2, B3, B4, and B6) were converted to temporary monitoring wells to collect groundwater samples. Groundwater was not encountered in boring B5; therefore, a temporary well was not installed. A Geophysical Survey was also performed during Stage 1 in the parking lot area of the subject property to evaluate for the potential presence of underground storage tank(s) (USTs).

During the second stage, seven soil borings (B7 through B13) were installed at the site to assess the soils in the area of the Existing East Garage, the Existing West Garage, Building L, Building H, Building G, and the Courtyard Area between the existing West Garage and Building C (Figure 2). Three of the seven borings (B-7, B-8, and B-9) were converted to temporary monitoring wells to collect groundwater samples.

The soil samples collected during the Stage 1 activities were submitted for laboratory analysis of VOCs by EPA Method 8260B, Priority Pollutant metals (silver, mercury, arsenic, beryllium, cadmium, chromium, copper, nickel, lead, antimony, selenium, thallium, and zinc), Volatile Petroleum Hydrocarbons (VPH) Aliphatic and Aromatic Hydrocarbons, and VPH Target Analytes (benzene, ethylbenzene, methyl tert-butyl ether, naphthalene, toluene, m,p-xylene, and o-xylene). During Stage 2, the soil samples from the 0-6-inch interval below ground surface (bgs) and any landscaped material and the 6-inch interval immediately above the water table were submitted to the laboratory for analysis. The soil samples were submitted for laboratory analysis of VOCs by EPA Method 8260B plus the ten Tentatively Identified Compounds (TICs),

exhibiting the highest peak on the mass spectroscopy chromatogram Priority Pollutant metals (silver, mercury, arsenic, beryllium, cadmium, chromium, copper, nickel, lead, antimony, selenium, thallium, and zinc), and VPH.

Groundwater samples during Stage 1 were analyzed for VOCs by EPA Method 8260B, for Priority Pollutant total metals (unfiltered samples), and for VPH Aliphatic and Aromatic Hydrocarbons and VPH Target Analytes. During Stage 2, temporary wells were reinstalled at boring locations B-1, B-2, B-3, B-4, and B-6 to obtain groundwater samples for analysis of dissolved metals versus total metals analyzed for in Stage 1. Groundwater samples during Stage 2 were analyzed for VOCs to plus 10 TICs by EPA Method 8260B, Priority Pollutant dissolved metals (filtered samples), and VPH Aliphatic and Aromatic Hydrocarbons.

Based upon the results of the Limited Phase II ESA, URS provides the following conclusions:

- A Geophysical Survey was performed in the parking lot area of the site. The geophysical survey did not identify the presence of a UST(s) in the survey area.
- Measurements of the depth to water and subsequent contouring of these results indicates that, in the immediate area of the site, local shallow groundwater flow within unconsolidated overburden is in a southeasterly direction.
- Arsenic was detected in the soils at concentrations of 60.0 mg/kg, 43.0 mg/kg, and 31.0 mg/kg in borings B-6 (13 feet bgs), B-9 (0-6 inches bgs), and B-13 (0-6 inches bgs), respectively. These concentrations exceeded the RCS-1 standard of 30 mg/kg and the detection of arsenic at a concentration of 43 mg/kg in surface soils at B-9 exceeds the Imminent Hazard threshold concentration of 40 mg/kg.
- Beryllium was detected in the soils at a concentration of 2.7 mg/kg in boring B-10 (4.5-5.0 feet bgs), which exceeded the RCS-1 standard of 0.70 mg/kg.
- No VPH, Aliphatic and Aromatic Hydrocarbons or VOCs plus ten TICs, or priority pollutant metals were detected in the groundwater samples at the site that exceeded the RCGW-2 reportable concentrations.
- Based on the sample results, it appears that the concentrations of arsenic detected in the surface soils at location B-9 must be reported to MADEP within 2 hours of discovery because the concentration exceeds the Imminent Hazard threshold. Otherwise, the arsenic concentrations (not exceeding the Imminent Hazard threshold concentration) and beryllium concentrations exceeding the RCS-1 thresholds in soils would have to be reported within 120 days of discovery.

URS makes the following recommendations based on the results of the Limited Phase II ESA:

- Report to MADEP the concentrations of arsenic detected in the surface soils at location B-9 that exceed the Imminent Hazard threshold of 40 mg/kg. The report should be made

to MADEP within 2 hours of discovery. The concentrations of arsenic below the Imminent Hazard threshold but above the RCS-1 threshold and the beryllium concentrations in soils exceeding the RCS-1 threshold require reporting within 120 days of discovery.

- Prepare an Immediate Response Action (IRA) Plan within 60 days of MADEP notification.
- Perform an IRA that includes excavating the soils at boring B-9 and B-13 at the 0-6 inches bgs interval and properly disposing of the soils in accordance with applicable regulations.
- Complete a site investigation and demonstrate that the levels of arsenic and beryllium in soils either are exempt from the reporting requirements of the MCP or are at levels that pose No Significant Risk under the MCP.

An Environmental Liability Estimate was prepared for the Worcester Center based upon the results of this Limited Phase II ESA and the current applicable Environmental Law. The estimated costs provide for:

- Reporting the arsenic soil concentration exceeding the Imminent Hazard threshold to MADEP and if necessary preparing an IRA Plan within 60 days of this notice.
- Conducting an IRA that includes excavating the soils at boring B-9 and B-13 at the 0-6 inches bgs interval and properly disposing of the soils.
- Collecting confirmation samples from the excavated area for analysis of arsenic.
- Testing of the backfill and subsequent backfilling of excavated areas.
- Completion reporting to MADEP with the IRA activities.
- If necessary, reporting the other subsurface arsenic and beryllium soil concentrations exceeding the RCS-1 levels to MADEP within 120 days.
- Completing site investigation activities and demonstrating that the levels of arsenic and beryllium in soils either are exempt from the reporting requirements of the MCP or are at levels that pose No Significant Risk under the MCP.

The estimated cost to perform the scope of work outlined above is approximately $20,000.00.

1.0 INTRODUCTION

1.1 BACKGROUND INFORMATION

URS Corporation (URS) was retained by Berkeley Investments, Inc. (Berkeley) to conduct a Limited Phase II Environmental Site Assessment (Phase II ESA) of a twenty-story office building at 100 Front Street, a nine-story office building at 120 Front Street, a retail mall and two parking garages and a two-acre parking lot at 110 Front Street, and a vacant building at 36 Washington Square in Worcester, Worcester County, Massachusetts (site or subject property). This project was conducted in accordance with URS' proposals to Mr. John Karoff of Berkeley, dated March 14, 2004 and May 19, 2004.

1.2 PURPOSE

The objective of this Limited Phase II ESA was to:

- Perform a limited geophysical survey to evaluate the parking lot area where a former filling station was located, and
- Perform limited soil and groundwater sampling and analysis to evaluate whether the soils and/or groundwater at the subject property has been impacted from historical operations.

1.3 SCOPE OF WORK

The scope of work for the Limited Phase II ESA was performed in two stages and is outlined below.

Stage 1

- Perform a geophysical survey in the parking lot of the site to evaluate a portion of the property (100 Front Street) for the potential presence of USTs,
- After performing the geophysical survey, install six Geoprobe borings in the parking lot area to evaluate the potential impacts to the soil and groundwater beneath the site from the operation of the USTs. Collect one soil sample and one groundwater sample from each boring for laboratory analysis,

Stage 2

- Reinstall five temporary wells in the area of the Stage 1 temporary wells to collect filtered groundwater samples for analysis of dissolved metals,

- Install three temporary wells (two in the courtyard area and one at the Existing East Garage) to evaluate the soils and groundwater in these areas of the site,
- Survey the elevations of the temporary wells and prepare a potentiometric contour map to assess the direction of groundwater flow at the site, and
- Install two soil borings near Buildings H and G areas, one soil boring in the West Garage, and one at Building L to evaluate the soils in these areas.

2.0 SITE DESCRIPTION

2.1 ENVIRONMENTAL SETTING

This section describes the environmental setting of the subject property.

2.1.1 Topography

According to the Worcester North, Massachusetts topographic map, the site is located at approximate latitude of 42° 15' 45.0" north and an approximate longitude of 71° 47' 58.9" west in Worcester, Worcester County, Massachusetts. Based on a review of the topographic map, the ground level elevation of the subject property is approximately 475 feet (150 meters) above mean sea level (msl). According to the topographic map and site observations, the surface topography of the subject property area appears to slope generally to the south (Figure 1).

2.1.2 Soils / Geology

The soils at the site are classified as urban land. Urban land consists of areas where asphalt, concrete, buildings, or other impervious materials cover more than 85 percent of the surface. In many areas, the soils have been disturbed and the examination and identification of these areas are impractical. The soil types encountered during the Limited Phase II ESA include fine sandy silts to sands with some fill material present in some portions of the site.

2.1.3 Hydrogeology

Due to the urban extent of the subject site and surrounding area, surface runoff is directed to storm water sewer drains throughout the site area. The surface topography in the site area appears to slope to the south. No groundwater wells were identified on the subject property during the Phase I ESA or Limited Phase II ESA. Groundwater was encountered at the site during the Phase II ESA at depths ranging from 9 to 25 feet below ground surface depending on the topography of the site. The apparent direction of groundwater flow was evaluated during the Limited Phase II ESA by installing temporary wells, collecting water level measurements, and determining the apparent direction of groundwater flow at the subject property. This information is presented in Section 4.4 of this report.

3.0 PHASE II ENVIRONMENTAL SITE ASSESSMENT

3.1 SCOPE OF WORK

The scope of work for the Limited Phase II ESA was developed based on the results of the Phase I ESA. The scope of work was performed in two stages. The first stage was performed on May 3 through May 5, 2004 and included conducting a geophysical survey and installing six borings for the collection of soil and groundwater samples for laboratory analysis. The second stage of the Limited Phase II ESA was performed on May 18, 19, and 20, 2004. This stage involved the resampling of the groundwater at the locations installed during the first stage, installation of three additional borings for collection of soil and groundwater samples, and the installation of four soil borings to collect soil samples for laboratory analysis. This section presents the field investigation.

3.2 FIELD INVESTIGATION

3.2.1 Geophysical Survey

On May 3, 2004 URS retained Forrest Environmental Services, Inc. (FES) to perform a geophysical survey on the parking lot at Worcester Center to evaluate whether any USTs may be present in the subsurface. A copy of the Geophysical Report is included in Appendix A. The location of the geophysical survey is shown on Figures 1 and 2 in Appendix A. The survey area was bounded to the east by Frances McGrath Boulevard, to the north by a building, to the south by Franklin Street, and to the west by a church. The geophysical survey was performed utilizing an EM-31 induction meter to measure the conductivity of the subsurface. The survey was performed along linear 10-foot traverses with stations at 2.5-foot centers that covered an area approximately 320 feet by 350 feet. The procedures utilized to perform the survey are included in Appendix A in the report prepared by FES entitled “Geophysical Survey, Worcester Center, Worcester Massachusetts”.

3.2.2 Location of Borings

Figure 2 shows the location of the soil borings installed at the site during the two stages of the Limited Phase II ESA. Thirteen (13) soil borings were installed at various locations at the subject property that may have been impacted by former operations at the site. During the first stage, six soil borings (B1, B2, B3, B4, B5, and B6) were installed in the parking lot area of the subject property to evaluate the soils and groundwater (Figure 2). Five of the six borings (B1,

B2, B3, B4, and B6) were converted to temporary monitoring wells to collect groundwater samples. Groundwater was not encountered in boring B5; therefore, a temporary well was not installed.

During the second stage, seven soil borings (B7 through B13) were installed at the site to assess the soils in the area of the Existing East Garage, the Existing West Garage, Building L, Building H, Building G, and the Courtyard Area between the existing West Garage and Building C (Figure 2). Three of the seven borings (B-7, B-8, and B-9) were converted to temporary wells to collect groundwater samples. Borings B-7 and B-8 were installed through landscaped tree beds since the courtyard was constructed of a concrete slab overlain by brick pavers. Borings B-9 and B-13 were installed in a landscaped grass area along the existing East Garage. Boring 10 was installed through the concrete floor of the basement of the Existing West Garage. Borings B-11 and B-12 were installed in a landscaped area outside of the Existing East Garage.

3.2.3 Sampling Procedures

All investigation activities were performed under the site Health and Safety Plan (HASP) that was developed for this project in accordance with OSHA regulations 29 CFR 1910.120. Prior to installing the soil borings at the site, URS had the utilities in the right-of-way areas cleared by the state utility clearance program. In addition, a private utility locator was utilized during Stage 2 to clear the boring locations in the interior portion of the subject property. Site plans with known utilities were also reviewed with site personnel to assess if any utilities were present in the areas where the soil borings would be installed.

Standard sampling protocol was utilized during the field investigation. Standard protocol included sampling collection, handling, and documentation, decontamination of the Geoprobe sampling rods and sampling equipment between each boring, etc. The samples selected for laboratory analysis were placed in clean sample jars provided by the analytical laboratory. After collection, each sample was placed in a cooler and maintained at 4^0 Celsius. Standard chain-of-custody protocol was maintained at all times for samples selected for laboratory analysis. The samples were shipped to the analytical laboratory each day via a common carrier (i.e., Federal Express) for next day delivery. Quality Control and Quality Assurance (QA/QC) procedures included submitting a trip blank for volatile organic compounds (VOCs) analysis with each sample shipment and standard laboratory Level II QA package consisting of matrix spike and matrix spike duplicates.

3.2.4 Soil Sampling

The soil borings were installed with a Geoprobe rig during the two stages. Continuous soil sampling was performed in the borings from land surface to the groundwater table. The soil samples were described in accordance with the Unified Soils Classification system. Soil boring logs are presented in Appendix B. Each four-foot interval was field screened with a photoionization detector (PID) for the presence of volatile organic compounds. Each four-foot sample was placed in a ziplock bag and the headspace measured inside the bag. The headspace readings were recorded on each boring log. The headspace readings on the soil samples collected during the investigation ranged from below detection (0 parts per million) to a high of 62.7 parts per million (ppm) in boring B-9 (interval 11.5 – 12.0 feet below ground surface). In general, the elevated headspace readings (>10 parts per million) were noted in four of the thirteen borings (B-8, B-9, B-10, and B-11) although all the readings in the borings were generally less than 60 ppm.

The soil samples collected during the Stage 1 activities were submitted for laboratory analysis of VOCs by EPA Method 8260B, Priority Pollutant metals (silver, mercury, arsenic, beryllium, cadmium, chromium, copper, nickel, lead, antimony, selenium, thallium, and zinc), Volatile Petroleum Hydrocarbons (VPH) Aliphatic and Aromatic Hydrocarbons, and VPH Target Analytes (benzene, ethylbenzene, methyl tert-butyl ether, naphthalene, toluene, m,p-xylene, and o-xylene). The soil samples from each boring were submitted to the laboratory for analysis based upon the presence of elevated field screening results or, in the absence of elevated PID readings, the soil sample immediately above the water table was selected for analysis. The analytical results of the soil samples are presented in Section 4.0. Analytical results were compared to Reportable Concentrations for Oil and Hazardous Materials (OHM) listed in the Massachusetts Contingency Plan (MCP), 310 Code Massachusetts regulations (CMR) 40.1600

During Stage 2, the soil samples from the 0-6-inch interval below ground surface (bgs) and any landscaped material and the 6-inch interval immediately above the water table were submitted to the laboratory for analysis. The soil samples were submitted for laboratory analysis of VOCs plus 10 TICs by EPA Method 8260B, Priority Pollutant metals (silver, mercury, arsenic, beryllium, cadmium, chromium, copper, nickel, lead, antimony, selenium, thallium, and zinc), and VPH. The VPH Target Analytes were not analyzed for during this stage since the constituents are analyzed by the VOC Method 8260B. The analytical results of the soil samples are presented in Section 4.0. Laboratory generated reports are provided in Appendices C through F.

3.2.5 Groundwater Sampling

Groundwater samples were collected from 5 temporary wells (B-1, B-2, B-3, B-4, and B-6) on May 4, 2004 during Stage 1. These samples were analyzed for VOCs by EPA Method 8260B, for Priority Pollutant total metals (unfiltered samples), and for VPH Aliphatic and Aromatic Hydrocarbons and VPH Target Analytes. During Stage 2, temporary wells were reinstalled at boring locations B-1, B-2, B-3, B-4, and B-6 to obtain groundwater samples for analysis of dissolved metals versus total metals analyzed for in Stage 1. The "resamples" were analyzed for the dissolved (filtered sample) metals arsenic, chromium, nickel, lead, and zinc since these metals were the only constituents in unfiltered samples that appeared to exceed the applicable Reportable Concentrations under the MCP.

Groundwater samples were collected from 3 additional temporary wells (B-7, B-8, and B-9) on May 19, 2004 during the Stage 2 activities. These samples were analyzed for VOCs plus 10 TICs by EPA Method 8260B, Priority Pollutant dissolved metals (filtered samples), and VPH Aliphatic and Aromatic Hydrocarbons.

3.2.6 Temporary Well Installation

Table 1 presents the temporary well construction details. During the Stage 2 activities, a total of eight borings were converted into temporary wells. The borings were converted into temporary wells by installing a 5-foot section of 1-inch diameter 0.01-inch slotted PVC well screen and riser pipe in the boring. The screened interval was installed to intercept the groundwater table. After installation, a registered surveyor surveyed the top of casing elevations in relation to an assumed datum plane. Water levels were recorded 24 hours after installation to allow the water table to stabilize. The temporary wells were properly abandoned after the survey and collection of the water level measurements.

4.0 SUMMARY OF FINDINGS AND CONCLUSIONS

4.1 GEOPHYSICAL SURVEY

The geophysical survey performed on May 3, 2004 identified seven anomalies in the survey area (Appendix A). The geophysical survey did not identity any subsurface anomalies that may suggest a UST(s) is present in the survey area. The anomalies identified are probably related to metallic surface objects, underground utilities, bedrock highs, or buried concrete with rebar. Two of the seven anomalies appeared to be underground utilities and four are from anthropogenic interferences such as a metal fence at the southeastern boundary of the survey and metal manholes at the northern section of the survey. The seventh anomaly occurred in the central section of the survey area and appears to be a buried object such as a building foundation with rebar or a bedrock high.

4.2 FIELD SCREENING RESULTS

The boring logs provided in Appendix B include the PID field screening results for each location. The headspace readings on the soil samples collected during the investigation ranged from below detection (0 parts per million) to a high of 62.7 ppm in boring B-9 (interval 11.5 – 12.0 feet below ground surface). In general, the elevated headspace readings (>10 parts per million) were noted in four of the thirteen borings (B-8, B-9, B-10, and B-11) although all the headspace readings in the borings were generally less than 60 ppm.

4.3 SUBSURFACE CONDITIONS

The depths of the borings at the site ranged from 8 to 25 feet bgs. The soils encountered were fine to medium brown silty sand to yellowish brown silty sand. Fill material was encountered in some borings at relatively shallow depths. Refusal was not encountered in any of the borings. Shallow groundwater was encountered in the temporary wells (after 24 hours) at depths ranging from 9.3 to 24.56 feet bgs.

4.4 GROUNDWATER FLOW DIRECTION

Table 1 presents the elevations of the top of casing of each temporary well, the total depth of the wells, the depth to the water table below the top of casing, and the groundwater elevation (referenced at an assumed datum plane). The depth to water was measured in each well approximately 24 hours after the wells were installed to allow the water table to equilibrate. Figure 3 presents a potentiometric map of the groundwater at the site. The apparent groundwater flow direction in the surficial aquifer at the site is to the southeast.

4.5 SOIL SAMPLE ANALYTICAL RESULTS

A total of twenty soil samples were submitted to the laboratory for analysis during the Limited Phase II ESA. The soil samples collected during the Stage 1 activities were submitted for laboratory analysis of VOCs, Priority Pollutant metals, VPH Aliphatic and Aromatic Hydrocarbons, and VPH Target Analytes. The soil samples collected during the Stage 2 activities were submitted for laboratory analysis of VOCs plus 10 TICs, Priority Pollutant metals, and VPH Aliphatic and Aromatic Hydrocarbons. The VPH Target Analytes were not analyzed for during Stage 2 since the constituents are analyzed for by the VOC Method 8260B.

The soil sample analytical results are summarized on Tables 2, 3, and 4. Table 2 presents the analytical results for the VPH Aliphatic and Aromatic Hydrocarbon analysis and Table 3 presents the analytical results for the VOC analysis. Table 4 presents the analytical data for the metals analysis. Laboratory analytical data are provided in Appendix C through Appendix F.

VPH Aliphatic and Aromatic Hydrocarbons and the VPH Target Analytes were not detected in the soil samples above the laboratory detection limits.

The VOCs acetone, 2-Butanone, tetrachloroethene, and toluene were detected in the soils at the site at concentrations ranging from 14 micrograms per kilogram (ug/kg) to 620 ug/kg. It is likely that the concentrations of acetone detected in the samples are probably a laboratory artifact and not related to the past historical operations of the site. Tetrachloroethene was detected in the shallow sample in boring B-8 (0-6” bgs) at 99.0 ug/kg but not detected in the sample collected at the 18.5-19.0 foot bgs interval. Five TICs (unknown C3H6 isomer, pentanal, propene, hexanal, and 2-furancarboxaldehyde) were detected in the soil samples collected from borings B-7 (0-6”), B-11 (0-6”), and B-12 (4.0-4.5’).

Various concentrations of metals were detected in the site soils. Arsenic, beryllium, chromium, copper, lead, and zinc were the most common metals detected in the site soils above the laboratory detection limits.

4.6 GROUNDWATER ANALYTICAL RESULTS

Groundwater samples were collected from 5 temporary wells (B-1, B-2, B-3, B-4, and B-6) on May 4, 2004 during Stage 1. These samples were analyzed for VOCs by EPA Method 8260B, total (unfiltered samples) Priority Pollutant metals, and for VPH Aliphatic and Aromatic Hydrocarbons and VPH Target Analytes. During Stage 2, temporary wells were reinstalled at boring locations B-1, B-2, B-3, B-4, and B-6 to obtain groundwater samples for analysis of

dissolved metals versus total metals analyzed for in Stage 1. The "resamples" were analyzed for the dissolved (filtered sample) metals arsenic, chromium, nickel, lead, and zinc since these constituents exceeded the applicable MCP Reportable Concentrations in the prior unfiltered samples.

Groundwater samples were collected from 3 additional temporary wells (B-7, B-8, and B-9) on May 19, 2004. These samples were analyzed for VOCs plus 10 TICs by EPA Method 8260B, Priority Pollutant dissolved metals (filtered samples), and VPH Aliphatic and Aromatic Hydrocarbons.

The groundwater sample analytical results are summarized on Tables 5, 6, and 7. Table 5 presents the results for the VPH Aliphatic and Aromatic Hydrocarbons analyses and Table 6 presents the results for the VOC plus 10 TICs analysis. Table 7 presents the results for the metals analyses. Laboratory analytical data are provided in Appendix C through Appendix F.

VPH Aliphatic and Aromatic Hydrocarbons and the VPH Target Analytes were not detected in the groundwater samples above the laboratory detection limits except in temporary well B-8. VPH Aliphatics (C5-C8) was detected in this well at a concentration of 56.6 micrograms per liter (ug/L).

The VOCs chloroform, naphthalene, toluene, trichloroethene, tetrachloroethene, cis-1,2-dichloroethene were detected at concentrations ranging from 1.0 ug/l to 140.0 ug/L. Two TICs, unknown C3H6 isomer and propene were detected in the groundwater samples at concentrations ranging from 1.1 ug/L to 16.0 ug/L. The chloroform concentrations detected in groundwater samples from the site ranged from 1.0 ug/L to 30.1 ug/L and concentrations detected could be the result of leaking water lines at a site or from irrigation of landscape areas using chlorinated water.

Various metals were detected in the unfiltered groundwater samples collected on May 3, 2004 from temporary wells B-1, B-2, B-3, B-4, and B-6. Since the metals detected were thought to be related to the suspended sediment in the unfiltered samples, temporary wells were reinstalled on May 19, 2004 and filtered samples collected for analysis of dissolved metals to evaluate whether if the metals were related to the sediment in the samples. The analytical data from the resampling of the B-1, B-2, B-3, B-4, and B-6 locations indicates that the metals were associated with the sediment in the samples and not representative of metals concentrations dissolved in the groundwater.

The groundwater samples collected from B-7, B-8, and B-9 during Stage 2 were field filtered

and analyzed for dissolved metals. Nickel was the only metal detected in the samples from these wells. Nickel was detected at a concentration of 0.026 milligrams per liter (mg/L).

4.7 REGULATORY FRAMEWORK

The analytical data generated during the Limited Phase II ESA were compared to the Reportable Concentrations (RC) for OHM listed in the MCP (310 CMR 40.1600). Reportable Concentrations are threshold concentrations in soil and groundwater for individual constituents above which potentially responsible parties may need to notify the Massachusetts Department Environment Protection (MADEP). Soil RCs fall into two categories depending upon the current use of the site, where category RCS-1 applies to soils at or within 500' of residential, school, playground, recreation area or park use or to soils over a drinking water resource, and category RCS-2 applies to all other soils. Similarly, groundwater RCs are subdivided into RCGW-1, for samples obtained with a current or potential drinking water source, and RCGW-2 for samples not within an RCGW-1. The site groundwater is classified as a RCGW-2 because the site is not in a potential or current drinking water source area based on MADEP aquifer and resource area mapping (known in the MCP as the site-scoring map). Soils at the site are classified RCS-1 in accordance with the MADEP guidelines because a park and a playground (daycare center) are located within 500 feet of the samples. Tables 2 through 7 include the applicable RCs for the respective soil and groundwater constituents.

4.2.1 Soils

The soil sample results were compared to the RCS-1 for reporting purposes. No VPH or VOC constituents were detected in the soil samples at levels that exceeded the RCS-1 thresholds. In addition, the VOC TICs identified in soil samples that had a RCS-1 threshold did not exceed the respective RCS-1 thresholds.

The comparison of the soil results to the RCS-1 for the site indicates that the metals arsenic and beryllium exceed the RCS-1 reporting standards. Arsenic was detected at concentrations of 60.0 mg/kg, 43.0 mg/kg, and 31.0 mg/kg in borings B-6 (13 feet bgs), B-9 (0-6 inches bgs), and B-13 (0-6 inches bgs), respectively. These concentrations exceeded the RCS-1 standard of 30 mg/kg. Beryllium was detected at a concentration of 2.7 mg/kg in boring B-10 (4.5-5.0 feet bgs), which exceeded the RCS-1 standard of 0.70 mg/kg.

The MCP regulations (310 CMR 40.0360) require notification to MADEP within 120 days of obtaining knowledge that the measured concentration in any soil sample exceeds the applicable RC. However, once reported, the presence of a constituent in one or a limited few samples need not require an actual response action after reporting. The MCP allows for the subsequent

averaging of soil data to evaluate whether if the soils at the site exceed a risk based level that would necessitate response actions. For example, although detected concentrations suggest that reporting is required, the beryllium data can be averaged by adding the soil concentrations detected and one-half the laboratory detection limit where the analytical results were below the laboratory detection limit data. The calculated average is 0.414 mg/kg, which does not exceed the MCP Method 1 S-1 risk based standard of 0.70 mg/kg. (Note that for this constituent, the notification threshold RCS-1 and the risk based Method 1 S-1 standard are the same. This is not always the case for all constituents.)

In addition to the 120 day reporting requirement for exceedances of RCs, section 310 CMR 40.0321 of also the MCP, also imposes a more stringent 2 hour notification requirement for releases, which in the eyes of MADEP, could pose an Imminent Hazard to health, safety, public welfare or the environment. Generally the Imminent Hazard threshold is intended to address sudden potentially catastrophic occurrences such as explosive environments, highway safety impacts, or readily apparent human or animal illness. However, the MCP also includes Imminent Hazard soil concentrations for seven specific hazardous materials (arsenic, cadmium, chromium, cyanide, mercury, methyl mercury and PCBs). The regulations require notification to MADEP within 2 hours of obtaining knowledge of the measurement of these OHM at levels that meet or exceed the Imminent Hazard threshold concentration in soils if the soils are within 12 inches of the surface and "within 500 feet of a residential dwelling, school, playground, recreation area or park, unless access by children is controlled or prevented by means of bituminous pavement, concrete, fence, or other physical barrier." The Imminent Hazard threshold concentration for arsenic is 40 mg/kg. The detection of arsenic at location B-9 in the upper 6 inches of soil at a concentration of 43 mg/kg exceeds this threshold. Location B-9 is in a landscape area that is not fenced or paved. It is within 500 feet of a day care center playground and may also be within 500' of Worcester Common Park.

4.2.2 Groundwater

No VPH Aliphatic and Aromatic Hydrocarbons VOCs plus 10 TICs, or priority pollutant metals were detected in the groundwater samples at the site that exceeded the RCGW-2 reportable concentrations.

4.8 CONCLUSIONS

Based on the findings presented above, URS provides the following conclusions:

- A Geophysical Survey was performed in the parking lot area of the site. The geophysical survey did not identify the presence of a UST(s) in the survey area.

- Thirteen soil borings were installed at the site for the collection of soil samples. A total of 20 soil samples were collected from the borings for laboratory analysis. Eight of the borings were converted to temporary wells for the collection of groundwater samples and measurement of groundwater elevations to evaluate the direction of groundwater flow at the site.
- Measurements of the depth to water and subsequent contouring of these results indicates that, in the immediate area of the site, local shallow groundwater flow within unconsolidated overburden is in a southeasterly direction.
- Arsenic was detected in the soils at concentrations of 60.0 mg/kg, 43.0 mg/kg, and 31.0 mg/kg in borings B-6 (13 feet bgs), B-9 (0-6 inches bgs), and B-13 (0-6 inches bgs), respectively. These concentrations exceeded the RCS-1 standard of 30 mg/kg and the detection of arsenic at a concentration of 43 mg/kg in surface soils at B-9 exceeds the Imminent Hazard threshold concentration of 40 mg/kg.
- Beryllium was detected in the soils at a concentration of 2.7 mg/kg in boring B-10 (4.5-5.0 feet bgs), which exceeded the RCS-1 standard of 0.70 mg/kg.
- No VPH Aliphatic and Aromatic Hydrocarbons VOCs plus TICs, or priority pollutant metals were detected in the groundwater samples at the site that exceeded the RCGW-2 reportable concentrations.
- Based on the sample results, it appears that the concentration of arsenic (43 mg/kg) detected in the surface soils at location B-9 have to be reported to MADEP within 2 hours of discovery since the concentration exceeds the Imminent Hazard threshold concentration of 40 mg/kg.

4.9 RECOMMENDATIONS

Based on the results of the Limited Phase II ESA URS makes the following recommendations:

- Report to MADEP the concentrations of arsenic detected in the surface soils at location B-9 that exceed the Imminent Hazard threshold of 40 mg/kg. The report should be made to MADEP within 2 hours of discovery. The concentrations of arsenic below the Imminent Hazard threshold but above the RCS-1 threshold and the beryllium concentrations in soils exceeding the RCS-1 threshold require reporting within 120 days of discovery.
- Prepare an Immediate Response Action (IRA) Plan within 60 days of MADEP notification.

- Perform an IRA that includes excavating the soils at boring B-9 and B-13 at the 0-6 inches bgs interval and properly disposing of the soils in accordance with applicable regulations.
- Complete a site investigation and demonstrate that the levels of arsenic and beryllium in soils either are exempt from the reporting requirements of the MCP or are at levels that pose No Significant Risk under the MCP. Achievement of a condition of No Significant Risk allows a Response Action Outcome to be achieved for the site, thereby concluding the MCP obligations associated with the arsenic and beryllium.

5.0 ENVIRONMENTAL LIABILITY ESTIMATE

An Environmental Liability Estimate was prepared for the Worcester Center based upon the results of this Limited Phase II ESA and the current applicable Environmental Law. The Environmental Liability Estimate was developed to address identified constituents in the soils that exceeded the Reportable Concentrations at the site. The cost estimate is based upon current costs.

The estimated costs provide for:

- Reporting the arsenic soil concentration exceeding the Imminent Hazard threshold to MADEP and if necessary preparing an IRA Plan within 60 days of this notice.
- Conducting an IRA that includes excavating the soils at boring B-9 and B-13 at the 0-6 inches bgs interval and properly disposing of the soils in accordance with applicable regulations.
- Collecting confirmation samples from the excavated area for analysis of arsenic.
- Testing the backfill material and subsequently backfilling the excavated areas.
- Completion reporting to MADEP with the IRA activities.
- If necessary, reporting the other subsurface arsenic and beryllium soil concentrations exceeding the RCS-1 levels to MADEP within 120 days.
- Completing site investigation activities and demonstrating that the levels of arsenic and beryllium in soils either are exempt from the reporting requirements of the MCP or are at levels that pose No Significant Risk under the MCP. Achievement of a condition of No Significant Risk allows a Response Action Outcome to be achieved for the site, thereby concluding the MCP obligations associated with the arsenic and beryllium.

The following assumptions were utilized to develop the cost estimate:

- The two locations, B-9 and B-13 requiring excavation, will not exceed three feet wide by three feet wide by two feet in depth. No additional contamination is detected in the soils in the floor and sidewalls of the excavations that require excavation.
- The soils excavated are nonhazardous and the quantity of soil to be excavated does not exceed 2 cubic yards.
- Assumes MADEP does not require any additional sampling outside of the excavated areas.

- Future changes in environmental law will not increase the cost or scope of the IRA.
- No costs are included for any potential third party claims.

The estimated cost to perform the scope of work outlined above is approximately $20,000.00.

FIGURES

LEGEND

SOURCE:
MassGIS, Commonwealth of Massachusetts
Executive Office of Environmental Affairs
USGS 7.5 Minute Series Topographic Quadrangle
Worcester North, 1995

0 250 500 750
GRAPHIC SCALE IN FEET

Title: SITE LOCATION MAP

Location: 100, 110, 120 Front Street
Worcester, Massachusetts

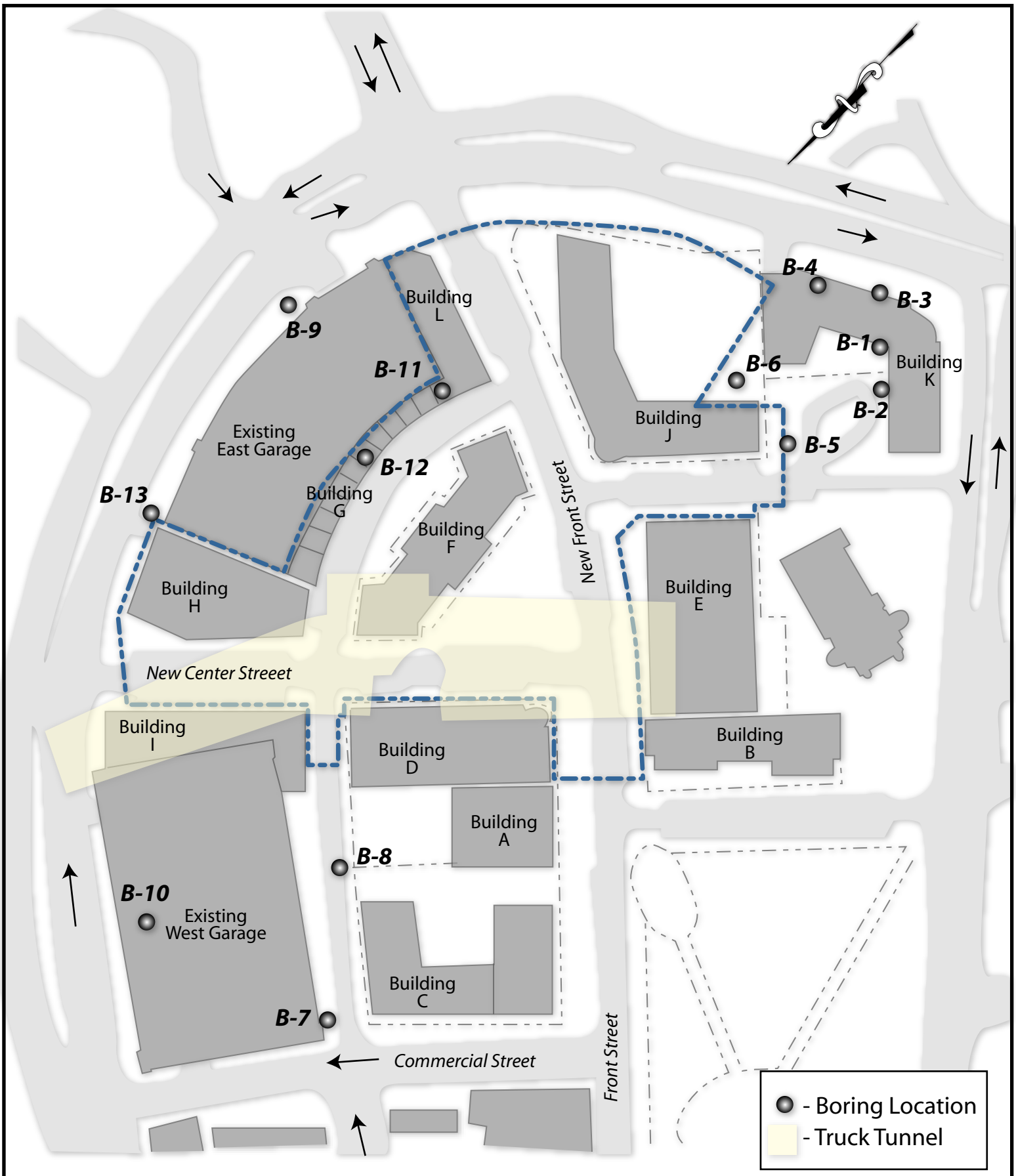
Client: Berkeley Management, Inc.

URS
URS Corporation
5900 Windward Parkway
Suite 400
Alpharetta, GA 30005

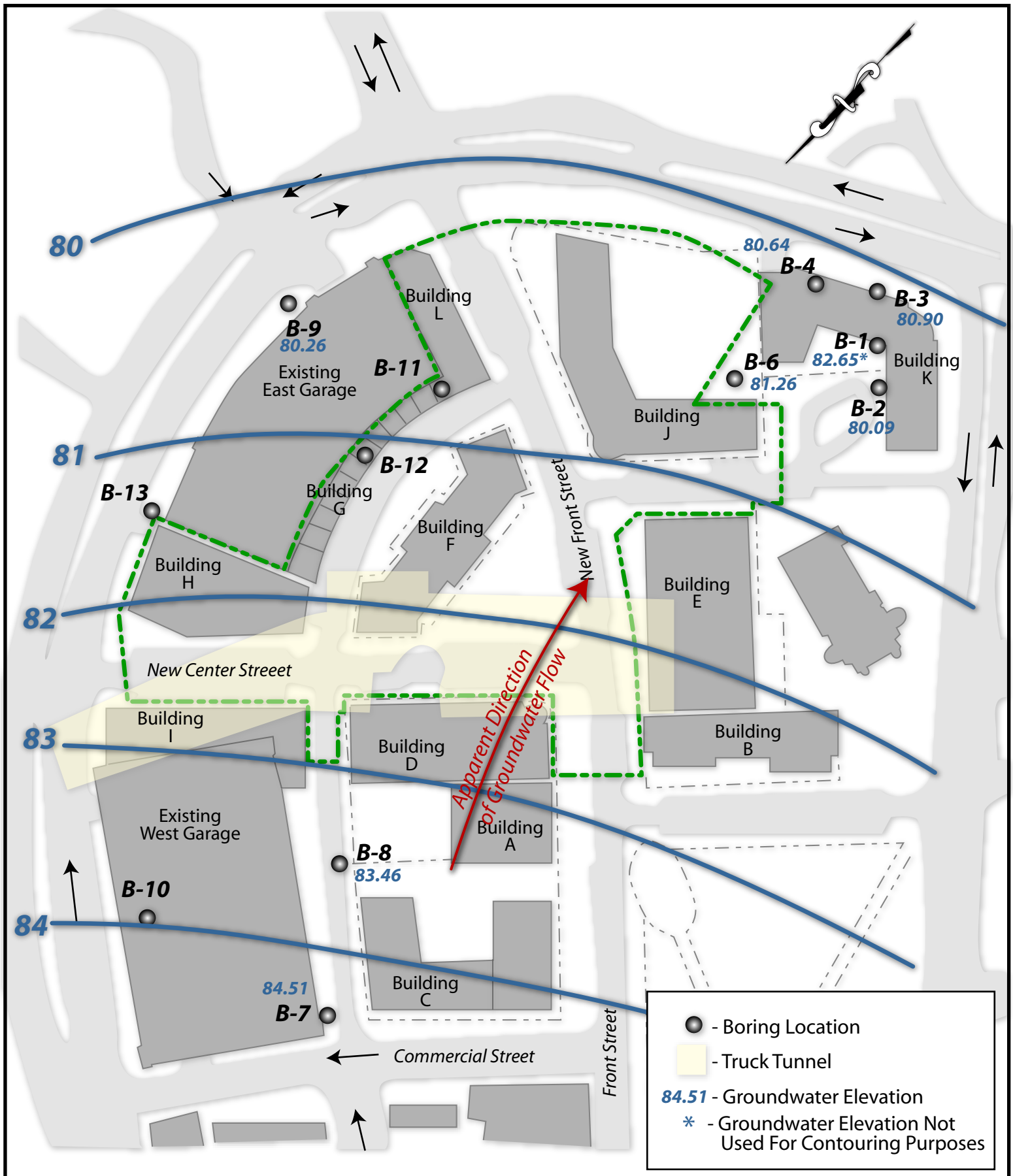
Drafter: DAD	Date: March 2004
Drg. Size: 8.5 x 11	Job No.: 15260048.45150

FIGURE 1

P:\In Progress\Berkeley Management\Figures\Figure 1 Site Location Map.mxt



CLIENT:	Berkeley Investments Inc.	TITLE:	Boring Locations Map
PROJECT:	110, 110, 120 Front Street, Worcester, MA		
DATE: 05/25/2004	DESIGNED BY:	URS	PROJ. NO.: 000000000
SCALE: Not to Scale	DRAWN BY: J. Anderson		TASK: 00000
FILE: H:\Projects\BerkeleyInv\WorcesterMA\BoringLocs.ai	CHECKED BY: B. Jacobs		FIGURE: 2



CLIENT: Berkeley Investments Inc.		TITLE: Water Level Contour Map	
PROJECT: 110, 110, 120 Front Street, Worcester, MA			
DATE: 05/25/2004	DESIGNED BY:	URS	PROJ. NO.: 000000000
SCALE: Not to Scale	DRAWN BY: J. Anderson		TASK: 00000
FILE: H:\Projects\BerkeleyInv\WorcesterMA\Contours.ai	CHECKED BY: B. Jacobs		FIGURE: 3

TABLES

TABLE 1

Temporary Well Construction Details
Limited Phase II ESA
Worcester Common
Worcester, Massachusetts

Piezometer Number	Total Depth (bgs) (Feet)	Screen Interval () (Feet)	TOC Elevation (Feet)	Depth To Groundwater (BTOC) (Feet)	Groundwater Elevation (feet)
B1	28	23-28	104.05	21.40	82.65
B2	25	20-25	104.65	24.56	80.09
B3	23	18-23	101.80	20.90	80.90
B4	23	18-23	99.49	18.85	80.64
B6	12	7-12	90.57	9.31	81.26
B7	28	23-28	107.81	23.30	84.51
B8	27	22-27	107.58	24.12	83.46
B9	17	12-17	94.97	14.71	80.26

TOC=Top-of-Casing

Bgs = below ground surface

BTOC=Below Top-of-Casing

Elevations are relative to Datum = 100 feet

TABLE 2

SUMMARY OF SOIL ANALYTICAL RESULTS

VPH Aliphatic/Aromatic Hydrocarbons and VPH Target Analytes

Worcester Center

Worcester, Massachusetts

			VPH Aliphatic/Aromatic Carbon Ranges					VPH Target Analytes						
Sample Location	**Sample Depth (bls feet)**	**Date Collected**	**C5-C8 Aliphatic (mg/kg)**	**C9-C12 Aliphatic (mg/kg)**	**C9-C10 Aromatic (mg/kg)**	**Unadjusted C5-C8 Aliphatic (mg/kg)**	**Unadjusted C9-C12 Aliphatic (mg/kg)**	**Benzene (ug/kg)**	**Ethylbenzene (ug/kg)**	**Methyl tert-butyl ether (ug/kg)**	**Naphthalene (ug/kg)**	**Toluene (ug/kg)**	**m,p-Xylene (ug/kg)**	**o-Xylene (ug/kg)**
B1	25'	5/4/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B2	25'	5/4/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B3	25'	5/4/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B4	23'	5/4/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B5	25'	5/4/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B6	13'	5/4/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B7	0-6"	5/19/2004	BRL	BRL	BRL	BRL	BRL	*	*	*	*	*	*	*
B7	19.5-20.0'	5/19/2004	BRL	BRL	BRL	BRL	BRL	*	*	*	*	*	*	*
B8	0-6"	5/19/2004	BRL	BRL	BRL	BRL	BRL	*	*	*	*	*	*	*
B8	18.5-19.0	5/19/2004	BRL	BRL	BRL	BRL	BRL	*	*	*	*	*	*	*
B9	0-6"	5/19/2004	BRL	BRL	BRL	BRL	BRL	*	*	*	*	*	*	*
B9	11.5-12.0'	5/19/2004	BRL	BRL	BRL	BRL	BRL	*	*	*	*	*	*	*
B10	0-6"	5/20/2004	BRL	BRL	BRL	BRL	BRL	*	*	*	*	*	*	*
B10	4.5-5.0'	5/20/2004	BRL	BRL	BRL	BRL	BRL	*	*	*	*	*	*	*
B11	0-6"	5/19/2004	BRL	BRL	BRL	BRL	BRL	*	*	*	*	*	*	*
B11	7.0-7.5'	5/19/2004	BRL	BRL	BRL	BRL	BRL	*	*	*	*	*	*	*
B12	0-6"	5/20/2004	BRL	BRL	BRL	BRL	BRL	*	*	*	*	*	*	*
B12	4.0-4.5'	5/20/2004	BRL	BRL	BRL	BRL	BRL	*	*	*	*	*	*	*
B13	0-6"	5/20/2004	BRL	BRL	BRL	BRL	BRL	*	*	*	*	*	*	*
B13	8.5-9.0'	5/20/2004	BRL	BRL	BRL	BRL	BRL	*	*	*	*	*	*	*
RCS-1 (mg/kg)			**100**	**1000**	**100**	**100**	**1,000**	**10,000**	**80,000**	**300**	**4,000**	**90,000**	**500,000**	**500,000**
RCS-2 (mg/kg)			**500**	**2500**	**500**	**500**	**2,500**	**60,000**	**500,000**	**200,000**	**1,000,000**	**500,000**	**500,000**	**500,000**

Notes:

mg/kg - millgrams per kilogram or parts per million

ug/kg - micrograms per kilogram or parts per billion

BRL - Below Reporting Limit

* Analyzed for under 8260B method

Analysis by USEPA SW 846 method 8270

TABLE 3

SUMMARY OF SOIL ANALYTICAL RESULTS

VOCs BY METHOD 8260

Worcester Center

Worcester, Massachusetts

							Tentatively Identified Compounds				
Sample Location	**Sample Depth (bls feet)**	**Date Collected**	**Acetone (ug/kg)**	**2-Butanone (ug/kg)**	**Tetrachloroethene (ug/kg)**	**Toluene (ug/kg)**	**Unknown C3H6 Isomer (ug/kg)**	**Pentanal (ug/kg)**	**Propene (ug/kg)**	**Hexanal (ug/kg)**	**2-Furancarboxaldehyde (ug/kg)**
B1	25'	5/4/2004	BRL	BRL	BRL	BRL	NA	NA	NA	NA	NA
B2	25'	5/4/2004	BRL	BRL	BRL	BRL	NA	NA	NA	NA	NA
B3	25'	5/4/2004	BRL	BRL	BRL	BRL	NA	NA	NA	NA	NA
B4	23'	5/4/2004	BRL	BRL	BRL	BRL	NA	NA	NA	NA	NA
B5	25'	5/4/2004	BRL	BRL	BRL	BRL	NA	NA	NA	NA	NA
B6	13'	5/4/2004	BRL	BRL	BRL	BRL	NA	NA	NA	NA	NA
B7	0-6"	5/19/2004	44.00	BRL	BRL	BRL	3.50	12.00	BRL	180.00	5.9
B7	19.5-20.0'	5/19/2004	36.00	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B8	0-6"	5/19/2004	13.00	BRL	99.00	BRL	BRL	BRL	BRL	BRL	BRL
B8	18.5-19.0	5/19/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B9	0-6"	5/19/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B9	11.5-12.0'	5/19/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B10[1]	0-6"	5/20/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B10[1]	4.5-5.0'	5/20/2004	620.00	100.00	BRL	15.00	BRL	BRL	BRL	BRL	BRL
B11	0-6"	5/19/2004	BRL	BRL	BRL	14.00	BRL	BRL	4.80	BRL	BRL
B11	7.0-7.5'	5/19/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B12[1]	0-6"	5/20/2004	17/18	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B12[1]	4.0-4.5'	5/20/2004	BRL	BRL	BRL	BRL	BRL	BRL	3.50	BRL	BRL
B13[1]	0-6"	5/20/2004	20.00	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B13[1]	8.5-9.0'	5/20/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
RCS-1 (ug/kg)			**3,000**	**300**	**500**	**90,000**	**NS**	**100,000**	**10,000**	**100,000**	**1,000,000**
RCS-2 (ug/kg)			**60,000**	**40,000**	**30,000**	**500,000**	**NS**	**1,000,000**	**1,000,000**	**1,000,000**	**10,000,000**

Notes:

ug/kg - micrograms per kilogram or parts per billior

BRL - Below Reporting Limit

12[1] Data outside QA Range. Results for high being analyzed

NA -Not Analyzed

NS - No Standard

Analysis by USEPA SW 846 method 8260

TABLE 4
SUMMARY OF SOIL ANALYTICAL RESULTS
Total Metals
Worcester Center
Worcester, Massachusetts

Sample Location	Sample Depth (bls feet)	Date Collected	Total Metals Silver (mg/kg)	Mercury (mg/kg)	Arsenic (mg/kg)	Beryllium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Nickel (mg/kg)	Lead (mg/kg)	Antimony (mg/kg)	Selenium (mg/kg)	Thallium (mg/kg)	Zinc (mg/kg)
B1	25'	5/4/2004	BRL	BRL	BRL	BRL	BRL	10.50	10.70	9.58	7.95	BRL	BRL	BRL	63.7
B2	25'	5/4/2004	BRL	BRL	8.52	BRL	BRL	11.20	7.20	11.70	2.17	BRL	BRL	BRL	21.90
B3	25'	5/4/2004	BRL	BRL	13.20	BRL	BRL	9.52	7.88	11.10	2.02	BRL	BRL	BRL	22.20
B4	23'	5/4/2004	BRL	BRL	9.58	BRL	BRL	9.31	6.44	9.61	BRL	BRL	BRL	BRL	19.90
B5	25'	5/4/2004	BRL	BRL	14.50	BRL	BRL	7.68	5.60	8.36	2.17	BRL	BRL	BRL	15.60
B6	13'	5/4/2004	BRL	BRL	**60.0**	BRL	0.9350	73.10	43.10	119.0	4.44	BRL	BRL	BRL	56.00
B7	0-6"	5/19/2004	BRL	BRL	21.00	0.3700	BRL	28.00	15.00	15.00	19.00	BRL	BRL	BRL	34.00
B7	19.5-20.0'	5/19/2004	BRL	BRL	14.00	0.2300	BRL	9.90	7.80	11.00	4.70	BRL	BRL	BRL	21.00
B8	0-6"	5/19/2004	BRL	BRL	17.00	0.4600	BRL	35.00	16.00	20.00	15.00	BRL	BRL	BRL	100.00
B8	18.5-19.0	5/19/2004	BRL	BRL	17.00	BRL	BRL	6.90	7.80	8.90	3.20	BRL	BRL	BRL	16.00
B9	0-6"	5/19/2004	BRL	BRL	**43.00**	0.2900	BRL	14.00	22.00	BRL	16.00	BRL	BRL	BRL	38.00
B9	11.5-12.0'	5/19/2004	BRL	BRL	12.00	BRL	BRL	6.70	5.50	7.30	3.00	BRL	BRL	BRL	15.00
B10	0-6"	5/20/2004	BRL	BRL	22.00	0.44	BRL	24.00	20.00	18.00	17.00	BRL	BRL	BRL	32.00
B10	4.5-5.0'	5/20/2004	BRL	BRL	8.10	**2.70**	BRL	7.40	17.00	9.60	BRL	BRL	4.20	BRL	BRL
B11	0-6"	5/19/2004	BRL	BRL	9.50	BRL	BRL	13.00	12.00	6.40	12.00	BRL	BRL	BRL	41.00
B11	7.0-7.5'	5/19/2004	BRL	BRL	19.00	0.3300	BRL	23.00	14.00	13.00	35.00	BRL	BRL	BRL	32.00
B12	0-6"	5/20/2004	BRL	BRL	14.00	BRL	BRL	7.50	8.60	8.20	6.60	BRL	BRL	BRL	19.00
B12	4.0-4.5'	5/20/2004	BRL	BRL	20.00	BRL	BRL	6.80	7.20	7.70	5.70	BRL	BRL	BRL	14.00
B13	0-6"	5/20/2004	BRL	BRL	**31.00**	0.3500	BRL	15.00	19.00	14.00	44.00	BRL	BRL	BRL	43.00
B13	8.5-9.0'	5/20/2004	BRL	0.1200	20.00	0.2200	BRL	8.60	18.00	10.00	30.00	BRL	BRL	BRL	55.00
RCS-1 (mg/kg)			100.0	20.0	30.0	0.70	30.0	1000.0	1000.0	300.0	300.0	10.0	40.0	8.0	2500.0
RCS-2 (mg/kg)			200.0	60.0	30.0	0.80	80.0	2500.0	10000.0	700.0	600.0	40.0	2500.0	30.0	2500.0

Notes:
mg/kg - millgrams per kilogram or parts per million
BRL - Below Reporting Limit
Bolded value exceeds RCS-2 standard
NS - No standard

TABLE 5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

VPH Aliphatic/Aromatic Hydrocarbons and VPH Target Analytes

Worcester Center

Worcester, Massachusetts

		VPH Aliphatic/Aromatic Carbon Ranges					VPH Target Analytes						
Sample Location	**Date Collected**	**C5-C8 Aliphatic (ug/L)**	**C9-C12 Aliphatic (ug/L)**	**C9-C10 Aromatic (ug/L)**	**Unadjusted C5-C8 Aliphatic (ug/L)**	**Unadjusted C9-C12 Aliphatic (ug/L)**	**Benzene (ug/L)**	**Ethylbenzene (ug/L)**	**Methyl tert-butyl ether (ug/L)**	**Naphthalene (ug/L)**	**Toluene (ug/L)**	**m,p-Xylene (ug/L)**	**o-Xylene (ug/L)**
B1	5/4/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B2	5/4/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B3	5/4/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B4	5/4/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B5	5/4/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B6	5/4/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B7	5/19/2004	BRL	BRL	BRL	BRL	BRL	*	*	*	*	*	*	*
B8	5/19/2004	56.60	BRL	BRL	56.60	BRL	*	*	*	*	*	*	*
B9	5/19/2004	BRL	BRL	BRL	BRL	BRL	*	*	*	*	*	*	*
RCGW-2 (ug/L)		**1000**	**1000**	**4000**	**1000**	**1000**	**2000**	**4000**	**50000**	**6000**	**6000**	**6000**	**6000**

Notes:

ug/L - micrograms per liter or parts per billion

BRL - Below Reporting Limit

Analysis by USEPA SW 846 method 8270

* reported under VOC analysis by 8260B

TABLE 6

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

VOCs BY METHOD 8260

Worcester Center

Worcester, Massachusetts

								Tentatively Identified Compounds	
Sample Location	**Date Collected**	**Chloroform (ug/L)**	**Naphthalene (ug/L)**	**Toluene (ug/L)**	**Trichloroethene (ug/L)**	**tetrachloroethene (ug/L)**	**cis-1,2,-Dichloroethene (ug/L)**	**Unknown C3H6 (ug/L)**	**Propene (ug/L)**
B1	5/4/2004	30.1	BRL	1.5	BRL	BRL	BRL	NA	NA
B2	5/4/2004	17.9	BRL	BRL	BRL	BRL	BRL	NA	NA
B3	5/4/2004	BRL	BRL	BRL	BRL	BRL	BRL	NA	NA
B4	5/4/2004	BRL	BRL	BRL	BRL	BRL	BRL	NA	NA
B6	5/4/2004	1.0	5.0	BRL	BRL	BRL	BRL	NA	NA
B7	5/19/2004	BRL	BRL	BRL	BRL	BRL	BRL	1.4	BRL
B8	5/19/2004	BRL	BRL	BRL	10.0	140.0	16.0	BRL	3.0
B9	5/19/2004	BRL	BRL	BRL	BRL	BRL	BRL	1.1	BRL
RCGW-2 (ug/L)		**400**	**6000**	**6000**	**300**	**3000**	**NS**	**NS**	**30000**

Notes:

ug/L - micrograms per liter or parts per billion

BRL - Below Reporting Limit

NA - Not analyzed

Analysis by USEPA SW 846 method 8260

TABLE 7

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

Priority Pollutant Metals

Worcester Center

Worcester, Massachusetts

		Metals												
Sample Location	**Date Collected**	**Silver (mg/L)**	**Arsenic (mg/L)**	**Beryllium (mg/L)**	**Cadmium (mg/L)**	**Chromium (mg/L)**	**Copper (mg/L)**	**Mercury (mg/L)**	**Nickel (mg/L)**	**Lead (mg/L)**	**Antimony (mg/L)**	**Selenium (mg/L)**	**Thallium (mg/L)**	**Zinc (mg/L)**
B1[1]	5/4/2004	BRL	**2.3500**	0.0425	BRL	**2.4600**	1.8400	0.0003	**2.3700**	**0.6980**	BRL	BRL	BRL	**4.04**
B2[1]	5/4/2004	BRL	**0.9220**	0.0125	BRL	0.8820	0.5120	0.00128	**0.6540**	**0.3900**	BRL	BRL	BRL	**1.12**
B3[1]	5/4/2004	BRL	**2.9600**	0.0452	BRL	**2.4400**	1.8200	0.0072	**2.0800**	**1.8500**	BRL	BRL	BRL	**3.92**
B4[1]	5/4/2004	BRL	**2.6800**	0.0318	BRL	1.2400	0.9370	BRL	**1.1300**	**0.5070**	BRL	BRL	BRL	**1.80**
B6[1]	5/4/2004	BRL	**2.5000**	0.0150	BRL	1.0000	1.0800	0.0003	**2.1400**	**0.3850**	BRL	BRL	BRL	**1.49**
B1[2]	5/18/2004	NA	0.0070	NA	NA	BRL	NA	NA	BRL	BRL	NA	NA	NA	BRL
B2[2]	5/18/2004	NA	BRL	NA	NA	BRL	NA	NA	BRL	BRL	NA	NA	NA	BRL
B3[2]	5/18/2004	NA	BRL	NA	NA	BRL	NA	NA	BRL	BRL	NA	NA	NA	BRL
B4[2]	5/18/2004	NA	BRL	NA	NA	BRL	NA	NA	BRL	BRL	NA	NA	NA	BRL
B6[2]	5/18/2004	NA	BRL	NA	NA	BRL	NA	NA	BRL	BRL	NA	NA	NA	BRL
B7[2]	5/19/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	0.026	BRL	BRL	BRL	BRL	BRL
B8[2]	5/19/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
B9[2]	5/19/2004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
RCGW-2 (mg/L)		0.007	0.400	0.050	0.010	2.0	100.0	0.001	0.080	0.030	0.300	0.080	0.400	0.900

Notes:

mg/L - milligrams per liter or parts per million

BRL - Below Reporting Limit

NA - Not analyzed

Bolded value exceeds RCGW-2 standard

B1[1] Results for 5/4/04 samples are total metals on unfiltered samples

B1[2] Results for 5/18/04 samples are disspolved metals on filtered samples

APPENDIX A
GEOGRAPHICAL SURVEY REPORT

Geophysical Survey
Worcester Center
Asphalt Parking Lot
Worcester, Massachusetts

Prepared For:

URS Corporation

400 North Park Town Center
1000 Abernathy N.E., Suite 900
Atlanta, Georgia 30328

Prepared By:

Forrest Environmental Services, Inc.
3057 Crosen Court
Oak Hill, Virginia 20171
(703) 648-9090

May 2004

FES Project No. 04134

Table of Contents

Section Page

Executive Summary ES-1

1.0 Introduction 1

2.0 Equipment and Procedures 2

3.0 Survey Results and Conclusions 4

List of Figures

Figure

1 Geophysical Boundary Map 6
2 EM Apparent Conductivity Contour Map 7
3 EM Average Magnetic Susceptibility Contour Map 8
4 Geophysical Anomaly Map 9

Executive Summary

Forrest Environmental Services, Inc. (FES) performed a geophysical survey located at the Worcester Center asphalt parking lot located in Worcester, Massachusetts on 3rd May 2004. The investigation consisted of an electromagnetic (EM) survey to locate suspected underground storage tanks (USTs).

The EM survey was performed using an EM-31 induction meter to measure the apparent conductivity of the subsurface. Data was collected along linear 10-foot traverses having stations at 2.5-foot centers that covered approximately 320 by 350 feet.

The depth of investigation by EM is a function of the intercoil spacing and the orientation of the antenna dipoles. The EM-31 has an intercoil spacing of 12 feet, and used in the vertical dipole mode, has an effective penetration depth of approximately 18 feet. The background apparent terrain conductivity value at the site was approximately 10 millimhos per meter (mmhos/m).

The EM survey located seven anomalies. The EM survey located two linear anomalies that appear to be from underground utilities. Four anomalies are from anthropogenic interferences such as the metal fence located at the southeastern boundary of the survey, and metal manholes at the northern section of the survey.

One negative anomaly is located at the central section of the survey. The negative anomaly appears to be a large mass of buried metal such as a building foundation or reinforced concrete.

1.0 Introduction

Forrest Environmental Services, Inc. (FES) performed a geophysical survey located at the Worcester Center asphalt parking lot located in Worcester, Massachusetts on 3rd May 2004. The investigation consisted of an electromagnetic (EM) survey to locate suspected underground storage tanks (USTs).

The EM survey was bounded to the east by Frances McGrath Boulevard, to the north by a parking lot building, to the south by Franklin Street, and to the west by the Church. Data was collected along linear 10-foot traverses having stations at 2.5-foot centers that covered approximately 320 by 350 feet.

Line 0 North and station 0 East denotes the southeast corner of the survey. The survey boundary included the whole parking lot area. The survey boundary was selected by an URS Corporation representative.

Topographically, the site slopes gently to the northeast. The site consists of an asphalted parking lot. Survey locations and physical features are shown in Figure 1.

Details of the geophysical survey are described in the following sections.

2.0 Equipment and Procedures

The EM survey was performed using an EM-31 induction meter to measure the apparent conductivity of the subsurface. The EM-31 consists of two horizontal coplanar loops, one acting as a transmitter and the other as a receiver. The transmitter induces electrical eddy currents in the earth, which in turn produce a secondary magnetic field. The receiver intercepts the secondary field, and the meter measures the terrain conductivity by comparing the strength of the secondary field to that of the primary field.

The depth of investigation by EM is a function of the intercoil spacing and the orientation of the antenna dipoles. The EM-31 has an intercoil spacing of 12 feet, and used in the vertical dipole mode, has an effective penetration depth of approximately 18 feet.

Two readings were obtained from the EM-31 at each measurement station. The EM was connected to a data logger that simultaneously recorded both the quadrature-phase component and the in-phase component. The quadrature-phase component measures the apparent terrain conductivity of the subsurface, and will detect metallic and nonmetallic objects or features with conductivities that deviate from their surroundings. The background apparent terrain conductivity value at the site was approximately 10 millimhos per meter (mmhos/m).

The in-phase component measurements are proportional to an effective, average magnetic susceptibility of the surrounding earth; this mode is sensitive to large metallic objects. The readings do not indicate true magnetic susceptibility because there is an unknown additive constant and multiplying factor that would be required to convert the measured values to magnetic susceptibility.

Generally, negative EM values can indicate the areal extent of large, shallow buried metal objects. The EM displays moderate-sized metal objects that are buried deep as areas of high conductivity; therefore, both high and negative readings of apparent conductivity can indicate metal. However, high conductivity materials can also be caused by conductive chemical compounds such as acids, sulfates, fly ash, and salts in the subsurface and by conductive soils

such as clay. Low conductivity materials such as wood and oil are generally not detectable by the EM.

Contours of the EM data were generated by computer using Golden Software's SURFER®. Data gridding were performed using 1-foot spacing, and the Kriging algorithm was used for grid interpolation. The contour maps of the data results are discussed in the following section.

3.0 Survey Results and Conclusions

The objective of the geophysical survey was to determine the presence of USTs. The EM apparent terrain conductivity contour map (Figure 2) exhibited seven anomalies within the parking lot area. The EM average magnetic susceptibility contour map (Figure 3) confirms the presence of anomalies of Figure 2.

One linear northwest-southeast negative anomaly is centered at 50 North 280 West. Anomaly A appears to be from underground utility.

One linear east-west high anomaly is centered at 150 North 300 West. Anomaly B appears to be from underground utility.

One negative anomaly is centered at 0 North 50 West. Anomaly C appears to be from a metal fence.

One negative anomaly is centered at 290 North 200 West. Anomaly D appears to be from a metal manhole.

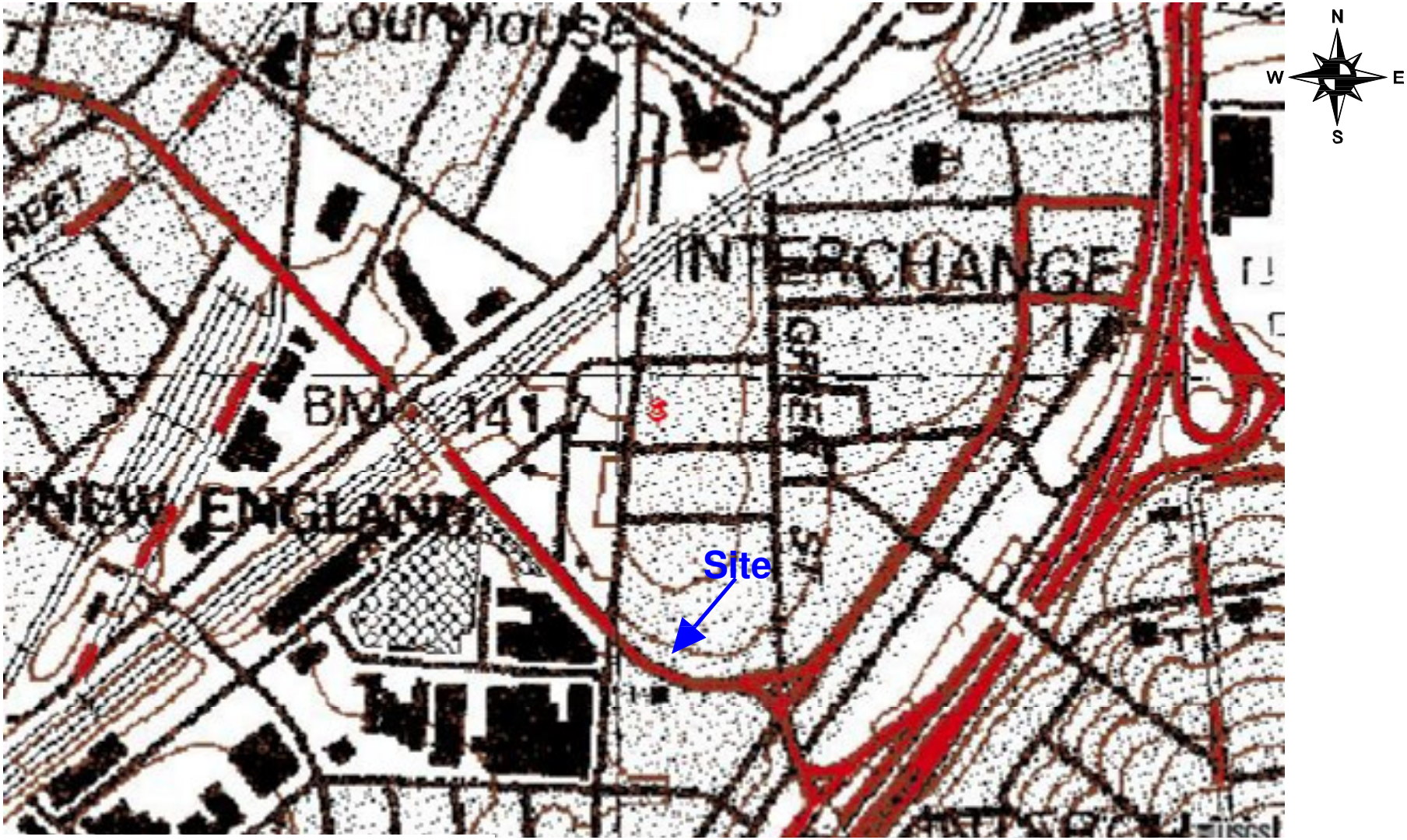
One negative anomaly is centered at 250 North 190 West. Anomaly E appears to be from a metal manhole.

One negative anomaly is centered at 190 North 70 West. Anomaly F appears to be from a metal manhole.

One negative anomaly is centered at 120 North 150 West. Anomaly G appears to be from buried metal such as a building foundation or reinforced concrete.

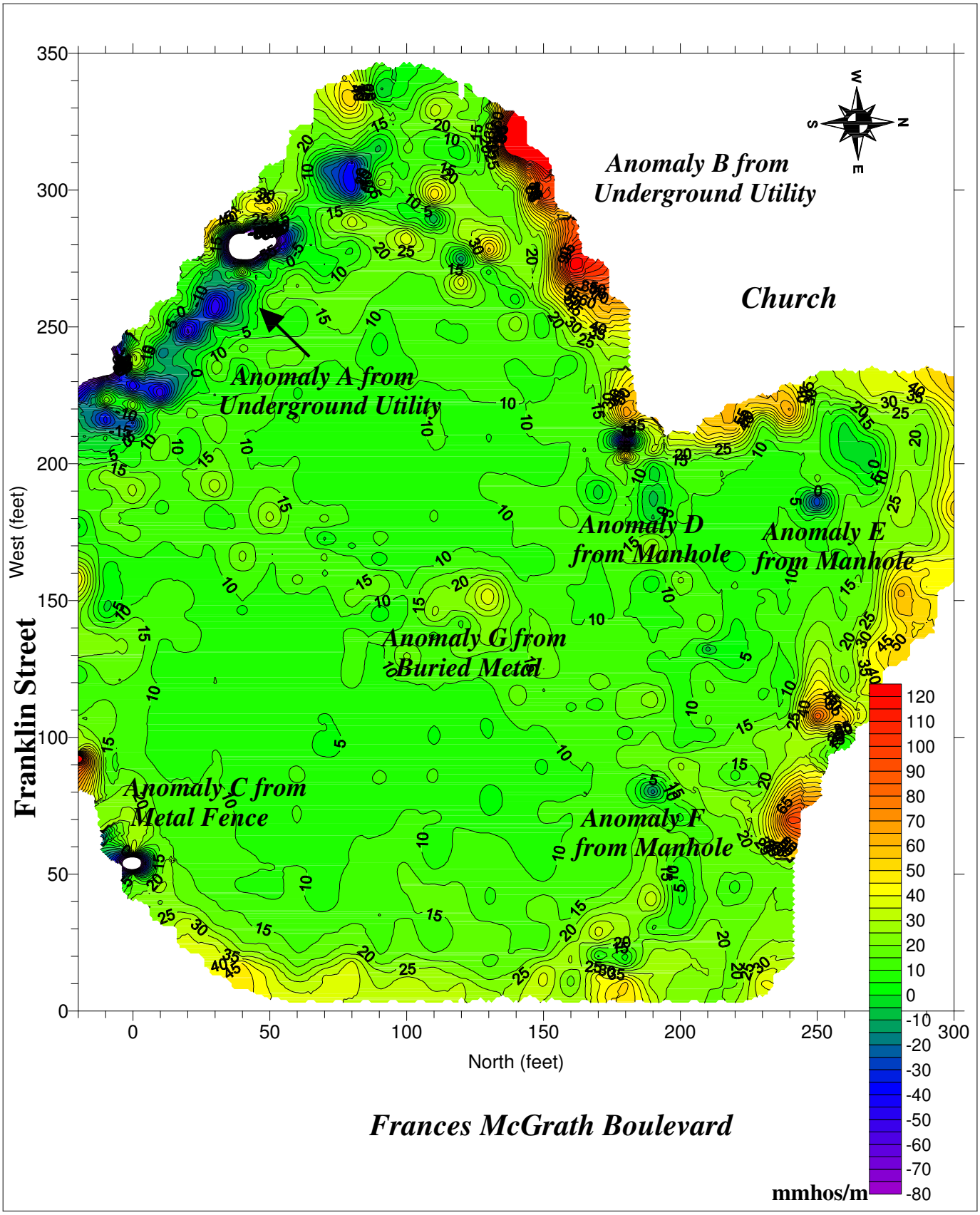
The EM survey located seven anomalies. The EM survey located two linear anomalies that appear to be from underground utilities (Figure 4). Four anomalies are from anthropogenic interferences such as the metal fence located at the southeastern boundary of the survey, and metal manholes at the northern section of the survey.

One negative anomaly is located at the central section of the survey. The negative anomaly appears to be a large mass of buried metal such as a building foundation or reinforced concrete.

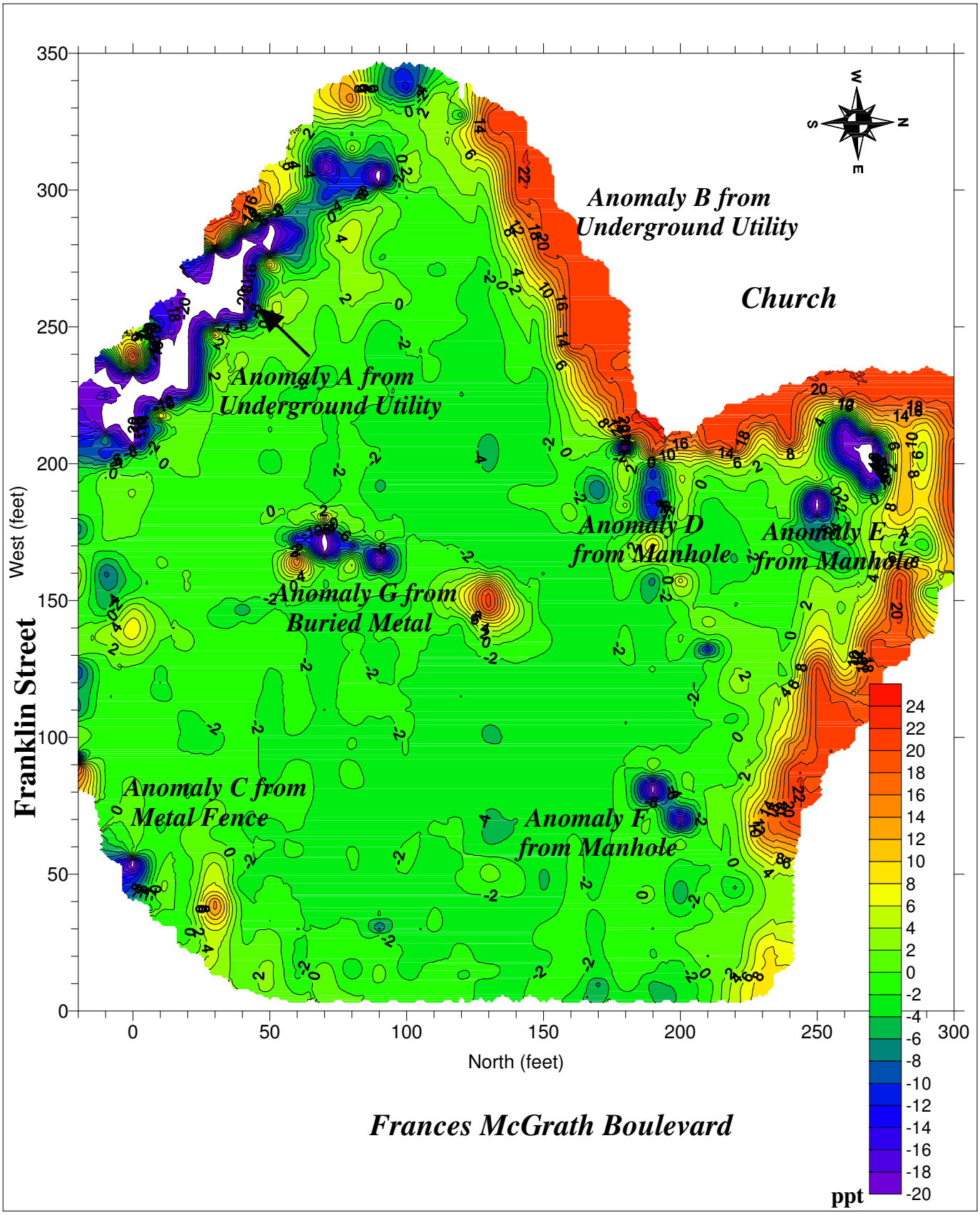


Forrest Environmental Services, Inc.
Oak Hill, Virginia
(703) 648-9090
www.fesinc.net

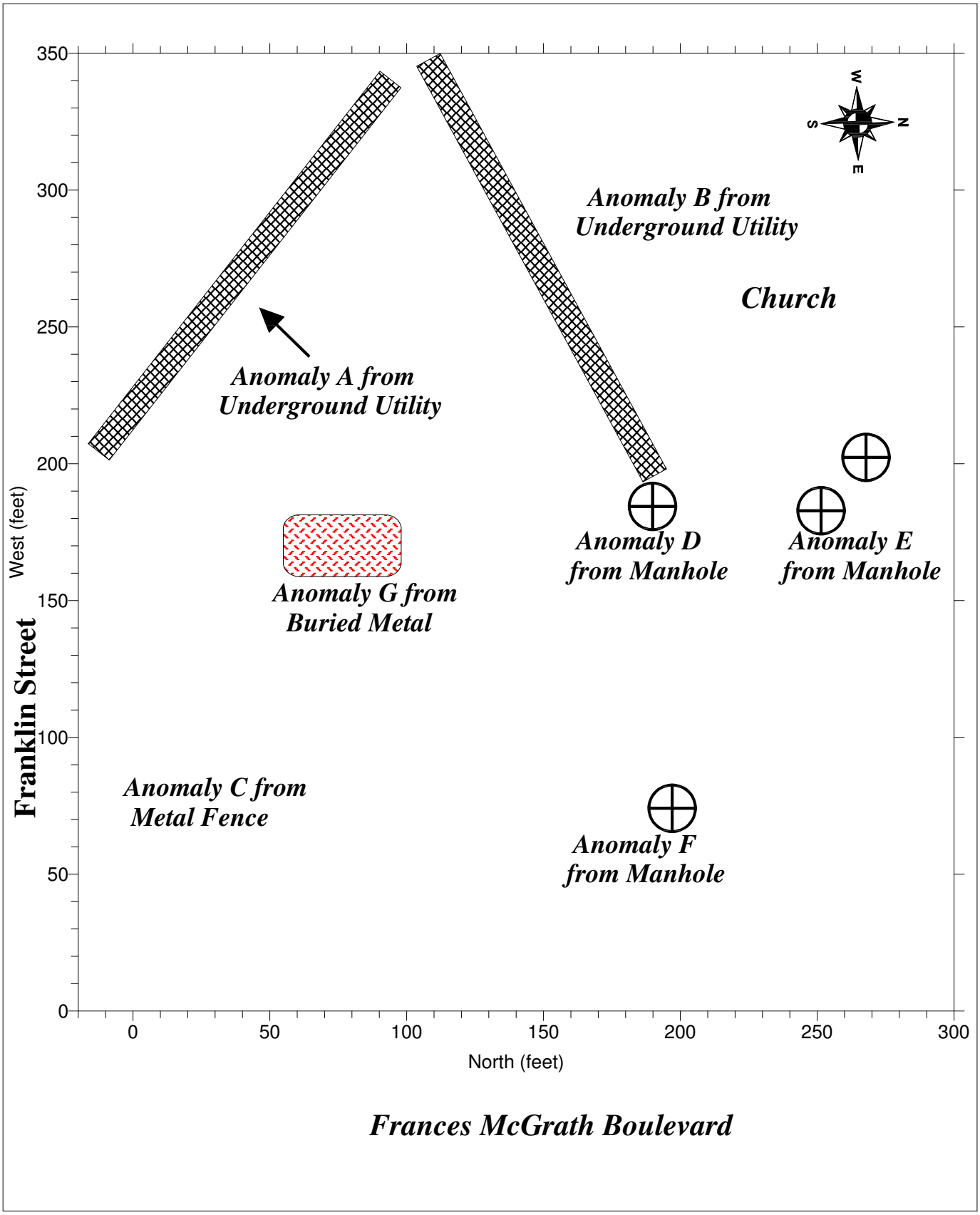
DATE: May 2004	SCALE: not to scale	TITLE: ***Geophysical Site Map*** ***Berkley Investments*** ***36 Washington Square*** ***Worcester, Massachusetts***	
DRAWN BY:	APPROVED BY:		
JOB NO.: 04134	DWG. NO./ REV. NO.: URSWF1.SRF	CLIENT: URS Corporation	FIGURE: 1



Forrest Environmental Services, Inc. Oak Hill, Virginia (703) 648-9090 www.fesinc.net	DATE May 2004	SCALE 1 inch = 50 feet	TITLE Apparent Conductivity Contour Map Berkley Investments 36 Washington Square Worcester, Massachusetts
	DRAWN BY	APPROVED BY	
	JOB NO. 04134	DWG. NO./ REV. NO. URSWc.SRF	CLIENT URS Corporation FIGURE 2



Forrest Environmental Services, Inc. Oak Hill, Virginia (703) 648-9090 www.fesinc.net	DATE May 2004	SCALE 1 inch = 50 feet	TITLE *Average Magnetic Susceptibility Contour Map* *Berkley Investments* *36 Washington Square* *Worcester, Massachusetts*
	DRAWN BY	APPROVED BY	
	JOB NO. 04134	DWG. NO./ REV. NO. URSWi.SRF	CLIENT **URS Corporation**
			FIGURE **3**



Forrest Environmental Services, Inc. Oak Hill, Virginia (703) 648-9090 www.fesinc.net	DATE May 2004	SCALE 1 inch = 50 feet	TITLE **Geophysical Anomaly Map** **Berkley Investments** **36 Washington Square** **Worcester, Massachusetts**
	DRAWN BY	APPROVED BY	
	JOB NO. 04134	DWG. NO./ REV. NO. URSWF4.SRF	CLIENT **URS Corporation**
			FIGURE **3**

APPENDIX B
SOIL BORING LOGS

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048
PROJECT NAME Worcester Commons
LOCATION Worcester, MA
DRILLING METHOD Geo Probe 66, Truck-Mounted Rig, Direct Push
SAMPLING METHOD 5' Macro Liner
GROUND ELEVATION
TOP OF CASING
LOGGED BY A. Pollock
REMARKS Drilled by Geosearch, Inc.

BORING/WELL NUMBER B-1
DATE DRILLED 5/4/04
CASING TYPE/DIAMETER 1" Diameter Schedule 40 PVC
SCREEN TYPE/SLOT 1" Diameter Schedule 40 PVC, 0.01" machine slot
GRAVEL PACK TYPE N/A
GROUT TYPE/QUANTITY N/A
DEPTH TO WATER
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
0		24	CORE 1					ASPHALT Parking Area; with base FILL; sampled as medium brown coarse to fine SAND and GRAVEL, some silt, brick fragments, dry. FILL; sampled as very dark brown to black SILT, medium dense, some ash-like material, trace of medium to fine gravel, moist.	
								No Recovery, 3.5' to 5' bgs.	
0		48	CORE 2		5	SP		SAND; yellowish brown, bright, coarse to fine grained, with coarse to fine GRAVEL, sub-round to round, moist.	
0		49	CORE 3		10				
0		41	CORE 4		15				
						SW		SAND; trace of silt, fine grained, yellowish brown, moist.	
0		30	CORE 5		20				
						ML		SILT; trace of fine sand, medium brown, dense, wet. Collected soil sample for laboratory analysis.	

Continued Next Page

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048 **BORING/WELL NUMBER** B-1

PROJECT NAME Worcester Commons **DATE DRILLED** 5/4/04

Continued from Previous Page

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
								No Recovery, 22.5' to 25' bgs.	
					25			Geoprobe terminated at 25' bgs; Set temporary 1" PVC piezometer with 10' screen. Collected groundwater sample for laboratory analysis.	

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048
PROJECT NAME Worcester Commons
LOCATION Worcester, MA
DRILLING METHOD Geo Probe 54 DT, Direct Push
SAMPLING METHOD 4' Macro Liner
GROUND ELEVATION
TOP OF CASING
LOGGED BY A. Pollock
REMARKS Drilled by Geosearch, Inc.

BORING/WELL NUMBER B-10
DATE DRILLED 5/20/04
CASING TYPE/DIAMETER N/A
SCREEN TYPE/SLOT N/A
GRAVEL PACK TYPE N/A
GROUT TYPE/QUANTITY N/A
DEPTH TO WATER
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
8.3		44	CORE 1					ASPHALT and concrete, with gravel base	
								FILL; sampled as brown GRAVELLY SAND, fine to medium grained, underlain by a 5" layer of cobbles. Collected surface soil sample for laboratory analysis.	
								grades olive gray, little silt, some dark brown organics at bottom of core.	
21.2		48	CORE 2			SM		SILTY SAND; with organics, dark brown, very dense, roots. Collected soil sample from 4.5' to 5' bgs for laboratory analysis.	
					5	SM		SILTY SAND; olive gray, fine grained, grading to fine to coarse sand, wet at 5.5' bgs.	
								Geoprobe terminated at 8' bgs.	

BORING_WELL_WORCSTER.GPJ DM_ATLNT.GDT 7/27/04

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048
PROJECT NAME Worcester Commons
LOCATION Worcester, MA
DRILLING METHOD Geo Probe 54 DT, Direct Push
SAMPLING METHOD 4' Macro Liner
GROUND ELEVATION
TOP OF CASING
LOGGED BY A. Pollock
REMARKS Drilled by Geosearch, Inc.

BORING/WELL NUMBER B-11
DATE DRILLED 5/20/04
CASING TYPE/DIAMETER N/A
SCREEN TYPE/SLOT N/A
GRAVEL PACK TYPE N/A
GROUT TYPE/QUANTITY N/A
DEPTH TO WATER
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
46.9		40	CORE 1					TOPSOIL FILL; sampled as brown SAND, fine to coarse grained, seam of cobbles, dry. Collected surface soil sample for laboratory analysis.	
58.3		24	CORE 2		5			grades fine to medium grained. Collected soil sample from 7' to 7.5' bgs for laboratory analysis.	
								Geoprobe terminated at 8' bgs. Soils grade wet.	

BORING_WELL WORCSTER.GPJ DM_ATLNT.GDT 7/27/04

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048
PROJECT NAME Worcester Commons
LOCATION Worcester, MA
DRILLING METHOD Geo Probe 54 DT, Direct Push
SAMPLING METHOD 4' Macro Liner
GROUND ELEVATION
TOP OF CASING
LOGGED BY A. Pollock
REMARKS Drilled by Geosearch, Inc.

BORING/WELL NUMBER B-12
DATE DRILLED 5/20/04
CASING TYPE/DIAMETER N/A
SCREEN TYPE/SLOT N/A
GRAVEL PACK TYPE N/A
GROUT TYPE/QUANTITY N/A
DEPTH TO WATER
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
0		40	CORE 1					TOPSOIL, mulch	
								FILL; sampled as brown SAND, fine to medium grained, little fine to coarse gravel, slightly moist. Collected surface soil sample for laboratory analysis.	
0		48	CORE 2		5			grades fine grained, little silt, trace of red brick, gravel present. Collected soil sample from 4' to 4.5' bgs for laboratory analysis. wet at 5' bgs.	
								Geoprobe terminated at 8' bgs.	

BORING_WELL WORCSTER.GPJ DM_ATLNT.GDT 7/27/04

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048
PROJECT NAME Worcester Commons
LOCATION Worcester, MA
DRILLING METHOD Geo Probe 54 DT, Direct Push
SAMPLING METHOD 4' Macro Liner
GROUND ELEVATION
TOP OF CASING
LOGGED BY A. Pollock
REMARKS Drilled by Geosearch, Inc.

BORING/WELL NUMBER B-13
DATE DRILLED 5/20/04
CASING TYPE/DIAMETER N/A
SCREEN TYPE/SLOT N/A
GRAVEL PACK TYPE N/A
GROUT TYPE/QUANTITY N/A
DEPTH TO WATER
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
7.9		38	CORE 1					TOPSOIL, mulch	
								FILL; sampled as brown SAND, fine to medium grained, trace of silt, some fine to coarse gravel, dry. Collected surface soil sample for laboratory analysis.	
0		30	CORE 2		5			6" layer of red brick, slightly moist.	
2.1		40	CORE 3		10	SM		SAND; brown, fine to medium trace of silt, some fine to coarse gravel, seam of cobbles. Collected soil sample from 8.5' to 9' bgs for laboratory analysis. grades wet at 9' bgs.	
								Geoprobe terminated at 12' bgs.	

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048
BORING/WELL NUMBER B-2
PROJECT NAME Worcester Commons
DATE DRILLED 5/4/04
LOCATION Worcester, MA
CASING TYPE/DIAMETER 1" Diameter Schedule 40 PVC
DRILLING METHOD Geo Probe 66, Truck-Mounted Rig, Direct Push
SCREEN TYPE/SLOT 1" Diameter Schedule 40 PVC, 0.01" machine slot
SAMPLING METHOD 5' Macro Liner
GRAVEL PACK TYPE N/A
GROUND ELEVATION
GROUT TYPE/QUANTITY N/A
TOP OF CASING
DEPTH TO WATER
LOGGED BY A. Pollock
GROUND WATER ELEVATION
REMARKS Drilled by Geosearch, Inc.

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
0		27	CORE 1					ASPHALT Parking Area; gray coloring FILL; sampled as very dark brown SILT, medium dense, some coarse to fine, sub-angular to sub-rounded gravel, trace of coarse to fine sand, brick fragments. grades medium brown, dense, moist to dry.	
0		52	CORE 2		5			SAND; trace of silt, yellowish brown, bright, coarse to fine grained, with coarse to fine GRAVEL, sub-round to round, dry.	
0		42	CORE 3		10	SP			
0		34	CORE 4		15			SAND; trace of silt, fine grained, medium brown, moist.	
0		32	CORE 5		20	SW			
						ML		SILT; trace of fine sand, medium brown, dense, wet. Collected soil sample for laboratory analysis. ∇	

Continued Next Page

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048 **BORING/WELL NUMBER** B-2

PROJECT NAME Worcester Commons **DATE DRILLED** 5/4/04

Continued from Previous Page

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
								No Recovery, 22.5' to 25' bgs.	
					25			Geoprobe terminated at 25' bgs; Set temporary 1" PVC piezometer with 10' screen. Collected groundwater sample for laboratory analysis.	

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048
PROJECT NAME Worcester Commons
LOCATION Worcester, MA
DRILLING METHOD Geo Probe 66, Truck-Mounted Rig, Direct Push
SAMPLING METHOD 5' Macro Liner
GROUND ELEVATION
TOP OF CASING
LOGGED BY A. Pollock
REMARKS Drilled by Geosearch, Inc.

BORING/WELL NUMBER B-3
DATE DRILLED 5/4/04
CASING TYPE/DIAMETER 1" Diameter Schedule 40 PVC
SCREEN TYPE/SLOT 1" Diameter Schedule 40 PVC, 0.01" machine slot
GRAVEL PACK TYPE N/A
GROUT TYPE/QUANTITY N/A
DEPTH TO WATER
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
0		40	CORE 1					ASPHALT Parking Area; gray coloring FILL; sampled as very dark brown SILT, medium dense, trace of medium to fine, sub-rounded to round gravel, some coarse to fine sand, brick fragment, dry.	
0		36	CORE 2		5			brick and mortar debris present, moist.	
0		42	CORE 3		10	SP		SAND; trace of silt, yellowish brown, bright, coarse to fine grained, with coarse to fine GRAVEL, sub-round to round, dry.	
0		36	CORE 4		15	SP		SAND; some silt, medium brown to yellowish brown, medium to fine grained, with trace of fine gravel, sub-round to round, moist. grades fine grained, medium brown, moist.	
0		36	CORE 5		20	ML		SILT; with fine SAND, medium brown, medium dense, moist to wet. grades dense, trace of fine sand, wet. ∇	

Continued Next Page

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048 **BORING/WELL NUMBER** B-3

PROJECT NAME Worcester Commons **DATE DRILLED** 5/4/04

Continued from Previous Page

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
						ML		SILT; stratified, trace of fine sand, medium brown, dense, moist to wet. Collected soil sample for laboratory analysis.	
								No Recovery, 23' to 25' bgs.	
					25			Geoprobe terminated at 25' bgs; Set temporary 1" PVC piezometer with 10' screen. Collected groundwater sample for laboratory analysis.	

BORING_WELL_WORCSTER.GPJ DM_ATLNT.GDT 7/27/04

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048
PROJECT NAME Worcester Commons
LOCATION Worcester, MA
DRILLING METHOD Geo Probe 66, Truck-Mounted Rig, Direct Push
SAMPLING METHOD 5' Macro Liner
GROUND ELEVATION
TOP OF CASING
LOGGED BY A. Pollock
REMARKS Drilled by Geosearch, Inc.

BORING/WELL NUMBER B-4
DATE DRILLED 5/4/04
CASING TYPE/DIAMETER 1" Diameter Schedule 40 PVC
SCREEN TYPE/SLOT 1" Diameter Schedule 40 PVC, 0.01" machine slot
GRAVEL PACK TYPE N/A
GROUT TYPE/QUANTITY N/A
DEPTH TO WATER
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
0		42	CORE 1					ASPHALT Parking Area FILL; sampled as very dark brown SILT, medium dense, trace of medium to fine, sub-rounded to round gravel, some medium to fine sand, brick fragments, moist.	
0		46	CORE 2		5	SP		SAND; trace of silt, yellowish brown, coarse to fine grained, with coarse to fine GRAVEL, sub-round to round, dry.	
0		41	CORE 3		10	SP		SAND; yellowish brown, coarse to fine grained, with trace of medium to fine, sub-rounded to round gravel, moist. grades fine grained, trace of silt, medium brown to yellowish brown, moist.	
0		30	CORE 4		15	SP		grades wet.	
0		36	CORE 5		20	SM		SAND and SILT; medium brown, wet. Collected soil sample for laboratory analysis.	

Continued Next Page

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048 **BORING/WELL NUMBER** B-4

PROJECT NAME Worcester Commons **DATE DRILLED** 5/4/04

Continued from Previous Page

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
								Geoprobe terminated at 23' bgs; Set temporary 1" PVC piezometer with 10' screen. Collected groundwater sample for laboratory analysis.	

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048
BORING/WELL NUMBER B-5
PROJECT NAME Worcester Commons
DATE DRILLED 5/4/04
LOCATION Worcester, MA
CASING TYPE/DIAMETER N/A
DRILLING METHOD Geo Probe 66, Truck-Mounted Rig, Direct Push
SCREEN TYPE/SLOT N/A
SAMPLING METHOD 5' Macro Liner
GRAVEL PACK TYPE N/A
GROUND ELEVATION
GROUT TYPE/QUANTITY N/A
TOP OF CASING
DEPTH TO WATER
LOGGED BY A. Pollock
GROUND WATER ELEVATION
REMARKS Drilled by Geosearch, Inc.

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
0		39	CORE 1					ASPHALT Parking Area FILL; sampled as medium gray SILT, dense, some coarse to fine, sub-angular to angular gravel, trace of medium to fine sand, brick fragments, moist.	
								FILL; sampled as dark brown SILT and CLAY, dense, trace of fine, sub-angular to angular gravel, trace of organics, moist.	
0		21	CORE 2		5			FILL; sampled as red brick, trace of silt, some coarse to fine sand and coarse to fine, sub-angular to sub-rounded gravel, dry.	
								No Recovery, 6.75' to 10' bgs.	
0		33	CORE 3		10	SP		SAND; trace of silt, yellowish brown, bright, coarse to fine grained, with coarse to fine GRAVEL, sub-round to round, dry.	
0		41	CORE 4		15				
0		25	CORE 5		20	ML		SILT; trace of clay, trace of medium to fine sand and fine, sub-rounded to round gravel, medium brown, dense, moist. Collected soil sample for laboratory analysis.	

Continued Next Page

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048 **BORING/WELL NUMBER** B-5

PROJECT NAME Worcester Commons **DATE DRILLED** 5/4/04

Continued from Previous Page

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
								No Recovery, 22' to 25' bgs.	
					25			Geoprobe terminated at 25' bgs; No groundwater encountered.	

BORING_WELL WORCSTER.GPJ DM_ATLNT.GDT 7/27/04

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048
PROJECT NAME Worcester Commons
LOCATION Worcester, MA
DRILLING METHOD Geo Probe 66, Truck-Mounted Rig, Direct Push
SAMPLING METHOD 5' Macro Liner
GROUND ELEVATION
TOP OF CASING
LOGGED BY A. Pollock
REMARKS Drilled by Geosearch, Inc.

BORING/WELL NUMBER B-6
DATE DRILLED 5/4/04
CASING TYPE/DIAMETER 1" Diameter Schedule 40 PVC
SCREEN TYPE/SLOT 1" Diameter Schedule 40 PVC, 0.01" machine slot
GRAVEL PACK TYPE N/A
GROUT TYPE/QUANTITY N/A
DEPTH TO WATER
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
10		36	CORE 1					ASPHALT Parking Area FILL; sampled as red brick and black coal-like material with tar-like odor (10 ppm).	
						SP		SAND; trace of silt, yellowish brown, coarse to fine grained, some coarse to fine, sub-rounded to round gravel, moist.	
						SP		SAND; trace of silt, medium brown, fine grained, moist.	
0		36	CORE 2		5				
						ML		SILT; trace of clay and fine sand, medium gray, medium dense, wet.	
0		41	CORE 3		10				
						ML		SILT; some coarse to fine, sub-angular to sub-rounded gravel, trace of coarse to fine sand, medium brown, dense, wet. Collected soil sample for laboratory analysis.	
					15			Geoprobe terminated at 15' bgs; Set temporary 1" PVC piezometer with 10' screen. Collected groundwater sample for laboratory analysis.	

BORING_WELL WORCSTER.GPJ DM_ATLNT.GDT 7/27/04

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048
PROJECT NAME Worcester Commons
LOCATION Worcester, MA
DRILLING METHOD Geo Probe 54 DT, Direct Push
SAMPLING METHOD 4' Macro Liner
GROUND ELEVATION
TOP OF CASING
LOGGED BY A. Pollock
REMARKS Drilled by Geosearch, Inc.

BORING/WELL NUMBER B-7
DATE DRILLED 5/19/04
CASING TYPE/DIAMETER 1" Diameter Schedule 40 PVC
SCREEN TYPE/SLOT 1" Diameter Schedule 40 PVC, 0.01" machine slot
GRAVEL PACK TYPE N/A
GROUT TYPE/QUANTITY N/A
DEPTH TO WATER
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
0		39	CORE 1					MULCH ground-cover FILL; sampled as brown SAND, fine to medium grained, roots, dry. Collected surface soil sample for laboratory analysis.	
0		41	CORE 2		5			grades with fine to coarse gravel, brick fragments, dry.	
0		24	CORE 3		10	SM		SAND; trace of silt, brown, fine to medium grained, seams of cobbles, dry.	
0.4		30	CORE 4		15	SM		SAND; trace of fine gravel, brown, fine grained, slightly moist.	
0.7		48	CORE 5					grades with trace of fine to coarse gravel, moist. Collected soil sample from 19.5' to 20' bgs for laboratory analysis.	
2.8		48	CORE 6		20			SAND; trace of fine gravel, brown, fine grained, wet.	

Continued Next Page

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048 **BORING/WELL NUMBER** B-7

PROJECT NAME Worcester Commons **DATE DRILLED** 5/19/04

Continued from Previous Page

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
						SM			
								Geoprobe terminated at 24' bgs; Set temporary 1" PVC piezometer with 5' screen at 26' bgs. Collected groundwater sample for laboratory analysis.	

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048
PROJECT NAME Worcester Commons
LOCATION Worcester, MA
DRILLING METHOD Geo Probe 54 DT, Direct Push
SAMPLING METHOD 4' Macro Liner
GROUND ELEVATION
TOP OF CASING
LOGGED BY A. Pollock
REMARKS Drilled by Geosearch, Inc.

BORING/WELL NUMBER B-8
DATE DRILLED 5/19/04
CASING TYPE/DIAMETER 1" Diameter Schedule 40 PVC
SCREEN TYPE/SLOT 1" Diameter Schedule 40 PVC, 0.01" machine slot
GRAVEL PACK TYPE N/A
GROUT TYPE/QUANTITY N/A
DEPTH TO WATER
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
34.4		40	CORE 1					MULCH ground-cover	
								FILL; sampled as brown SAND, fine to medium grained, roots, dry. Collected surface soil sample for laboratory analysis.	
51		40	CORE 2		5			grades with some fine to coarse gravel.	
37.4		40	CORE 3		10			SAND; brown, fine to medium grained, little fine to coarse gravel, moist.	
24.1		24	CORE 4		15	SM			
55.4		30	CORE 5			SM		SAND; fine to medium grained, brown, seams of fine to coarse gravel, moist. Collected soil sample from 18.5' to 19' bgs for laboratory analysis.	
22.1		48	CORE 6		20			SAND; fine grained, some silt, trace of fine gravel, brown, wet.	

Continued Next Page

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048 **BORING/WELL NUMBER** B-8

PROJECT NAME Worcester Commons **DATE DRILLED** 5/19/04

Continued from Previous Page

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
						SM			
								Geoprobe terminated at 24' bgs; Set temporary 1" PVC piezometer with 5' screen at 27' bgs. Collected groundwater sample for laboratory analysis.	

URS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 15260048
PROJECT NAME Worcester Commons
LOCATION Worcester, MA
DRILLING METHOD Geo Probe 54 DT, Direct Push
SAMPLING METHOD 4' Macro Liner
GROUND ELEVATION
TOP OF CASING
LOGGED BY A. Pollock
REMARKS Drilled by Geosearch, Inc.

BORING/WELL NUMBER B-9
DATE DRILLED 5/19/04
CASING TYPE/DIAMETER 1" Diameter Schedule 40 PVC
SCREEN TYPE/SLOT 1" Diameter Schedule 40 PVC, 0.01" machine slot
GRAVEL PACK TYPE N/A
GROUT TYPE/QUANTITY N/A
DEPTH TO WATER
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	INTERVAL	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	ELEVATION (feet)
55.3		40	CORE 1					TOPSOIL FILL; sampled as brown SAND, fine to medium grained, some silt and fine to coarse gravel, 6" layer of red brick in bottom of core. Collected surface soil sample for laboratory analysis.	
54.3		24	CORE 2		5			8" layer of red brick, dry.	
62.7		48	CORE 3		10			SAND; brown, fine grained, orange mottling, 8" of red brick, slightly moist.	
55.7		48	CORE 4		15	SM		Collected soil sample from 11.5' to 12' bgs for laboratory analysis. grades wet, with little silt.	
								Geoprobe terminated at 16' bgs; Set temporary 1" PVC piezometer with 5' screen. Collected groundwater sample for laboratory analysis.	

BORING_WELL WORCSTER.GPJ DM_ATLNT.GDT 7/27/04

APPENDIX C

MAY 4, 2004
SOIL AND GROUNDWATER ANALYTICAL DATA

Report Date:
07-May-04 16:29

☐ Final Report
☐ Re-Issued Report
☐ Revised Report

Laboratory Report

URS
400 North Park Town Center, 1000 Abernathy Rd. NE,
Suite 900
Atlanta GA 30328
Attn: Duncan Douglas

Project: Worcester Common - Worcester, MA
Project #: 15260048

Laboratory ID	Client Sample ID	Matrix	Date Sampled	Date Received
SA11919-01	DRAFT: B1	Ground Water	04-May-04 09:45	04-May-04 17:55
SA11919-02	DRAFT: B2	Ground Water	04-May-04 11:18	04-May-04 17:55
SA11919-03	DRAFT: B3	Ground Water	04-May-04 11:55	04-May-04 17:55
SA11919-04	DRAFT: B4	Ground Water	04-May-04 12:55	04-May-04 17:55
SA11919-05	DRAFT: B1	Ground Water	04-May-04 13:45	04-May-04 17:55
SA11919-06	DRAFT: B6	Ground Water	04-May-04 15:50	04-May-04 17:55
SA11919-07	DRAFT: B-1	Soil	04-May-04 09:28	04-May-04 17:55
SA11919-08	DRAFT: B-2	Soil	04-May-04 10:28	04-May-04 17:55
SA11919-09	DRAFT: B-3	Soil	04-May-04 11:28	04-May-04 17:55
SA11919-10	DRAFT: B-4	Soil	04-May-04 12:43	04-May-04 17:55
SA11919-11	DRAFT: B-5	Soil	04-May-04 15:30	04-May-04 17:55
SA11919-12	DRAFT: B-6	Soil	04-May-04 15:55	04-May-04 17:55

I attest that the information contained within the report has been reviewed for accuracy and checked against the quality control requirements for each method. All applicable NELAC requirements have been met.
Please note that this report contains 37 pages of analytical data plus Chain of Custody document(s).
This report may not be reproduced, except in full, without written approval from Spectrum Analytical, Inc.

Massachusetts Certification # M-MA138/MA1110
Connecticut # PH-0777
Florida # E87600
Maine # MA138
New Hampshire # 2538
New York # 11393
Rhode Island # 98
USDA # S-51435

Authorized by:

Hanibal C. Tayeh, Ph.D.
President/Laboratory Director

Please refer to our "Quality" webpage at www.spectrum-analytical.com for a full listing of our current certifications.

CASE NARRATIVE:

The data set for work order SA11919 complies with internal QC criteria for the methods performed. The samples were received @ 4.0 degrees Celsius. An infrared thermometer with a tolerance of +/- 2.0 degrees Celsius was used immediately upon receipt of the samples.

The soil samples collected for VOC analysis, samples -07 through -12, had the VOA containers over-filled. The SW846 5035 and 5030 methods require that the solvent to sample ration be 1:1 and there must be sufficient solvent covering the sample. The samples preserved in sodium bisulfate could no be used for analysis due to the amount of sample in the container, there was no visible solvent left. Due to the excessive amount of sample collected into the methanol VOA containers, the solvent may not have accurately extracted the compounds of interest into the solvent phase.

Sampling tips and guidelines are available on our website at www.spectrum-analytical.com. Please refer to "Notes and Definitions" for all sample/analyte qualifiers.

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B1	15260048	Ground Water	04-May-04 09:45	04-May-04
SA11919-01				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
Volatile Organic Compounds by SW846 8260B		Prepared by method		Volatiles					
Acetone	BRL	20.0 ug/l	1	SW846 8260B	06-May-04	06-May-04	4050323	RLJ	
Acrylonitrile	BRL	1.0 ug/l	1	"	"	"	"	"	
Benzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromochloromethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromodichloromethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromoform	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromomethane	BRL	2.0 ug/l	1	"	"	"	"	"	
2-Butanone (MEK)	BRL	10.0 ug/l	1	"	"	"	"	"	
n-Butylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
sec-Butylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
tert-Butylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Carbon disulfide	BRL	5.0 ug/l	1	"	"	"	"	"	
Carbon tetrachloride	BRL	1.0 ug/l	1	"	"	"	"	"	
Chlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Chloroethane	BRL	2.0 ug/l	1	"	"	"	"	"	
Chloroform	30.1	1.0 ug/l	1	"	"	"	"	"	**Z-2**
Chloromethane	BRL	2.0 ug/l	1	"	"	"	"	"	
2-Chlorotoluene	BRL	1.0 ug/l	1	"	"	"	"	"	
4-Chlorotoluene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	BRL	2.0 ug/l	1	"	"	"	"	"	
Dibromochloromethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dibromoethane (EDB)	BRL	1.0 ug/l	1	"	"	"	"	"	
Dibromomethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3-Dichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,4-Dichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Dichlorodifluoromethane (Freon12)	BRL	2.0 ug/l	1	"	"	"	"	"	
1,1-Dichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1-Dichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
cis-1,2-Dichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
trans-1,2-Dichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3-Dichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
2,2-Dichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1-Dichloropropene	BRL	1.0 ug/l	1	"	"	"	"	"	
cis-1,3-Dichloropropene	BRL	1.0 ug/l	1	"	"	"	"	"	
trans-1,3-Dichloropropene	BRL	1.0 ug/l	1	"	"	"	"	"	
Ethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Hexachlorobutadiene	BRL	1.0 ug/l	1	"	"	"	"	"	
2-Hexanone (MBK)	BRL	10.0 ug/l	1	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B1	15260048	Ground Water	04-May-04 09:45	04-May-04
SA11919-01				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
Volatile Organic Compounds by SW846 8260B		Prepared by method		Volatiles					
Isopropylbenzene	BRL	1.0 ug/l	1	SW846 8260B	06-May-04	06-May-04	4050323	RLJ	
4-Isopropyltoluene	BRL	1.0 ug/l	1	"	"	"	"	"	
Methyl tert-butyl ether	BRL	1.0 ug/l	1	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	BRL	10.0 ug/l	1	"	"	"	"	"	
Methylene chloride	BRL	10.0 ug/l	1	"	"	"	"	"	
Naphthalene	BRL	1.0 ug/l	1	"	"	"	"	"	
n-Propylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Styrene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Tetrachloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
Toluene	1.5	1.0 ug/l	1	"	"	"	"	"	**Z-2**
1,2,3-Trichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,4-Trichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,1-Trichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,2-Trichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Trichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
Trichlorofluoromethane (Freon 11)	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,3-Trichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,4-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3,5-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Vinyl chloride	BRL	1.0 ug/l	1	"	"	"	"	"	
m,p-Xylene	BRL	2.0 ug/l	1	"	"	"	"	"	
o-Xylene	BRL	1.0 ug/l	1	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	*90.3*	*70-130 %*		"	"	"	"	"	
Surrogate: Toluene-d8	*96.7*	*70-130 %*		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	*106*	*70-130 %*		"	"	"	"	"	
Surrogate: Dibromofluoromethane	*102*	*70-130 %*		"	"	"	"	"	
VPH Aliphatic/Aromatic Carbon Ranges		Prepared by method		Volatiles					
C5-C8 Aliphatic Hydrocarbons	BRL	0.0750 mg/l	1	MA VPH 97-12	05-May-04	05-May-04	4050248	SS	
C9-C12 Aliphatic Hydrocarbons	BRL	0.0250 mg/l	1	"	"	"	"	"	
C9-C10 Aromatic Hydrocarbons	BRL	0.0250 mg/l	1	"	"	"	"	"	
Unadjusted C5-C8 Aliphatic Hydrocarbons	BRL	0.0750 mg/l	1	"	"	"	"	"	
Unadjusted C9-C12 Aliphatic Hydrocarbons	BRL	0.0250 mg/l	1	"	"	"	"	"	
VPH Target Analytes		Prepared by method		Volatiles					
Benzene	BRL	5.0 ug/l	1	"	"	"	"	"	
Ethylbenzene	BRL	5.0 ug/l	1	"	"	"	"	"	
Methyl tert-butyl ether	BRL	5.0 ug/l	1	"	"	"	"	"	
Naphthalene	BRL	5.0 ug/l	1	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B1	15260048	Ground Water	04-May-04 09:45	04-May-04
SA11919-01				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VPH Target Analytes		Prepared by method		Volatiles					
Toluene	BRL	5.0 ug/l	1	MA VPH 97-12	05-May-04	05-May-04	4050248	SS	
m,p-Xylene	BRL	10.0 ug/l	1	"	"	"	"	"	
o-Xylene	BRL	5.0 ug/l	1	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*70-130 %*		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (GCMS)		*70-130 %*		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (FID)	*99.8*	*70-130 %*		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (PID)	*95.6*	*70-130 %*		"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B2	15260048	Ground Water	04-May-04 11:18	04-May-04
SA11919-02				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
Volatile Organic Compounds by SW846 8260B		Prepared by method		Volatiles					
Acetone	BRL	20.0 ug/l	1	SW846 8260B	07-May-04	07-May-04	4050416	RLJ	
Acrylonitrile	BRL	1.0 ug/l	1	"	"	"	"	"	
Benzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromochloromethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromodichloromethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromoform	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromomethane	BRL	2.0 ug/l	1	"	"	"	"	"	
2-Butanone (MEK)	BRL	10.0 ug/l	1	"	"	"	"	"	
n-Butylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
sec-Butylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
tert-Butylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Carbon disulfide	BRL	5.0 ug/l	1	"	"	"	"	"	
Carbon tetrachloride	BRL	1.0 ug/l	1	"	"	"	"	"	
Chlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Chloroethane	BRL	2.0 ug/l	1	"	"	"	"	"	
Chloroform	17.9	1.0 ug/l	1	"	"	"	"	"	
Chloromethane	BRL	2.0 ug/l	1	"	"	"	"	"	
2-Chlorotoluene	BRL	1.0 ug/l	1	"	"	"	"	"	
4-Chlorotoluene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	BRL	2.0 ug/l	1	"	"	"	"	"	
Dibromochloromethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dibromoethane (EDB)	BRL	1.0 ug/l	1	"	"	"	"	"	
Dibromomethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3-Dichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,4-Dichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Dichlorodifluoromethane (Freon12)	BRL	2.0 ug/l	1	"	"	"	"	"	
1,1-Dichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1-Dichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
cis-1,2-Dichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
trans-1,2-Dichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3-Dichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
2,2-Dichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1-Dichloropropene	BRL	1.0 ug/l	1	"	"	"	"	"	
cis-1,3-Dichloropropene	BRL	1.0 ug/l	1	"	"	"	"	"	
trans-1,3-Dichloropropene	BRL	1.0 ug/l	1	"	"	"	"	"	
Ethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Hexachlorobutadiene	BRL	1.0 ug/l	1	"	"	"	"	"	
2-Hexanone (MBK)	BRL	10.0 ug/l	1	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B2	15260048	Ground Water	04-May-04 11:18	04-May-04
SA11919-02				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
Volatile Organic Compounds by SW846 8260B		Prepared by method		Volatiles					
Isopropylbenzene	BRL	1.0 ug/l	1	SW846 8260B	07-May-04	07-May-04	4050416	RLJ	
4-Isopropyltoluene	BRL	1.0 ug/l	1	"	"	"	"	"	
Methyl tert-butyl ether	BRL	1.0 ug/l	1	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	BRL	10.0 ug/l	1	"	"	"	"	"	
Methylene chloride	BRL	10.0 ug/l	1	"	"	"	"	"	
Naphthalene	BRL	1.0 ug/l	1	"	"	"	"	"	
n-Propylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Styrene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Tetrachloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
Toluene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,3-Trichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,4-Trichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,1-Trichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,2-Trichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Trichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
Trichlorofluoromethane (Freon 11)	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,3-Trichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,4-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3,5-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Vinyl chloride	BRL	1.0 ug/l	1	"	"	"	"	"	
m,p-Xylene	BRL	2.0 ug/l	1	"	"	"	"	"	
o-Xylene	BRL	1.0 ug/l	1	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	*92.0*	*70-130 %*		"	"	"	"	"	
Surrogate: Toluene-d8	*95.3*	*70-130 %*		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	*115*	*70-130 %*		"	"	"	"	"	
Surrogate: Dibromofluoromethane	*110*	*70-130 %*		"	"	"	"	"	
VPH Aliphatic/Aromatic Carbon Ranges		Prepared by method		Volatiles					
C5-C8 Aliphatic Hydrocarbons	BRL	0.0750 mg/l	1	MA VPH 97-12	05-May-04	05-May-04	4050248	SS	
C9-C12 Aliphatic Hydrocarbons	BRL	0.0250 mg/l	1	"	"	"	"	"	
C9-C10 Aromatic Hydrocarbons	BRL	0.0250 mg/l	1	"	"	"	"	"	
Unadjusted C5-C8 Aliphatic Hydrocarbons	BRL	0.0750 mg/l	1	"	"	"	"	"	
Unadjusted C9-C12 Aliphatic Hydrocarbons	BRL	0.0250 mg/l	1	"	"	"	"	"	
VPH Target Analytes		Prepared by method		Volatiles					
Benzene	BRL	5.0 ug/l	1	"	"	"	"	"	
Ethylbenzene	BRL	5.0 ug/l	1	"	"	"	"	"	
Methyl tert-butyl ether	BRL	5.0 ug/l	1	"	"	"	"	"	
Naphthalene	BRL	5.0 ug/l	1	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B2	15260048	Ground Water	04-May-04 11:18	04-May-04
SA11919-02				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VPH Target Analytes		Prepared by method		Volatiles					
Toluene	BRL	5.0 ug/l	1	MA VPH 97-12	05-May-04	05-May-04	4050248	SS	
m,p-Xylene	BRL	10.0 ug/l	1	"	"	"	"	"	
o-Xylene	BRL	5.0 ug/l	1	"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (FID)	*105*	*70-130 %*		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (PID)	*97.8*	*70-130 %*		"	"	"	"	"	
DRAFT: Total Metals by EPA 200 Series Methods									
Silver	BRL	0.0500 mg/l	1	EPA 200.7	06-May-04	06-May-04	4050341	HB	
Arsenic	0.922	0.0400 mg/l	1	"	"	"	"	"	
Beryllium	0.0125	0.0100 mg/l	1	"	"	"	"	"	
Cadmium	BRL	0.0125 mg/l	1	"	"	"	"	"	
Chromium	0.882	0.0250 mg/l	1	"	"	"	"	"	
Copper	0.512	0.0250 mg/l	1	"	"	"	"	"	
Mercury	0.00128	0.00020 mg/l	1	EPA 245.2/7470A	"	07-May-04	4050342	YP	
Nickel	0.654	0.0250 mg/l	1	EPA 200.7	"	06-May-04	4050341	HB	
Lead	0.390	0.0375 mg/l	1	"	"	"	"	"	
Antimony	BRL	0.0600 mg/l	1	"	"	"	"	"	
Selenium	BRL	0.0750 mg/l	1	"	"	"	"	"	
Thallium	BRL	0.0500 mg/l	1	"	"	"	"	"	
Zinc	1.12	0.0250 mg/l	1	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B3	15260048	Ground Water	04-May-04 11:55	04-May-04
SA11919-03				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
Volatile Organic Compounds by SW846 8260B		Prepared by method		Volatiles					
Acetone	BRL	20.0 ug/l	1	SW846 8260B	06-May-04	06-May-04	4050323	RLJ	
Acrylonitrile	BRL	1.0 ug/l	1	"	"	"	"	"	
Benzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromochloromethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromodichloromethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromoform	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromomethane	BRL	2.0 ug/l	1	"	"	"	"	"	
2-Butanone (MEK)	BRL	10.0 ug/l	1	"	"	"	"	"	
n-Butylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
sec-Butylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
tert-Butylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Carbon disulfide	BRL	5.0 ug/l	1	"	"	"	"	"	
Carbon tetrachloride	BRL	1.0 ug/l	1	"	"	"	"	"	
Chlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Chloroethane	BRL	2.0 ug/l	1	"	"	"	"	"	
Chloroform	BRL	1.0 ug/l	1	"	"	"	"	"	
Chloromethane	BRL	2.0 ug/l	1	"	"	"	"	"	
2-Chlorotoluene	BRL	1.0 ug/l	1	"	"	"	"	"	
4-Chlorotoluene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	BRL	2.0 ug/l	1	"	"	"	"	"	
Dibromochloromethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dibromoethane (EDB)	BRL	1.0 ug/l	1	"	"	"	"	"	
Dibromomethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3-Dichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,4-Dichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Dichlorodifluoromethane (Freon12)	BRL	2.0 ug/l	1	"	"	"	"	"	
1,1-Dichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1-Dichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
cis-1,2-Dichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
trans-1,2-Dichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3-Dichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
2,2-Dichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1-Dichloropropene	BRL	1.0 ug/l	1	"	"	"	"	"	
cis-1,3-Dichloropropene	BRL	1.0 ug/l	1	"	"	"	"	"	
trans-1,3-Dichloropropene	BRL	1.0 ug/l	1	"	"	"	"	"	
Ethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Hexachlorobutadiene	BRL	1.0 ug/l	1	"	"	"	"	"	
2-Hexanone (MBK)	BRL	10.0 ug/l	1	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B3	15260048	Ground Water	04-May-04 11:55	04-May-04
SA11919-03				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
Volatile Organic Compounds by SW846 8260B		Prepared by method		Volatiles					
Isopropylbenzene	BRL	1.0 ug/l	1	SW846 8260B	06-May-04	06-May-04	4050323	RLJ	
4-Isopropyltoluene	BRL	1.0 ug/l	1	"	"	"	"	"	
Methyl tert-butyl ether	BRL	1.0 ug/l	1	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	BRL	10.0 ug/l	1	"	"	"	"	"	
Methylene chloride	BRL	10.0 ug/l	1	"	"	"	"	"	
Naphthalene	BRL	1.0 ug/l	1	"	"	"	"	"	
n-Propylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Styrene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Tetrachloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
Toluene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,3-Trichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,4-Trichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,1-Trichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,2-Trichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Trichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
Trichlorofluoromethane (Freon 11)	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,3-Trichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,4-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3,5-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Vinyl chloride	BRL	1.0 ug/l	1	"	"	"	"	"	
m,p-Xylene	BRL	2.0 ug/l	1	"	"	"	"	"	
o-Xylene	BRL	1.0 ug/l	1	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	*91.7*	*70-130 %*		"	"	"	"	"	
Surrogate: Toluene-d8	*96.0*	*70-130 %*		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	*112*	*70-130 %*		"	"	"	"	"	
Surrogate: Dibromofluoromethane	*105*	*70-130 %*		"	"	"	"	"	
VPH Aliphatic/Aromatic Carbon Ranges		Prepared by method		Volatiles					
C5-C8 Aliphatic Hydrocarbons	BRL	0.0750 mg/l	1	MA VPH 97-12	05-May-04	05-May-04	4050248	SS	
C9-C12 Aliphatic Hydrocarbons	BRL	0.0250 mg/l	1	"	"	"	"	"	
C9-C10 Aromatic Hydrocarbons	BRL	0.0250 mg/l	1	"	"	"	"	"	
Unadjusted C5-C8 Aliphatic Hydrocarbons	BRL	0.0750 mg/l	1	"	"	"	"	"	
Unadjusted C9-C12 Aliphatic Hydrocarbons	BRL	0.0250 mg/l	1	"	"	"	"	"	
VPH Target Analytes		Prepared by method		Volatiles					
Benzene	BRL	5.0 ug/l	1	"	"	"	"	"	
Ethylbenzene	BRL	5.0 ug/l	1	"	"	"	"	"	
Methyl tert-butyl ether	BRL	5.0 ug/l	1	"	"	"	"	"	
Naphthalene	BRL	5.0 ug/l	1	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B3	15260048	Ground Water	04-May-04 11:55	04-May-04
SA11919-03				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VPH Target Analytes		Prepared by method		Volatiles					
Toluene	BRL	5.0 ug/l	1	MA VPH 97-12	05-May-04	05-May-04	4050248	SS	
m,p-Xylene	BRL	10.0 ug/l	1	"	"	"	"	"	
o-Xylene	BRL	5.0 ug/l	1	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*70-130 %*		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (GCMS)		*70-130 %*		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (FID)	*97.4*	*70-130 %*		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (PID)	*96.0*	*70-130 %*		"	"	"	"	"	
DRAFT: Total Metals by EPA 200 Series Methods									
Silver	BRL	0.0500 mg/l	1	EPA 200.7	06-May-04	06-May-04	4050341	HB	
Arsenic	2.96	0.0400 mg/l	1	"	"	"	"	"	
Beryllium	0.0452	0.0100 mg/l	1	"	"	"	"	"	
Cadmium	BRL	0.0125 mg/l	1	"	"	"	"	"	
Chromium	2.44	0.0250 mg/l	1	"	"	"	"	"	
Copper	1.82	0.0250 mg/l	1	"	"	"	"	"	
Mercury	0.00715	0.00020 mg/l	1	EPA 245.2/7470A	"	07-May-04	4050342	YP	
Nickel	2.08	0.0250 mg/l	1	EPA 200.7	"	06-May-04	4050341	HB	
Lead	1.85	0.0375 mg/l	1	"	"	"	"	"	
Antimony	BRL	0.0600 mg/l	1	"	"	"	"	"	
Selenium	BRL	0.0750 mg/l	1	"	"	"	"	"	
Thallium	BRL	0.0500 mg/l	1	"	"	"	"	"	
Zinc	3.92	0.0250 mg/l	1	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B4	15260048	Ground Water	04-May-04 12:55	04-May-04
SA11919-04				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
Volatile Organic Compounds by SW846 8260B		Prepared by method		Volatiles					
Acetone	BRL	20.0 ug/l	1	SW846 8260B	06-May-04	06-May-04	4050323	RLJ	
Acrylonitrile	BRL	1.0 ug/l	1	"	"	"	"	"	
Benzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromochloromethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromodichloromethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromoform	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromomethane	BRL	2.0 ug/l	1	"	"	"	"	"	
2-Butanone (MEK)	BRL	10.0 ug/l	1	"	"	"	"	"	
n-Butylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
sec-Butylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
tert-Butylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Carbon disulfide	BRL	5.0 ug/l	1	"	"	"	"	"	
Carbon tetrachloride	BRL	1.0 ug/l	1	"	"	"	"	"	
Chlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Chloroethane	BRL	2.0 ug/l	1	"	"	"	"	"	
Chloroform	BRL	1.0 ug/l	1	"	"	"	"	"	
Chloromethane	BRL	2.0 ug/l	1	"	"	"	"	"	
2-Chlorotoluene	BRL	1.0 ug/l	1	"	"	"	"	"	
4-Chlorotoluene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	BRL	2.0 ug/l	1	"	"	"	"	"	
Dibromochloromethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dibromoethane (EDB)	BRL	1.0 ug/l	1	"	"	"	"	"	
Dibromomethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3-Dichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,4-Dichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Dichlorodifluoromethane (Freon12)	BRL	2.0 ug/l	1	"	"	"	"	"	
1,1-Dichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1-Dichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
cis-1,2-Dichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
trans-1,2-Dichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3-Dichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
2,2-Dichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1-Dichloropropene	BRL	1.0 ug/l	1	"	"	"	"	"	
cis-1,3-Dichloropropene	BRL	1.0 ug/l	1	"	"	"	"	"	
trans-1,3-Dichloropropene	BRL	1.0 ug/l	1	"	"	"	"	"	
Ethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Hexachlorobutadiene	BRL	1.0 ug/l	1	"	"	"	"	"	
2-Hexanone (MBK)	BRL	10.0 ug/l	1	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B4	15260048	Ground Water	04-May-04 12:55	04-May-04
SA11919-04				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
Volatile Organic Compounds by SW846 8260B		Prepared by method		Volatiles					
Isopropylbenzene	BRL	1.0 ug/l	1	SW846 8260B	06-May-04	06-May-04	4050323	RLJ	
4-Isopropyltoluene	BRL	1.0 ug/l	1	"	"	"	"	"	
Methyl tert-butyl ether	BRL	1.0 ug/l	1	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	BRL	10.0 ug/l	1	"	"	"	"	"	
Methylene chloride	BRL	10.0 ug/l	1	"	"	"	"	"	
Naphthalene	BRL	1.0 ug/l	1	"	"	"	"	"	
n-Propylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Styrene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Tetrachloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
Toluene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,3-Trichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,4-Trichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,1-Trichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,2-Trichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Trichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
Trichlorofluoromethane (Freon 11)	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,3-Trichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,4-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3,5-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Vinyl chloride	BRL	1.0 ug/l	1	"	"	"	"	"	
m,p-Xylene	BRL	2.0 ug/l	1	"	"	"	"	"	
o-Xylene	BRL	1.0 ug/l	1	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	*90.0*	*70-130 %*		"	"	"	"	"	
Surrogate: Toluene-d8	*96.0*	*70-130 %*		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	*112*	*70-130 %*		"	"	"	"	"	
Surrogate: Dibromofluoromethane	*107*	*70-130 %*		"	"	"	"	"	
VPH Aliphatic/Aromatic Carbon Ranges		Prepared by method		Volatiles					
C5-C8 Aliphatic Hydrocarbons	BRL	0.0750 mg/l	1	MA VPH 97-12	05-May-04	05-May-04	4050248	SS	
C9-C12 Aliphatic Hydrocarbons	BRL	0.0250 mg/l	1	"	"	"	"	"	
C9-C10 Aromatic Hydrocarbons	BRL	0.0250 mg/l	1	"	"	"	"	"	
Unadjusted C5-C8 Aliphatic Hydrocarbons	BRL	0.0750 mg/l	1	"	"	"	"	"	
Unadjusted C9-C12 Aliphatic Hydrocarbons	BRL	0.0250 mg/l	1	"	"	"	"	"	
VPH Target Analytes		Prepared by method		Volatiles					
Benzene	BRL	5.0 ug/l	1	"	"	"	"	"	
Ethylbenzene	BRL	5.0 ug/l	1	"	"	"	"	"	
Methyl tert-butyl ether	BRL	5.0 ug/l	1	"	"	"	"	"	
Naphthalene	BRL	5.0 ug/l	1	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B4	15260048	Ground Water	04-May-04 12:55	04-May-04
SA11919-04				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VPH Target Analytes		Prepared by method		Volatiles					
Toluene	BRL	5.0 ug/l	1	MA VPH 97-12	05-May-04	05-May-04	4050248	SS	
m,p-Xylene	BRL	10.0 ug/l	1	"	"	"	"	"	
o-Xylene	BRL	5.0 ug/l	1	"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (FID)	*102*	*70-130 %*		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (PID)	*92.0*	*70-130 %*		"	"	"	"	"	
DRAFT: Total Metals by EPA 200 Series Methods									
Silver	BRL	0.0500 mg/l	1	EPA 200.7	06-May-04	06-May-04	4050341	HB	
Arsenic	2.68	0.0400 mg/l	1	"	"	"	"	"	
Beryllium	0.0318	0.0100 mg/l	1	"	"	"	"	"	
Cadmium	BRL	0.0125 mg/l	1	"	"	"	"	"	
Chromium	1.24	0.0250 mg/l	1	"	"	"	"	"	
Copper	0.937	0.0250 mg/l	1	"	"	"	"	"	
Mercury	BRL	0.00020 mg/l	1	EPA 245.2/7470A	"	07-May-04	4050342	YP	
Nickel	1.13	0.0250 mg/l	1	EPA 200.7	"	06-May-04	4050341	HB	
Lead	0.507	0.0375 mg/l	1	"	"	"	"	"	
Antimony	BRL	0.0600 mg/l	1	"	"	"	"	"	
Selenium	BRL	0.0750 mg/l	1	"	"	"	"	"	
Thallium	BRL	0.0500 mg/l	1	"	"	"	"	"	
Zinc	1.80	0.0250 mg/l	1	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B1	15260048	Ground Water	04-May-04 13:45	04-May-04
SA11919-05				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Total Metals by EPA 200 Series Methods									
Silver	BRL	0.0500 mg/l	1	EPA 200.7	06-May-04	06-May-04	4050341	HB	
Arsenic	2.35	0.0400 mg/l	1	"	"	"	"	"	
Beryllium	0.0425	0.0100 mg/l	1	"	"	"	"	"	
Cadmium	BRL	0.0125 mg/l	1	"	"	"	"	"	
Chromium	2.46	0.0250 mg/l	1	"	"	"	"	"	
Copper	1.84	0.0250 mg/l	1	"	"	"	"	"	
Mercury	0.00029	0.00020 mg/l	1	EPA 245.2/7470A	"	07-May-04	4050342	YP	
Nickel	2.37	0.0250 mg/l	1	EPA 200.7	"	06-May-04	4050341	HB	
Lead	0.698	0.0375 mg/l	1	"	"	"	"	"	
Antimony	BRL	0.0600 mg/l	1	"	"	"	"	"	
Selenium	BRL	0.0750 mg/l	1	"	"	"	"	"	
Thallium	BRL	0.0500 mg/l	1	"	"	"	"	"	
Zinc	4.04	0.0250 mg/l	1	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B6	15260048	Ground Water	04-May-04 15:50	04-May-04
SA11919-06				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
Volatile Organic Compounds by SW846 8260B		Prepared by method		Volatiles					
Acetone	BRL	20.0 ug/l	1	SW846 8260B	06-May-04	06-May-04	4050323	RLJ	
Acrylonitrile	BRL	1.0 ug/l	1	"	"	"	"	"	
Benzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromochloromethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromodichloromethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromoform	BRL	1.0 ug/l	1	"	"	"	"	"	
Bromomethane	BRL	2.0 ug/l	1	"	"	"	"	"	
2-Butanone (MEK)	BRL	10.0 ug/l	1	"	"	"	"	"	
n-Butylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
sec-Butylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
tert-Butylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Carbon disulfide	BRL	5.0 ug/l	1	"	"	"	"	"	
Carbon tetrachloride	BRL	1.0 ug/l	1	"	"	"	"	"	
Chlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Chloroethane	BRL	2.0 ug/l	1	"	"	"	"	"	
Chloroform	1.0	1.0 ug/l	1	"	"	"	"	"	
Chloromethane	BRL	2.0 ug/l	1	"	"	"	"	"	
2-Chlorotoluene	BRL	1.0 ug/l	1	"	"	"	"	"	
4-Chlorotoluene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	BRL	2.0 ug/l	1	"	"	"	"	"	
Dibromochloromethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dibromoethane (EDB)	BRL	1.0 ug/l	1	"	"	"	"	"	
Dibromomethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3-Dichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,4-Dichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Dichlorodifluoromethane (Freon12)	BRL	2.0 ug/l	1	"	"	"	"	"	
1,1-Dichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1-Dichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
cis-1,2-Dichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
trans-1,2-Dichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2-Dichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3-Dichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
2,2-Dichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1-Dichloropropene	BRL	1.0 ug/l	1	"	"	"	"	"	
cis-1,3-Dichloropropene	BRL	1.0 ug/l	1	"	"	"	"	"	
trans-1,3-Dichloropropene	BRL	1.0 ug/l	1	"	"	"	"	"	
Ethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Hexachlorobutadiene	BRL	1.0 ug/l	1	"	"	"	"	"	
2-Hexanone (MBK)	BRL	10.0 ug/l	1	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B6	15260048	Ground Water	04-May-04 15:50	04-May-04
SA11919-06				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
Volatile Organic Compounds by SW846 8260B		Prepared by method		Volatiles					
Isopropylbenzene	BRL	1.0 ug/l	1	SW846 8260B	06-May-04	06-May-04	4050323	RLJ	
4-Isopropyltoluene	BRL	1.0 ug/l	1	"	"	"	"	"	
Methyl tert-butyl ether	BRL	1.0 ug/l	1	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	BRL	10.0 ug/l	1	"	"	"	"	"	
Methylene chloride	BRL	10.0 ug/l	1	"	"	"	"	"	
Naphthalene	5.0	1.0 ug/l	1	"	"	"	"	"	
n-Propylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Styrene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Tetrachloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
Toluene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,3-Trichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,4-Trichlorobenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,1-Trichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,1,2-Trichloroethane	BRL	1.0 ug/l	1	"	"	"	"	"	
Trichloroethene	BRL	1.0 ug/l	1	"	"	"	"	"	
Trichlorofluoromethane (Freon 11)	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,3-Trichloropropane	BRL	1.0 ug/l	1	"	"	"	"	"	
1,2,4-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
1,3,5-Trimethylbenzene	BRL	1.0 ug/l	1	"	"	"	"	"	
Vinyl chloride	BRL	1.0 ug/l	1	"	"	"	"	"	
m,p-Xylene	BRL	2.0 ug/l	1	"	"	"	"	"	
o-Xylene	BRL	1.0 ug/l	1	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	*92.3*	*70-130 %*		"	"	"	"	"	
Surrogate: Toluene-d8	*96.7*	*70-130 %*		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	*117*	*70-130 %*		"	"	"	"	"	
Surrogate: Dibromofluoromethane	*111*	*70-130 %*		"	"	"	"	"	
VPH Aliphatic/Aromatic Carbon Ranges		Prepared by method		Volatiles					
C5-C8 Aliphatic Hydrocarbons	BRL	0.0750 mg/l	1	MA VPH 97-12	05-May-04	05-May-04	4050248	SS	
C9-C12 Aliphatic Hydrocarbons	BRL	0.0250 mg/l	1	"	"	"	"	"	
C9-C10 Aromatic Hydrocarbons	BRL	0.0250 mg/l	1	"	"	"	"	"	
Unadjusted C5-C8 Aliphatic Hydrocarbons	BRL	0.0750 mg/l	1	"	"	"	"	"	
Unadjusted C9-C12 Aliphatic Hydrocarbons	BRL	0.0250 mg/l	1	"	"	"	"	"	
VPH Target Analytes		Prepared by method		Volatiles					
Benzene	BRL	5.0 ug/l	1	"	"	"	"	"	
Ethylbenzene	BRL	5.0 ug/l	1	"	"	"	"	"	
Methyl tert-butyl ether	BRL	5.0 ug/l	1	"	"	"	"	"	
Naphthalene	BRL	5.0 ug/l	1	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B6	15260048	Ground Water	04-May-04 15:50	04-May-04
SA11919-06				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VPH Target Analytes		Prepared by method		Volatiles					
Toluene	BRL	5.0 ug/l	1	MA VPH 97-12	05-May-04	05-May-04	4050248	SS	
m,p-Xylene	BRL	10.0 ug/l	1	"	"	"	"	"	
o-Xylene	BRL	5.0 ug/l	1	"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (FID)	*105*	*70-130 %*		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (PID)	*102*	*70-130 %*		"	"	"	"	"	
DRAFT: Total Metals by EPA 200 Series Methods									
Silver	BRL	0.0500 mg/l	1	EPA 200.7	06-May-04	06-May-04	4050341	HB	
Arsenic	2.50	0.0400 mg/l	1	"	"	"	"	"	
Beryllium	0.0150	0.0100 mg/l	1	"	"	"	"	"	
Cadmium	BRL	0.0125 mg/l	1	"	"	"	"	"	
Chromium	1.00	0.0250 mg/l	1	"	"	"	"	"	
Copper	1.08	0.0250 mg/l	1	"	"	"	"	"	
Mercury	0.00033	0.00020 mg/l	1	EPA 245.2/7470A	"	07-May-04	4050342	YP	
Nickel	2.14	0.0250 mg/l	1	EPA 200.7	"	06-May-04	4050341	HB	
Lead	0.385	0.0375 mg/l	1	"	"	"	"	"	
Antimony	BRL	0.0600 mg/l	1	"	"	"	"	"	
Selenium	BRL	0.0750 mg/l	1	"	"	"	"	"	
Thallium	BRL	0.0500 mg/l	1	"	"	"	"	"	
Zinc	1.49	0.0250 mg/l	1	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-1	15260048	Soil	04-May-04 09:28	04-May-04
SA11919-07				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VOC Extraction	Field Extracted	N/A	1	VOC	05-May-04	05-May-04	4050331	LN	
Volatile Organic Compounds by SW846 8260B		Prepared by method		SW846 5030 Soil MS					VOC10
Acetone	BRL	545 ug/kg dry	50	SW846 8260B	06-May-04	06-May-04	4050322	tim	
Acrylonitrile	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Benzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Bromobenzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Bromochloromethane	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Bromodichloromethane	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Bromoform	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Bromomethane	BRL	54.5 ug/kg dry	50	"	"	"	"	"	
2-Butanone (MEK)	BRL	272 ug/kg dry	50	"	"	"	"	"	
n-Butylbenzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
sec-Butylbenzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
tert-Butylbenzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Carbon disulfide	BRL	136 ug/kg dry	50	"	"	"	"	"	
Carbon tetrachloride	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Chlorobenzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Chloroethane	BRL	54.5 ug/kg dry	50	"	"	"	"	"	
Chloroform	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Chloromethane	BRL	54.5 ug/kg dry	50	"	"	"	"	"	
2-Chlorotoluene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
4-Chlorotoluene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	BRL	54.5 ug/kg dry	50	"	"	"	"	"	
Dibromochloromethane	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,2-Dibromoethane (EDB)	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Dibromomethane	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,2-Dichlorobenzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,3-Dichlorobenzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,4-Dichlorobenzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Dichlorodifluoromethane (Freon12)	BRL	54.5 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloroethane	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,2-Dichloroethane	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloroethene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
cis-1,2-Dichloroethene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
trans-1,2-Dichloroethene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,2-Dichloropropane	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,3-Dichloropropane	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
2,2-Dichloropropane	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloropropene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
cis-1,3-Dichloropropene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
trans-1,3-Dichloropropene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Ethylbenzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Hexachlorobutadiene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-1	15260048	Soil	04-May-04 09:28	04-May-04
SA11919-07				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
Volatile Organic Compounds by SW846 8260B		Prepared by method		SW846 5030 Soil MS					VOC10
2-Hexanone (MBK)	BRL	272 ug/kg dry	50	SW846 8260B	06-May-04	06-May-04	4050322	tim	
Isopropylbenzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
4-Isopropyltoluene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Methyl tert-butyl ether	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	BRL	272 ug/kg dry	50	"	"	"	"	"	
Methylene chloride	BRL	272 ug/kg dry	50	"	"	"	"	"	
Naphthalene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
n-Propylbenzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Styrene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Tetrachloroethene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Toluene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,2,3-Trichlorobenzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,2,4-Trichlorobenzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,1,1-Trichloroethane	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,1,2-Trichloroethane	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Trichloroethene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Trichlorofluoromethane (Freon 11)	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,2,3-Trichloropropane	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,2,4-Trimethylbenzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
1,3,5-Trimethylbenzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Vinyl chloride	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
m,p-Xylene	BRL	54.5 ug/kg dry	50	"	"	"	"	"	
o-Xylene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	*99.2*	*70-130 %*		"	"	"	"	"	
Surrogate: Toluene-d8	*102*	*70-130 %*		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	*93.8*	*70-130 %*		"	"	"	"	"	
Surrogate: Dibromofluoromethane	*99.2*	*70-130 %*		"	"	"	"	"	
VPH Aliphatic/Aromatic Carbon Ranges		Prepared by method		SW846 5030 Soil MS					VOC10
C5-C8 Aliphatic Hydrocarbons	BRL	0.408 mg/kg dry	50	MA VPH 97-12	05-May-04	05-May-04	4050267	ss	
C9-C12 Aliphatic Hydrocarbons	BRL	0.136 mg/kg dry	50	"	"	"	"	"	
C9-C10 Aromatic Hydrocarbons	BRL	0.136 mg/kg dry	50	"	"	"	"	"	
Unadjusted C5-C8 Aliphatic Hydrocarbons	BRL	0.408 mg/kg dry	50	"	"	"	"	"	
Unadjusted C9-C12 Aliphatic Hydrocarbons	BRL	0.136 mg/kg dry	50	"	"	"	"	"	
VPH Target Analytes		Prepared by method		SW846 5030 Soil MS					VOC10
Benzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Ethylbenzene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Methyl tert-butyl ether	BRL	27.2 ug/kg dry	50	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-1	15260048	Soil	04-May-04 09:28	04-May-04
SA11919-07				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VPH Target Analytes		Prepared by method		SW846 5030 Soil MS					VOC10
Naphthalene	BRL	27.2 ug/kg dry	50	MA VPH 97-12	05-May-04	05-May-04	4050267	ss	
Toluene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
m,p-Xylene	BRL	54.5 ug/kg dry	50	"	"	"	"	"	
o-Xylene	BRL	27.2 ug/kg dry	50	"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (FID)	*82.6*	*70-130 %*		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (PID)	*78.4*	*70-130 %*		"	"	"	"	"	
DRAFT: Total Metals by EPA 6000/7000 Series Methods, Prepared by SW846 3050B									
Mercury	BRL	0.198 mg/kg dry	1	SW846 7471A	05-May-04	06-May-04	4050294	YP	
DRAFT: Total Metals by EPA 200 Series Methods									
Silver	BRL	2.24 mg/kg dry	1	EPA 200.7	05-May-04	05-May-04	4050289	CR	
Arsenic	BRL	3.98 mg/kg dry	1	"	"	"	"	"	
Beryllium	BRL	0.449 mg/kg dry	1	"	"	"	"	"	
Cadmium	BRL	0.561 mg/kg dry	1	"	"	"	"	"	
Chromium	10.5	1.12 mg/kg dry	1	"	"	"	"	"	
Copper	10.7	1.12 mg/kg dry	1	"	"	"	"	"	
Nickel	9.58	1.12 mg/kg dry	1	"	"	"	"	"	
Lead	7.95	1.68 mg/kg dry	1	"	"	"	"	"	
Antimony	BRL	3.37 mg/kg dry	1	"	"	"	"	"	
Selenium	BRL	3.37 mg/kg dry	1	"	"	"	"	"	
Thallium	BRL	3.37 mg/kg dry	1	"	"	"	"	"	
Zinc	63.7	1.12 mg/kg dry	1	"	"	"	"	"	
DRAFT: General Chemistry Parameters									
% Solids	80.9	%	1	SM2540 G Mod.	05-May-04	06-May-04	4050264	LN	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-2	15260048	Soil	04-May-04 10:28	04-May-04
SA11919-08				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VOC Extraction	Field Extracted	N/A	1	VOC	05-May-04	05-May-04	4050331	LN	
Volatile Organic Compounds by SW846 8260B		Prepared by method		SW846 5030 Soil MS					VOC10
Acetone	BRL	564 ug/kg dry	50	SW846 8260B	06-May-04	06-May-04	4050322	tim	
Acrylonitrile	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Benzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Bromobenzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Bromochloromethane	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Bromodichloromethane	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Bromoform	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Bromomethane	BRL	56.4 ug/kg dry	50	"	"	"	"	"	
2-Butanone (MEK)	BRL	282 ug/kg dry	50	"	"	"	"	"	
n-Butylbenzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
sec-Butylbenzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
tert-Butylbenzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Carbon disulfide	BRL	141 ug/kg dry	50	"	"	"	"	"	
Carbon tetrachloride	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Chlorobenzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Chloroethane	BRL	56.4 ug/kg dry	50	"	"	"	"	"	
Chloroform	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Chloromethane	BRL	56.4 ug/kg dry	50	"	"	"	"	"	
2-Chlorotoluene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
4-Chlorotoluene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	BRL	56.4 ug/kg dry	50	"	"	"	"	"	
Dibromochloromethane	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,2-Dibromoethane (EDB)	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Dibromomethane	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,2-Dichlorobenzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,3-Dichlorobenzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,4-Dichlorobenzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Dichlorodifluoromethane (Freon12)	BRL	56.4 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloroethane	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,2-Dichloroethane	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloroethene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
cis-1,2-Dichloroethene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
trans-1,2-Dichloroethene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,2-Dichloropropane	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,3-Dichloropropane	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
2,2-Dichloropropane	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloropropene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
cis-1,3-Dichloropropene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
trans-1,3-Dichloropropene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Ethylbenzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Hexachlorobutadiene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-2	15260048	Soil	04-May-04 10:28	04-May-04
SA11919-08				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
Volatile Organic Compounds by SW846 8260B		Prepared by method		SW846 5030 Soil MS					VOC10
2-Hexanone (MBK)	BRL	282 ug/kg dry	50	SW846 8260B	06-May-04	06-May-04	4050322	tim	
Isopropylbenzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
4-Isopropyltoluene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Methyl tert-butyl ether	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	BRL	282 ug/kg dry	50	"	"	"	"	"	
Methylene chloride	BRL	282 ug/kg dry	50	"	"	"	"	"	
Naphthalene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
n-Propylbenzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Styrene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Tetrachloroethene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Toluene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,2,3-Trichlorobenzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,2,4-Trichlorobenzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,1,1-Trichloroethane	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,1,2-Trichloroethane	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Trichloroethene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Trichlorofluoromethane (Freon 11)	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,2,3-Trichloropropane	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,2,4-Trimethylbenzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
1,3,5-Trimethylbenzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Vinyl chloride	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
m,p-Xylene	BRL	56.4 ug/kg dry	50	"	"	"	"	"	
o-Xylene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	*102*	*70-130 %*		"	"	"	"	"	
Surrogate: Toluene-d8	*105*	*70-130 %*		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	*98.0*	*70-130 %*		"	"	"	"	"	
Surrogate: Dibromofluoromethane	*98.4*	*70-130 %*		"	"	"	"	"	
VPH Aliphatic/Aromatic Carbon Ranges		Prepared by method		SW846 5030 Soil MS					VOC10
C5-C8 Aliphatic Hydrocarbons	BRL	0.423 mg/kg dry	50	MA VPH 97-12	05-May-04	05-May-04	4050267	ss	
C9-C12 Aliphatic Hydrocarbons	BRL	0.141 mg/kg dry	50	"	"	"	"	"	
C9-C10 Aromatic Hydrocarbons	BRL	0.141 mg/kg dry	50	"	"	"	"	"	
Unadjusted C5-C8 Aliphatic Hydrocarbons	BRL	0.423 mg/kg dry	50	"	"	"	"	"	
Unadjusted C9-C12 Aliphatic Hydrocarbons	BRL	0.141 mg/kg dry	50	"	"	"	"	"	
VPH Target Analytes		Prepared by method		SW846 5030 Soil MS					VOC10
Benzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Ethylbenzene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Methyl tert-butyl ether	BRL	28.2 ug/kg dry	50	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-2	15260048	Soil	04-May-04 10:28	04-May-04
SA11919-08				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VPH Target Analytes		Prepared by method		SW846 5030 Soil MS					VOC10
Naphthalene	BRL	28.2 ug/kg dry	50	MA VPH 97-12	05-May-04	05-May-04	4050267	ss	
Toluene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
m,p-Xylene	BRL	56.4 ug/kg dry	50	"	"	"	"	"	
o-Xylene	BRL	28.2 ug/kg dry	50	"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (FID)	*75.2*	*70-130 %*		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (PID)	*74.0*	*70-130 %*		"	"	"	"	"	
DRAFT: Total Metals by EPA 6000/7000 Series Methods, Prepared by SW846 3050B									
Mercury	BRL	0.194 mg/kg dry	1	SW846 7471A	05-May-04	06-May-04	4050294	YP	
DRAFT: Total Metals by EPA 200 Series Methods									
Silver	BRL	2.32 mg/kg dry	1	EPA 200.7	05-May-04	05-May-04	4050289	CR	
Arsenic	8.52	3.48 mg/kg dry	1	"	"	"	"	"	
Beryllium	BRL	0.464 mg/kg dry	1	"	"	"	"	"	
Cadmium	BRL	0.580 mg/kg dry	1	"	"	"	"	"	
Chromium	11.2	1.16 mg/kg dry	1	"	"	"	"	"	
Copper	7.20	1.16 mg/kg dry	1	"	"	"	"	"	
Nickel	11.7	1.16 mg/kg dry	1	"	"	"	"	"	
Lead	2.17	1.74 mg/kg dry	1	"	"	"	"	"	
Antimony	BRL	3.48 mg/kg dry	1	"	"	"	"	"	
Selenium	BRL	3.48 mg/kg dry	1	"	"	"	"	"	
Thallium	BRL	3.48 mg/kg dry	1	"	"	"	"	"	
Zinc	21.9	1.16 mg/kg dry	1	"	"	"	"	"	
DRAFT: General Chemistry Parameters									
% Solids	80.9	%	1	SM2540 G Mod.	05-May-04	06-May-04	4050264	LN	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-3	15260048	Soil	04-May-04 11:28	04-May-04
SA11919-09				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VOC Extraction	Field Extracted	N/A	1	VOC	05-May-04	05-May-04	4050331	LN	
Volatile Organic Compounds by SW846 8260B		Prepared by method		SW846 5030 Soil MS					VOC10
Acetone	BRL	593 ug/kg dry	50	SW846 8260B	06-May-04	06-May-04	4050322	tim	
Acrylonitrile	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Benzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Bromobenzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Bromochloromethane	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Bromodichloromethane	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Bromoform	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Bromomethane	BRL	59.3 ug/kg dry	50	"	"	"	"	"	
2-Butanone (MEK)	BRL	297 ug/kg dry	50	"	"	"	"	"	
n-Butylbenzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
sec-Butylbenzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
tert-Butylbenzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Carbon disulfide	BRL	148 ug/kg dry	50	"	"	"	"	"	
Carbon tetrachloride	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Chlorobenzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Chloroethane	BRL	59.3 ug/kg dry	50	"	"	"	"	"	
Chloroform	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Chloromethane	BRL	59.3 ug/kg dry	50	"	"	"	"	"	
2-Chlorotoluene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
4-Chlorotoluene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	BRL	59.3 ug/kg dry	50	"	"	"	"	"	
Dibromochloromethane	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,2-Dibromoethane (EDB)	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Dibromomethane	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,2-Dichlorobenzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,3-Dichlorobenzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,4-Dichlorobenzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Dichlorodifluoromethane (Freon12)	BRL	59.3 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloroethane	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,2-Dichloroethane	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloroethene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
cis-1,2-Dichloroethene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
trans-1,2-Dichloroethene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,2-Dichloropropane	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,3-Dichloropropane	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
2,2-Dichloropropane	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloropropene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
cis-1,3-Dichloropropene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
trans-1,3-Dichloropropene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Ethylbenzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Hexachlorobutadiene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-3	15260048	Soil	04-May-04 11:28	04-May-04
SA11919-09				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
Volatile Organic Compounds by SW846 8260B		Prepared by method		SW846 5030 Soil MS					VOC10
2-Hexanone (MBK)	BRL	297 ug/kg dry	50	SW846 8260B	06-May-04	06-May-04	4050322	tim	
Isopropylbenzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
4-Isopropyltoluene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Methyl tert-butyl ether	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	BRL	297 ug/kg dry	50	"	"	"	"	"	
Methylene chloride	BRL	297 ug/kg dry	50	"	"	"	"	"	
Naphthalene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
n-Propylbenzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Styrene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Tetrachloroethene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Toluene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,2,3-Trichlorobenzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,2,4-Trichlorobenzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,1,1-Trichloroethane	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,1,2-Trichloroethane	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Trichloroethene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Trichlorofluoromethane (Freon 11)	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,2,3-Trichloropropane	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,2,4-Trimethylbenzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
1,3,5-Trimethylbenzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Vinyl chloride	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
m,p-Xylene	BRL	59.3 ug/kg dry	50	"	"	"	"	"	
o-Xylene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	*101*	*70-130 %*		"	"	"	"	"	
Surrogate: Toluene-d8	*106*	*70-130 %*		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	*95.8*	*70-130 %*		"	"	"	"	"	
Surrogate: Dibromofluoromethane	*99.8*	*70-130 %*		"	"	"	"	"	
VPH Aliphatic/Aromatic Carbon Ranges		Prepared by method		SW846 5030 Soil MS					VOC10
C5-C8 Aliphatic Hydrocarbons	BRL	0.445 mg/kg dry	50	MA VPH 97-12	05-May-04	06-May-04	4050267	ss	
C9-C12 Aliphatic Hydrocarbons	BRL	0.148 mg/kg dry	50	"	"	"	"	"	
C9-C10 Aromatic Hydrocarbons	BRL	0.148 mg/kg dry	50	"	"	"	"	"	
Unadjusted C5-C8 Aliphatic Hydrocarbons	BRL	0.445 mg/kg dry	50	"	"	"	"	"	
Unadjusted C9-C12 Aliphatic Hydrocarbons	BRL	0.148 mg/kg dry	50	"	"	"	"	"	
VPH Target Analytes		Prepared by method		SW846 5030 Soil MS					VOC10
Benzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Ethylbenzene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Methyl tert-butyl ether	BRL	29.7 ug/kg dry	50	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-3	15260048	Soil	04-May-04 11:28	04-May-04
SA11919-09				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VPH Target Analytes		Prepared by method		SW846 5030 Soil MS					VOC10
Naphthalene	BRL	29.7 ug/kg dry	50	MA VPH 97-12	05-May-04	06-May-04	4050267	ss	
Toluene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
m,p-Xylene	BRL	59.3 ug/kg dry	50	"	"	"	"	"	
o-Xylene	BRL	29.7 ug/kg dry	50	"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (FID)	*78.0*	*70-130 %*		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (PID)	*80.4*	*70-130 %*		"	"	"	"	"	
DRAFT: Total Metals by EPA 6000/7000 Series Methods, Prepared by SW846 3050B									
Mercury	BRL	0.219 mg/kg dry	1	SW846 7471A	05-May-04	06-May-04	4050294	YP	
DRAFT: Total Metals by EPA 200 Series Methods									
Silver	BRL	2.45 mg/kg dry	1	EPA 200.7	05-May-04	05-May-04	4050289	CR	
Arsenic	13.2	3.67 mg/kg dry	1	"	"	"	"	"	
Beryllium	BRL	0.490 mg/kg dry	1	"	"	"	"	"	
Cadmium	BRL	0.612 mg/kg dry	1	"	"	"	"	"	
Chromium	9.52	1.22 mg/kg dry	1	"	"	"	"	"	
Copper	7.88	1.22 mg/kg dry	1	"	"	"	"	"	
Nickel	11.1	1.22 mg/kg dry	1	"	"	"	"	"	
Lead	2.02	1.84 mg/kg dry	1	"	"	"	"	"	
Antimony	BRL	3.67 mg/kg dry	1	"	"	"	"	"	
Selenium	BRL	3.67 mg/kg dry	1	"	"	"	"	"	
Thallium	BRL	3.67 mg/kg dry	1	"	"	"	"	"	
Zinc	22.2	1.22 mg/kg dry	1	"	"	"	"	"	
DRAFT: General Chemistry Parameters									
% Solids	79.4	%	1	SM2540 G Mod.	05-May-04	06-May-04	4050264	LN	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-4	15260048	Soil	04-May-04 12:43	04-May-04
SA11919-10				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VOC Extraction	Field Extracted	N/A	1	VOC	05-May-04	05-May-04	4050331	LN	
Volatile Organic Compounds by SW846 8260B		Prepared by method		SW846 5030 Soil MS					VOC10
Acetone	BRL	500 ug/kg dry	50	SW846 8260B	06-May-04	06-May-04	4050322	tim	
Acrylonitrile	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Benzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Bromobenzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Bromochloromethane	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Bromodichloromethane	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Bromoform	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Bromomethane	BRL	50.0 ug/kg dry	50	"	"	"	"	"	
2-Butanone (MEK)	BRL	250 ug/kg dry	50	"	"	"	"	"	
n-Butylbenzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
sec-Butylbenzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
tert-Butylbenzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Carbon disulfide	BRL	125 ug/kg dry	50	"	"	"	"	"	
Carbon tetrachloride	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Chlorobenzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Chloroethane	BRL	50.0 ug/kg dry	50	"	"	"	"	"	
Chloroform	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Chloromethane	BRL	50.0 ug/kg dry	50	"	"	"	"	"	
2-Chlorotoluene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
4-Chlorotoluene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	BRL	50.0 ug/kg dry	50	"	"	"	"	"	
Dibromochloromethane	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,2-Dibromoethane (EDB)	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Dibromomethane	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,2-Dichlorobenzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,3-Dichlorobenzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,4-Dichlorobenzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Dichlorodifluoromethane (Freon12)	BRL	50.0 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloroethane	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,2-Dichloroethane	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloroethene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
cis-1,2-Dichloroethene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
trans-1,2-Dichloroethene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,2-Dichloropropane	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,3-Dichloropropane	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
2,2-Dichloropropane	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloropropene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
cis-1,3-Dichloropropene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
trans-1,3-Dichloropropene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Ethylbenzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Hexachlorobutadiene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-4	15260048	Soil	04-May-04 12:43	04-May-04
SA11919-10				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
Volatile Organic Compounds by SW846 8260B		Prepared by method		SW846 5030 Soil MS					VOC10
2-Hexanone (MBK)	BRL	250 ug/kg dry	50	SW846 8260B	06-May-04	06-May-04	4050322	tim	
Isopropylbenzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
4-Isopropyltoluene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Methyl tert-butyl ether	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	BRL	250 ug/kg dry	50	"	"	"	"	"	
Methylene chloride	BRL	250 ug/kg dry	50	"	"	"	"	"	
Naphthalene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
n-Propylbenzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Styrene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Tetrachloroethene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Toluene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,2,3-Trichlorobenzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,2,4-Trichlorobenzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,1,1-Trichloroethane	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,1,2-Trichloroethane	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Trichloroethene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Trichlorofluoromethane (Freon 11)	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,2,3-Trichloropropane	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,2,4-Trimethylbenzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
1,3,5-Trimethylbenzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Vinyl chloride	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
m,p-Xylene	BRL	50.0 ug/kg dry	50	"	"	"	"	"	
o-Xylene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	*101*	*70-130 %*		"	"	"	"	"	
Surrogate: Toluene-d8	*102*	*70-130 %*		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	*96.8*	*70-130 %*		"	"	"	"	"	
Surrogate: Dibromofluoromethane	*98.8*	*70-130 %*		"	"	"	"	"	
VPH Aliphatic/Aromatic Carbon Ranges		Prepared by method		SW846 5030 Soil MS					VOC10
C5-C8 Aliphatic Hydrocarbons	BRL	0.375 mg/kg dry	50	MA VPH 97-12	05-May-04	06-May-04	4050267	ss	
C9-C12 Aliphatic Hydrocarbons	BRL	0.125 mg/kg dry	50	"	"	"	"	"	
C9-C10 Aromatic Hydrocarbons	BRL	0.125 mg/kg dry	50	"	"	"	"	"	
Unadjusted C5-C8 Aliphatic Hydrocarbons	BRL	0.375 mg/kg dry	50	"	"	"	"	"	
Unadjusted C9-C12 Aliphatic Hydrocarbons	BRL	0.125 mg/kg dry	50	"	"	"	"	"	
VPH Target Analytes		Prepared by method		SW846 5030 Soil MS					VOC10
Benzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Ethylbenzene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Methyl tert-butyl ether	BRL	25.0 ug/kg dry	50	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-4	15260048	Soil	04-May-04 12:43	04-May-04
SA11919-10				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VPH Target Analytes		Prepared by method		SW846 5030 Soil MS					VOC10
Naphthalene	BRL	25.0 ug/kg dry	50	MA VPH 97-12	05-May-04	06-May-04	4050267	ss	
Toluene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
m,p-Xylene	BRL	50.0 ug/kg dry	50	"	"	"	"	"	
o-Xylene	BRL	25.0 ug/kg dry	50	"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (FID)	*89.0*	*70-130 %*		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (PID)	*84.6*	*70-130 %*		"	"	"	"	"	
DRAFT: Total Metals by EPA 6000/7000 Series Methods, Prepared by SW846 3050B									
Mercury	BRL	0.195 mg/kg dry	1	SW846 7471A	05-May-04	06-May-04	4050294	YP	
DRAFT: Total Metals by EPA 200 Series Methods									
Silver	BRL	2.31 mg/kg dry	1	EPA 200.7	05-May-04	05-May-04	4050289	CR	
Arsenic	9.58	3.46 mg/kg dry	1	"	"	"	"	"	
Beryllium	BRL	0.462 mg/kg dry	1	"	"	"	"	"	
Cadmium	BRL	0.577 mg/kg dry	1	"	"	"	"	"	
Chromium	9.31	1.15 mg/kg dry	1	"	"	"	"	"	
Copper	6.44	1.15 mg/kg dry	1	"	"	"	"	"	
Nickel	9.61	1.15 mg/kg dry	1	"	"	"	"	"	
Lead	BRL	1.73 mg/kg dry	1	"	"	"	"	"	
Antimony	BRL	3.46 mg/kg dry	1	"	"	"	"	"	
Selenium	BRL	3.46 mg/kg dry	1	"	"	"	"	"	
Thallium	BRL	3.46 mg/kg dry	1	"	"	"	"	"	
Zinc	19.9	1.15 mg/kg dry	1	"	"	"	"	"	
DRAFT: General Chemistry Parameters									
% Solids	83.4	%	1	SM2540 G Mod.	05-May-04	06-May-04	4050264	LN	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-5	15260048	Soil	04-May-04 15:30	04-May-04
SA11919-11				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VOC Extraction	Field Extracted	N/A	1	VOC	05-May-04	05-May-04	4050331	LN	
Volatile Organic Compounds by SW846 8260B		Prepared by method		SW846 5030 Soil MS					VOC10
Acetone	BRL	384 ug/kg dry	50	SW846 8260B	06-May-04	06-May-04	4050322	tim	
Acrylonitrile	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Benzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Bromobenzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Bromochloromethane	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Bromodichloromethane	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Bromoform	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Bromomethane	BRL	38.4 ug/kg dry	50	"	"	"	"	"	
2-Butanone (MEK)	BRL	192 ug/kg dry	50	"	"	"	"	"	
n-Butylbenzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
sec-Butylbenzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
tert-Butylbenzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Carbon disulfide	BRL	96.1 ug/kg dry	50	"	"	"	"	"	
Carbon tetrachloride	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Chlorobenzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Chloroethane	BRL	38.4 ug/kg dry	50	"	"	"	"	"	
Chloroform	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Chloromethane	BRL	38.4 ug/kg dry	50	"	"	"	"	"	
2-Chlorotoluene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
4-Chlorotoluene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	BRL	38.4 ug/kg dry	50	"	"	"	"	"	
Dibromochloromethane	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,2-Dibromoethane (EDB)	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Dibromomethane	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,2-Dichlorobenzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,3-Dichlorobenzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,4-Dichlorobenzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Dichlorodifluoromethane (Freon12)	BRL	38.4 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloroethane	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,2-Dichloroethane	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloroethene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
cis-1,2-Dichloroethene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
trans-1,2-Dichloroethene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,2-Dichloropropane	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,3-Dichloropropane	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
2,2-Dichloropropane	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloropropene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
cis-1,3-Dichloropropene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
trans-1,3-Dichloropropene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Ethylbenzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Hexachlorobutadiene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-5	15260048	Soil	04-May-04 15:30	04-May-04
SA11919-11				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
Volatile Organic Compounds by SW846 8260B		Prepared by method		SW846 5030 Soil MS					VOC10
2-Hexanone (MBK)	BRL	192 ug/kg dry	50	SW846 8260B	06-May-04	06-May-04	4050322	tim	
Isopropylbenzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
4-Isopropyltoluene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Methyl tert-butyl ether	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	BRL	192 ug/kg dry	50	"	"	"	"	"	
Methylene chloride	BRL	192 ug/kg dry	50	"	"	"	"	"	
Naphthalene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
n-Propylbenzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Styrene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Tetrachloroethene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Toluene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,2,3-Trichlorobenzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,2,4-Trichlorobenzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,1,1-Trichloroethane	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,1,2-Trichloroethane	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Trichloroethene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Trichlorofluoromethane (Freon 11)	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,2,3-Trichloropropane	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,2,4-Trimethylbenzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
1,3,5-Trimethylbenzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Vinyl chloride	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
m,p-Xylene	BRL	38.4 ug/kg dry	50	"	"	"	"	"	
o-Xylene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	*102*	*70-130 %*		"	"	"	"	"	
Surrogate: Toluene-d8	*105*	*70-130 %*		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	*95.4*	*70-130 %*		"	"	"	"	"	
Surrogate: Dibromofluoromethane	*98.0*	*70-130 %*		"	"	"	"	"	
VPH Aliphatic/Aromatic Carbon Ranges		Prepared by method		SW846 5030 Soil MS					VOC10
C5-C8 Aliphatic Hydrocarbons	BRL	0.288 mg/kg dry	50	MA VPH 97-12	05-May-04	06-May-04	4050267	ss	
C9-C12 Aliphatic Hydrocarbons	BRL	0.0961 mg/kg dry	50	"	"	"	"	"	
C9-C10 Aromatic Hydrocarbons	BRL	0.0961 mg/kg dry	50	"	"	"	"	"	
Unadjusted C5-C8 Aliphatic Hydrocarbons	BRL	0.288 mg/kg dry	50	"	"	"	"	"	
Unadjusted C9-C12 Aliphatic Hydrocarbons	BRL	0.0961 mg/kg dry	50	"	"	"	"	"	
VPH Target Analytes		Prepared by method		SW846 5030 Soil MS					VOC10
Benzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Ethylbenzene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Methyl tert-butyl ether	BRL	19.2 ug/kg dry	50	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-5	15260048	Soil	04-May-04 15:30	04-May-04
SA11919-11				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VPH Target Analytes		Prepared by method		SW846 5030 Soil MS					VOC10
Naphthalene	BRL	19.2 ug/kg dry	50	MA VPH 97-12	05-May-04	06-May-04	4050267	ss	
Toluene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
m,p-Xylene	BRL	38.4 ug/kg dry	50	"	"	"	"	"	
o-Xylene	BRL	19.2 ug/kg dry	50	"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (FID)	*75.4*	*70-130 %*		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (PID)	*77.8*	*70-130 %*		"	"	"	"	"	
DRAFT: Total Metals by EPA 6000/7000 Series Methods, Prepared by SW846 3050B									
Mercury	BRL	0.176 mg/kg dry	1	SW846 7471A	05-May-04	06-May-04	4050294	YP	
DRAFT: Total Metals by EPA 200 Series Methods									
Silver	BRL	1.95 mg/kg dry	1	EPA 200.7	05-May-04	05-May-04	4050289	CR	
Arsenic	14.5	2.93 mg/kg dry	1	"	"	"	"	"	
Beryllium	BRL	0.390 mg/kg dry	1	"	"	"	"	"	
Cadmium	BRL	0.488 mg/kg dry	1	"	"	"	"	"	
Chromium	7.68	0.975 mg/kg dry	1	"	"	"	"	"	
Copper	5.60	0.975 mg/kg dry	1	"	"	"	"	"	
Nickel	8.36	0.975 mg/kg dry	1	"	"	"	"	"	
Lead	2.17	1.46 mg/kg dry	1	"	"	"	"	"	
Antimony	BRL	2.93 mg/kg dry	1	"	"	"	"	"	
Selenium	BRL	2.93 mg/kg dry	1	"	"	"	"	"	
Thallium	BRL	2.93 mg/kg dry	1	"	"	"	"	"	
Zinc	15.6	0.975 mg/kg dry	1	"	"	"	"	"	
DRAFT: General Chemistry Parameters									
% Solids	91.7	%	1	SM2540 G Mod.	05-May-04	06-May-04	4050264	LN	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-6	15260048	Soil	04-May-04 15:55	04-May-04
SA11919-12				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VOC Extraction	Field Extracted	N/A	1	VOC	05-May-04	05-May-04	4050331	LN	
Volatile Organic Compounds by SW846 8260B		Prepared by method		SW846 5030 Soil MS					VOC10
Acetone	BRL	601 ug/kg dry	50	SW846 8260B	06-May-04	06-May-04	4050322	tim	
Acrylonitrile	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Benzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Bromobenzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Bromochloromethane	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Bromodichloromethane	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Bromoform	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Bromomethane	BRL	60.1 ug/kg dry	50	"	"	"	"	"	
2-Butanone (MEK)	BRL	300 ug/kg dry	50	"	"	"	"	"	
n-Butylbenzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
sec-Butylbenzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
tert-Butylbenzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Carbon disulfide	BRL	150 ug/kg dry	50	"	"	"	"	"	
Carbon tetrachloride	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Chlorobenzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Chloroethane	BRL	60.1 ug/kg dry	50	"	"	"	"	"	
Chloroform	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Chloromethane	BRL	60.1 ug/kg dry	50	"	"	"	"	"	
2-Chlorotoluene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
4-Chlorotoluene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	BRL	60.1 ug/kg dry	50	"	"	"	"	"	
Dibromochloromethane	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,2-Dibromoethane (EDB)	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Dibromomethane	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,2-Dichlorobenzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,3-Dichlorobenzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,4-Dichlorobenzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Dichlorodifluoromethane (Freon12)	BRL	60.1 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloroethane	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,2-Dichloroethane	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloroethene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
cis-1,2-Dichloroethene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
trans-1,2-Dichloroethene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,2-Dichloropropane	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,3-Dichloropropane	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
2,2-Dichloropropane	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,1-Dichloropropene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
cis-1,3-Dichloropropene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
trans-1,3-Dichloropropene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Ethylbenzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Hexachlorobutadiene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-6	15260048	Soil	04-May-04 15:55	04-May-04
SA11919-12				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
Volatile Organic Compounds by SW846 8260B		Prepared by method		SW846 5030 Soil MS					VOC10
2-Hexanone (MBK)	BRL	300 ug/kg dry	50	SW846 8260B	06-May-04	06-May-04	4050322	tim	
Isopropylbenzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
4-Isopropyltoluene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Methyl tert-butyl ether	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	BRL	300 ug/kg dry	50	"	"	"	"	"	
Methylene chloride	BRL	300 ug/kg dry	50	"	"	"	"	"	
Naphthalene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
n-Propylbenzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Styrene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Tetrachloroethene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Toluene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,2,3-Trichlorobenzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,2,4-Trichlorobenzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,1,1-Trichloroethane	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,1,2-Trichloroethane	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Trichloroethene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Trichlorofluoromethane (Freon 11)	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,2,3-Trichloropropane	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,2,4-Trimethylbenzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
1,3,5-Trimethylbenzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Vinyl chloride	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
m,p-Xylene	BRL	60.1 ug/kg dry	50	"	"	"	"	"	
o-Xylene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	*103*	*70-130 %*		"	"	"	"	"	
Surrogate: Toluene-d8	*103*	*70-130 %*		"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4	*97.8*	*70-130 %*		"	"	"	"	"	
Surrogate: Dibromofluoromethane	*100*	*70-130 %*		"	"	"	"	"	
VPH Aliphatic/Aromatic Carbon Ranges		Prepared by method		SW846 5030 Soil MS					VOC10
C5-C8 Aliphatic Hydrocarbons	BRL	0.451 mg/kg dry	50	MA VPH 97-12	05-May-04	06-May-04	4050267	ss	
C9-C12 Aliphatic Hydrocarbons	BRL	0.150 mg/kg dry	50	"	"	"	"	"	
C9-C10 Aromatic Hydrocarbons	BRL	0.150 mg/kg dry	50	"	"	"	"	"	
Unadjusted C5-C8 Aliphatic Hydrocarbons	BRL	0.451 mg/kg dry	50	"	"	"	"	"	
Unadjusted C9-C12 Aliphatic Hydrocarbons	BRL	0.150 mg/kg dry	50	"	"	"	"	"	
VPH Target Analytes		Prepared by method		SW846 5030 Soil MS					VOC10
Benzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Ethylbenzene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Methyl tert-butyl ether	BRL	30.0 ug/kg dry	50	"	"	"	"	"	

Sample Identification	Client Project #	Matrix	Collection Date/Time	Received
DRAFT: B-6	15260048	Soil	04-May-04 15:55	04-May-04
SA11919-12				

Analyte(s)	*Result*	**RDL/Units*	*Dilution*	*Method Ref.*	*Prepared*	*Analyzed*	*Batch*	*Analyst*	*Flag*
DRAFT: Volatile Organic Compounds									
VPH Target Analytes		Prepared by method		SW846 5030 Soil MS					VOC10
Naphthalene	BRL	30.0 ug/kg dry	50	MA VPH 97-12	05-May-04	06-May-04	4050267	ss	
Toluene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
m,p-Xylene	BRL	60.1 ug/kg dry	50	"	"	"	"	"	
o-Xylene	BRL	30.0 ug/kg dry	50	"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (FID)	*86.0*	*70-130 %*		"	"	"	"	"	
Surrogate: 2,5-Dibromotoluene (PID)	*84.6*	*70-130 %*		"	"	"	"	"	
DRAFT: Total Metals by EPA 6000/7000 Series Methods, Prepared by SW846 3050B									
Mercury	BRL	0.215 mg/kg dry	1	SW846 7471A	05-May-04	06-May-04	4050294	YP	
DRAFT: Total Metals by EPA 200 Series Methods									
Silver	BRL	2.25 mg/kg dry	1	EPA 200.7	05-May-04	05-May-04	4050289	CR	
Arsenic	60.0	3.38 mg/kg dry	1	"	"	"	"	"	
Beryllium	BRL	0.451 mg/kg dry	1	"	"	"	"	"	
Cadmium	0.935	0.564 mg/kg dry	1	"	"	"	"	"	
Chromium	73.1	1.13 mg/kg dry	1	"	"	"	"	"	
Copper	43.1	1.13 mg/kg dry	1	"	"	"	"	"	
Nickel	119	1.13 mg/kg dry	1	"	"	"	"	"	
Lead	4.44	1.69 mg/kg dry	1	"	"	"	"	"	
Antimony	BRL	3.38 mg/kg dry	1	"	"	"	"	"	
Selenium	BRL	3.38 mg/kg dry	1	"	"	"	"	"	
Thallium	BRL	3.38 mg/kg dry	1	"	"	"	"	"	
Zinc	56.0	1.13 mg/kg dry	1	"	"	"	"	"	
DRAFT: General Chemistry Parameters									
% Solids	80.0	%	1	SM2540 G Mod.	05-May-04	06-May-04	4050264	LN	

Notes and Definitions

vext2	Field Extracted
VOC10	The VOC field preserved soil sample is not within the recommended 1:1 weight to volume ratio. This is based on SW846 methods 5030 and 5035.
Z-2	Confirmed by duplicate analysis
BRL	Below Reporting Limit - Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
NR	Not Reported
RPD	Relative Percent Difference

Laboratory Control Sample (LCS): A known matrix spiked with compound(s) representative of the target analytes, which is used to document laboratory performance.

Matrix Duplicate: An intra-laboratory split sample which is used to document the precision of a method in a given sample matrix.

Matrix Spike: An aliquot of a sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Method Blank: An analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. The method blank is used to document contamination resulting from the analytical process.

Method Detection Limit (MDL): The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte.

Reportable Detection Limit (RDL): The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The RDL is generally 5 to 10 times the MDL. However, it may be nominally chosen within these guidelines to simplify data reporting. For many analytes the RDL analyte concentration is selected as the lowest non-zero standard in the calibration curve. Sample RDLs are highly matrix-dependent.

Surrogate: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. These compounds are spiked into all blanks, standards, and samples prior to analysis. Percent recoveries are calculated for each surrogate.

Validated by:
Hanibal C. Tayeh, Ph.D.

APPENDIX D

MAY 18, 2004
SOIL AND GROUNDWATER ANALYTICAL DATA

ALPHA ANALYTICAL LABORATORIES

Eight Walkup Drive
Westborough, Massachusetts 01581-1019
(508) 898-9220 www.alphalab.com

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

CERTIFICATE OF ANALYSIS

Client: URS Corporation

Address: 5 Industrial Way

Salem, NH 03079

Attn: Ms. Amy Pollock

Project Number: 15260048

Site: BERKELEY - WORCESTER COMMONS

Laboratory Job Number: L0405291

Date Received: 19-MAY-2004

Date Reported: 21-MAY-2004

Delivery Method: Client

The following questions pertain only to MCP Analytical Methods

An affirmative response to questions A,B,C & D is required for "Presumptive Certainty" status

A. Were all samples received by the laboratory in a condition consistent with those described on their Chain-of-Custody documentation for the data set? YES

B. Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines? YES

C. Does the analytical data included in this report meet all the requirements for "Presumptive Certainty", as described in section 2.0 of the MADEP document CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"? YES

D. **VPH and EPH methods only:** Was the VPH or EPH method run without significant modifications, as specified in Section 11.3? YES

A response to questions E and F is required for "Presumptive Certainty" status

E. Were all QC performance standards and recommendations for the specified method(s) achieved? YES

F. Were results for all analyte-list compounds/elements for the specified method(s) reported? NO

Any answers of NO to the above questions are addressed in the case narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized by: Scott McLean
This document electronically signed

ALPHA ANALYTICAL LABORATORIES

Laboratory Job Number: L0405291
Date Reported: 21-MAY-2004

ALPHA SAMPLE NUMBER	CLIENT IDENTIFICATION	SAMPLE LOCATION
L0405291-01	B-7	WORCESTER, MA
L0405291-02	B-8	WORCESTER, MA
L0405291-03	B-9	WORCESTER, MA

ALPHA ANALYTICAL LABORATORIES
NARRATIVE REPORT

Laboratory Job Number: L0405291

Report Submission

This report replaces the report issued May 20, 2004. At the client's request, the report has been amended to include the results of the top ten TICs for the Volatile Organics analysis on all samples.

MCP Related Narratives

Report Submission

In reference to question F, at the client's request, the samples were analyzed only for the compounds specified on the chain of custody.

Volatile Organics

L0405291-02 has elevated limits of detection due to the 2x dilution required by the elevated concentrations of target compounds in the sample.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405291-01
B-7
Sample Matrix: WATER

Date Collected: 19-MAY-2004 11:15
Date Received : 19-MAY-2004
Date Reported : 21-MAY-2004

Condition of Sample: Satisfactory

Field Prep: Field Filtered

Number & Type of Containers: 1-Plastic,4-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Dissolved Metals								
Antimony, Dissolved	ND	mg/l	0.006	54	6010B	0519 17:25	0520 10:15	RW
Arsenic, Dissolved	ND	mg/l	0.005	54	6010B	0519 17:25	0520 10:15	RW
Beryllium, Dissolved	ND	mg/l	0.004	54	6010B	0519 17:25	0520 10:15	RW
Cadmium, Dissolved	ND	mg/l	0.005	54	6010B	0519 17:25	0520 10:15	RW
Chromium, Dissolved	ND	mg/l	0.01	54	6010B	0519 17:25	0520 10:15	RW
Copper, Dissolved	ND	mg/l	0.01	54	6010B	0519 17:25	0520 10:15	RW
Lead, Dissolved	ND	mg/l	0.010	54	6010B	0519 17:25	0520 10:15	RW
Mercury, Dissolved	ND	mg/l	0.0005	54	7470A	0519 19:00	0520 09:15	DM
Nickel, Dissolved	0.026	mg/l	0.025	54	6010B	0519 17:25	0520 10:15	RW
Selenium, Dissolved	ND	mg/l	0.005	54	6010B	0519 17:25	0520 10:15	RW
Silver, Dissolved	ND	mg/l	0.007	54	6010B	0519 17:25	0520 10:15	RW
Thallium, Dissolved	ND	mg/l	0.002	54	7841	0519 17:25	0520 09:47	AJ
Zinc, Dissolved	ND	mg/l	0.05	54	6010B	0519 17:25	0520 10:15	RW
Volatile Organics by MCP 8260B				54	8260B		0520 11:54	RY
Methylene chloride	ND	ug/l	5.0					
1,1-Dichloroethane	ND	ug/l	0.75					
Chloroform	ND	ug/l	0.75					
Carbon tetrachloride	ND	ug/l	0.50					
1,2-Dichloropropane	ND	ug/l	1.8					
Dibromochloromethane	ND	ug/l	0.50					
1,1,2-Trichloroethane	ND	ug/l	0.75					
Tetrachloroethene	ND	ug/l	0.50					
Chlorobenzene	ND	ug/l	0.50					
Trichlorofluoromethane	ND	ug/l	2.5					
1,2-Dichloroethane	ND	ug/l	0.50					
1,1,1-Trichloroethane	ND	ug/l	0.50					
Bromodichloromethane	ND	ug/l	0.50					
trans-1,3-Dichloropropene	ND	ug/l	0.50					
cis-1,3-Dichloropropene	ND	ug/l	0.50					
1,1-Dichloropropene	ND	ug/l	2.5					
Bromoform	ND	ug/l	2.0					
1,1,2,2-Tetrachloroethane	ND	ug/l	0.50					
Benzene	ND	ug/l	0.50					
Toluene	ND	ug/l	0.75					
Ethylbenzene	ND	ug/l	0.50					
Chloromethane	ND	ug/l	2.5					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405291-01
B-7

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B continued				54 8260B		0520 11:54	RY
Bromomethane	ND	ug/l	1.0				
Vinyl chloride	ND	ug/l	1.0				
Chloroethane	ND	ug/l	1.0				
1,1-Dichloroethene	ND	ug/l	0.50				
trans-1,2-Dichloroethene	ND	ug/l	0.75				
Trichloroethene	ND	ug/l	0.50				
1,2-Dichlorobenzene	ND	ug/l	2.5				
1,3-Dichlorobenzene	ND	ug/l	2.5				
1,4-Dichlorobenzene	ND	ug/l	2.5				
Methyl tert butyl ether	ND	ug/l	1.0				
p/m-Xylene	ND	ug/l	0.50				
o-Xylene	ND	ug/l	0.50				
cis-1,2-Dichloroethene	ND	ug/l	0.50				
Dibromomethane	ND	ug/l	5.0				
1,2,3-Trichloropropane	ND	ug/l	5.0				
Styrene	ND	ug/l	0.50				
Dichlorodifluoromethane	ND	ug/l	5.0				
Acetone	ND	ug/l	5.0				
Carbon disulfide	ND	ug/l	5.0				
2-Butanone	ND	ug/l	5.0				
4-Methyl-2-pentanone	ND	ug/l	5.0				
2-Hexanone	ND	ug/l	5.0				
Bromochloromethane	ND	ug/l	2.5				
Tetrahydrofuran	ND	ug/l	10.				
2,2-Dichloropropane	ND	ug/l	2.5				
1,2-Dibromoethane	ND	ug/l	2.0				
1,3-Dichloropropane	ND	ug/l	2.5				
1,1,1,2-Tetrachloroethane	ND	ug/l	0.50				
Bromobenzene	ND	ug/l	2.5				
n-Butylbenzene	ND	ug/l	0.50				
sec-Butylbenzene	ND	ug/l	0.50				
tert-Butylbenzene	ND	ug/l	2.5				
o-Chlorotoluene	ND	ug/l	2.5				
p-Chlorotoluene	ND	ug/l	2.5				
1,2-Dibromo-3-chloropropane	ND	ug/l	2.5				
Hexachlorobutadiene	ND	ug/l	1.0				
Isopropylbenzene	ND	ug/l	0.50				
p-Isopropyltoluene	ND	ug/l	0.50				
Naphthalene	ND	ug/l	2.5				
n-Propylbenzene	ND	ug/l	0.50				
1,2,3-Trichlorobenzene	ND	ug/l	2.5				
1,2,4-Trichlorobenzene	ND	ug/l	2.5				
1,3,5-Trimethylbenzene	ND	ug/l	2.5				
1,2,4-Trimethylbenzene	ND	ug/l	2.5				
Ethyl ether	ND	ug/l	2.5				
Isopropyl Ether	ND	ug/l	2.0				
Ethyl-Tert-Butyl-Ether	ND	ug/l	2.0				
Tertiary-Amyl Methyl Ether	ND	ug/l	2.0				
1,4-Dioxane	ND	ug/l	250				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405291-01
B-7

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B continued				54 8260B		0520 11:54	RY
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	101.	%	70-130				
Toluene-d8	103.	%	70-130				
4-Bromofluorobenzene	106.	%	70-130				
Dibromofluoromethane	97.0	%	70-130				
Volatile Organics by MCP 8260B				54 8260B		0520 11:54	RY
Tentatively Identified Compounds							
Unknown C3H6 Isomer	1.4	ug/l					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405291-01
B-7

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0520 11:07	MM

Quality Control Information

Condition of sample received: Satisfactory
Aqueous preservative: Laboratory Provided Preserved Container
Sample temperature upon receipt: Received on Ice
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	ND	ug/l	40.0
C9-C12 Aliphatics, Unadjusted	ND	ug/l	40.0
C9-C10 Aromatics	ND	ug/l	40.0
C5-C8 Aliphatics, Adjusted	ND	ug/l	40.0
C9-C12 Aliphatics, Adjusted	ND	ug/l	40.0

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	104.	%	70-130
2,5-Dibromotoluene-FID	113.	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405291-02
B-8
Sample Matrix: WATER

Date Collected: 19-MAY-2004 13:05
Date Received : 19-MAY-2004
Date Reported : 21-MAY-2004

Condition of Sample: Satisfactory

Field Prep: Field Filtered

Number & Type of Containers: 1-Plastic,4-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Dissolved Metals								
Antimony, Dissolved	ND	mg/l	0.006	54	6010B	0519 17:25	0520 10:19	RW
Arsenic, Dissolved	ND	mg/l	0.005	54	6010B	0519 17:25	0520 10:19	RW
Beryllium, Dissolved	ND	mg/l	0.004	54	6010B	0519 17:25	0520 10:19	RW
Cadmium, Dissolved	ND	mg/l	0.005	54	6010B	0519 17:25	0520 10:19	RW
Chromium, Dissolved	ND	mg/l	0.01	54	6010B	0519 17:25	0520 10:19	RW
Copper, Dissolved	ND	mg/l	0.01	54	6010B	0519 17:25	0520 10:19	RW
Lead, Dissolved	ND	mg/l	0.010	54	6010B	0519 17:25	0520 10:19	RW
Mercury, Dissolved	ND	mg/l	0.0005	54	7470A	0519 19:00	0520 09:17	DM
Nickel, Dissolved	ND	mg/l	0.025	54	6010B	0519 17:25	0520 10:19	RW
Selenium, Dissolved	ND	mg/l	0.005	54	6010B	0519 17:25	0520 10:19	RW
Silver, Dissolved	ND	mg/l	0.007	54	6010B	0519 17:25	0520 10:19	RW
Thallium, Dissolved	ND	mg/l	0.002	54	7841	0519 17:25	0520 10:01	AJ
Zinc, Dissolved	ND	mg/l	0.05	54	6010B	0519 17:25	0520 10:19	RW
Volatile Organics by MCP 8260B				54	8260B		0520 12:31	RY
Methylene chloride	ND	ug/l	10.					
1,1-Dichloroethane	ND	ug/l	1.5					
Chloroform	ND	ug/l	1.5					
Carbon tetrachloride	ND	ug/l	1.0					
1,2-Dichloropropane	ND	ug/l	3.5					
Dibromochloromethane	ND	ug/l	1.0					
1,1,2-Trichloroethane	ND	ug/l	1.5					
Tetrachloroethene	140	ug/l	1.0					
Chlorobenzene	ND	ug/l	1.0					
Trichlorofluoromethane	ND	ug/l	5.0					
1,2-Dichloroethane	ND	ug/l	1.0					
1,1,1-Trichloroethane	ND	ug/l	1.0					
Bromodichloromethane	ND	ug/l	1.0					
trans-1,3-Dichloropropene	ND	ug/l	1.0					
cis-1,3-Dichloropropene	ND	ug/l	1.0					
1,1-Dichloropropene	ND	ug/l	5.0					
Bromoform	ND	ug/l	4.0					
1,1,2,2-Tetrachloroethane	ND	ug/l	1.0					
Benzene	ND	ug/l	1.0					
Toluene	ND	ug/l	1.5					
Ethylbenzene	ND	ug/l	1.0					
Chloromethane	ND	ug/l	5.0					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405291-02
B-8

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B continued				54 8260B		0520 12:31	RY
Bromomethane	ND	ug/l	2.0				
Vinyl chloride	ND	ug/l	2.0				
Chloroethane	ND	ug/l	2.0				
1,1-Dichloroethene	ND	ug/l	1.0				
trans-1,2-Dichloroethene	ND	ug/l	1.5				
Trichloroethene	10.	ug/l	1.0				
1,2-Dichlorobenzene	ND	ug/l	5.0				
1,3-Dichlorobenzene	ND	ug/l	5.0				
1,4-Dichlorobenzene	ND	ug/l	5.0				
Methyl tert butyl ether	ND	ug/l	2.0				
p/m-Xylene	ND	ug/l	1.0				
o-Xylene	ND	ug/l	1.0				
cis-1,2-Dichloroethene	16.	ug/l	1.0				
Dibromomethane	ND	ug/l	10.				
1,2,3-Trichloropropane	ND	ug/l	10.				
Styrene	ND	ug/l	1.0				
Dichlorodifluoromethane	ND	ug/l	10.				
Acetone	ND	ug/l	10.				
Carbon disulfide	ND	ug/l	10.				
2-Butanone	ND	ug/l	10.				
4-Methyl-2-pentanone	ND	ug/l	10.				
2-Hexanone	ND	ug/l	10.				
Bromochloromethane	ND	ug/l	5.0				
Tetrahydrofuran	ND	ug/l	20.				
2,2-Dichloropropane	ND	ug/l	5.0				
1,2-Dibromoethane	ND	ug/l	4.0				
1,3-Dichloropropane	ND	ug/l	5.0				
1,1,1,2-Tetrachloroethane	ND	ug/l	1.0				
Bromobenzene	ND	ug/l	5.0				
n-Butylbenzene	ND	ug/l	1.0				
sec-Butylbenzene	ND	ug/l	1.0				
tert-Butylbenzene	ND	ug/l	5.0				
o-Chlorotoluene	ND	ug/l	5.0				
p-Chlorotoluene	ND	ug/l	5.0				
1,2-Dibromo-3-chloropropane	ND	ug/l	5.0				
Hexachlorobutadiene	ND	ug/l	2.0				
Isopropylbenzene	ND	ug/l	1.0				
p-Isopropyltoluene	ND	ug/l	1.0				
Naphthalene	ND	ug/l	5.0				
n-Propylbenzene	ND	ug/l	1.0				
1,2,3-Trichlorobenzene	ND	ug/l	5.0				
1,2,4-Trichlorobenzene	ND	ug/l	5.0				
1,3,5-Trimethylbenzene	ND	ug/l	5.0				
1,2,4-Trimethylbenzene	ND	ug/l	5.0				
Ethyl ether	ND	ug/l	5.0				
Isopropyl Ether	ND	ug/l	4.0				
Ethyl-Tert-Butyl-Ether	ND	ug/l	4.0				
Tertiary-Amyl Methyl Ether	ND	ug/l	4.0				
1,4-Dioxane	ND	ug/l	500				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405291-02
B-8

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B continued				54 8260B		0520 12:31	RY
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	95.0	%	70-130				
Toluene-d8	104.	%	70-130				
4-Bromofluorobenzene	108.	%	70-130				
Dibromofluoromethane	96.0	%	70-130				
Volatile Organics by MCP 8260B				54 8260B		0520 12:31	RY
Tentatively Identified Compounds							
Propene	3.0	ug/l					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405291-02
B-8

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0520 10:17	MM

Quality Control Information

Condition of sample received: Satisfactory
Aqueous preservative: Laboratory Provided Preserved Container
Sample temperature upon receipt: Received on Ice
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	56.6	ug/l	40.0
C9-C12 Aliphatics, Unadjusted	ND	ug/l	40.0
C9-C10 Aromatics	ND	ug/l	40.0
C5-C8 Aliphatics, Adjusted	56.6	ug/l	40.0
C9-C12 Aliphatics, Adjusted	ND	ug/l	40.0

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	109.	%	70-130
2,5-Dibromotoluene-FID	118.	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405291-03
B-9
Sample Matrix: WATER

Date Collected: 19-MAY-2004 15:00
Date Received : 19-MAY-2004
Date Reported : 21-MAY-2004

Condition of Sample: Satisfactory

Field Prep: Field Filtered

Number & Type of Containers: 1-Plastic,4-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Dissolved Metals								
Antimony, Dissolved	ND	mg/l	0.006	54	6010B	0519 17:25	0520 10:26	RW
Arsenic, Dissolved	ND	mg/l	0.005	54	6010B	0519 17:25	0520 10:26	RW
Beryllium, Dissolved	ND	mg/l	0.004	54	6010B	0519 17:25	0520 10:26	RW
Cadmium, Dissolved	ND	mg/l	0.005	54	6010B	0519 17:25	0520 10:26	RW
Chromium, Dissolved	ND	mg/l	0.01	54	6010B	0519 17:25	0520 10:26	RW
Copper, Dissolved	ND	mg/l	0.01	54	6010B	0519 17:25	0520 10:26	RW
Lead, Dissolved	ND	mg/l	0.010	54	6010B	0519 17:25	0520 10:26	RW
Mercury, Dissolved	ND	mg/l	0.0005	54	7470A	0519 19:00	0520 09:18	DM
Nickel, Dissolved	ND	mg/l	0.025	54	6010B	0519 17:25	0520 10:26	RW
Selenium, Dissolved	ND	mg/l	0.005	54	6010B	0519 17:25	0520 10:26	RW
Silver, Dissolved	ND	mg/l	0.007	54	6010B	0519 17:25	0520 10:26	RW
Thallium, Dissolved	ND	mg/l	0.002	54	7841	0519 17:25	0520 10:08	AJ
Zinc, Dissolved	ND	mg/l	0.05	54	6010B	0519 17:25	0520 10:26	RW
Volatile Organics by MCP 8260B				54	8260B		0520 13:08	RY
Methylene chloride	ND	ug/l	5.0					
1,1-Dichloroethane	ND	ug/l	0.75					
Chloroform	ND	ug/l	0.75					
Carbon tetrachloride	ND	ug/l	0.50					
1,2-Dichloropropane	ND	ug/l	1.8					
Dibromochloromethane	ND	ug/l	0.50					
1,1,2-Trichloroethane	ND	ug/l	0.75					
Tetrachloroethene	ND	ug/l	0.50					
Chlorobenzene	ND	ug/l	0.50					
Trichlorofluoromethane	ND	ug/l	2.5					
1,2-Dichloroethane	ND	ug/l	0.50					
1,1,1-Trichloroethane	ND	ug/l	0.50					
Bromodichloromethane	ND	ug/l	0.50					
trans-1,3-Dichloropropene	ND	ug/l	0.50					
cis-1,3-Dichloropropene	ND	ug/l	0.50					
1,1-Dichloropropene	ND	ug/l	2.5					
Bromoform	ND	ug/l	2.0					
1,1,2,2-Tetrachloroethane	ND	ug/l	0.50					
Benzene	ND	ug/l	0.50					
Toluene	ND	ug/l	0.75					
Ethylbenzene	ND	ug/l	0.50					
Chloromethane	ND	ug/l	2.5					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405291-03
B-9

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B continued				54 8260B		0520 13:08	RY
Bromomethane	ND	ug/l	1.0				
Vinyl chloride	ND	ug/l	1.0				
Chloroethane	ND	ug/l	1.0				
1,1-Dichloroethene	ND	ug/l	0.50				
trans-1,2-Dichloroethene	ND	ug/l	0.75				
Trichloroethene	ND	ug/l	0.50				
1,2-Dichlorobenzene	ND	ug/l	2.5				
1,3-Dichlorobenzene	ND	ug/l	2.5				
1,4-Dichlorobenzene	ND	ug/l	2.5				
Methyl tert butyl ether	ND	ug/l	1.0				
p/m-Xylene	ND	ug/l	0.50				
o-Xylene	ND	ug/l	0.50				
cis-1,2-Dichloroethene	ND	ug/l	0.50				
Dibromomethane	ND	ug/l	5.0				
1,2,3-Trichloropropane	ND	ug/l	5.0				
Styrene	ND	ug/l	0.50				
Dichlorodifluoromethane	ND	ug/l	5.0				
Acetone	ND	ug/l	5.0				
Carbon disulfide	ND	ug/l	5.0				
2-Butanone	ND	ug/l	5.0				
4-Methyl-2-pentanone	ND	ug/l	5.0				
2-Hexanone	ND	ug/l	5.0				
Bromochloromethane	ND	ug/l	2.5				
Tetrahydrofuran	ND	ug/l	10.				
2,2-Dichloropropane	ND	ug/l	2.5				
1,2-Dibromoethane	ND	ug/l	2.0				
1,3-Dichloropropane	ND	ug/l	2.5				
1,1,1,2-Tetrachloroethane	ND	ug/l	0.50				
Bromobenzene	ND	ug/l	2.5				
n-Butylbenzene	ND	ug/l	0.50				
sec-Butylbenzene	ND	ug/l	0.50				
tert-Butylbenzene	ND	ug/l	2.5				
o-Chlorotoluene	ND	ug/l	2.5				
p-Chlorotoluene	ND	ug/l	2.5				
1,2-Dibromo-3-chloropropane	ND	ug/l	2.5				
Hexachlorobutadiene	ND	ug/l	1.0				
Isopropylbenzene	ND	ug/l	0.50				
p-Isopropyltoluene	ND	ug/l	0.50				
Naphthalene	ND	ug/l	2.5				
n-Propylbenzene	ND	ug/l	0.50				
1,2,3-Trichlorobenzene	ND	ug/l	2.5				
1,2,4-Trichlorobenzene	ND	ug/l	2.5				
1,3,5-Trimethylbenzene	ND	ug/l	2.5				
1,2,4-Trimethylbenzene	ND	ug/l	2.5				
Ethyl ether	ND	ug/l	2.5				
Isopropyl Ether	ND	ug/l	2.0				
Ethyl-Tert-Butyl-Ether	ND	ug/l	2.0				
Tertiary-Amyl Methyl Ether	ND	ug/l	2.0				
1,4-Dioxane	ND	ug/l	250				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405291-03
B-9

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B continued				54 8260B		0520 13:08	RY
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	102.	%	70-130				
Toluene-d8	104.	%	70-130				
4-Bromofluorobenzene	108.	%	70-130				
Dibromofluoromethane	97.0	%	70-130				
Volatile Organics by MCP 8260B				54 8260B		0520 13:08	RY
Tentatively Identified Compounds							
Unknown C3H6 Isomer	1.1	ug/l					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405291-03
B-9

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0520 11:58	MM

Quality Control Information

Condition of sample received: Satisfactory
Aqueous preservative: Laboratory Provided Preserved Container
Sample temperature upon receipt: Received on Ice
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	ND	ug/l	40.0
C9-C12 Aliphatics, Unadjusted	ND	ug/l	40.0
C9-C10 Aromatics	ND	ug/l	40.0
C5-C8 Aliphatics, Adjusted	ND	ug/l	40.0
C9-C12 Aliphatics, Adjusted	ND	ug/l	40.0

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	94.0	%	70-130
2,5-Dibromotoluene-FID	101.	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH DUPLICATE ANALYSIS

Laboratory Job Number: L0405291

Parameter	Value 1	Value 2	Units	RPD	RPD Limits
Volatile Petroleum Hydrocarbons for sample(s) 01-03 (L0405241-04, WG171120)					
C5-C8 Aliphatics	ND	ND	ug/l	NC	50
C9-C12 Aliphatics	462.	ND	ug/l	NC	50
C9-C10 Aromatics	324.	ND	ug/l	NC	50
C5-C8 Aliphatics, Adjusted	ND	ND	ug/l	NC	50
C9-C12 Aliphatics, Adjusted	138.	ND	ug/l	NC	50
Benzene	ND	ND	ug/l	NC	50
Toluene	ND	ND	ug/l	NC	50
Ethylbenzene	ND	ND	ug/l	NC	50
p/m-Xylene	ND	ND	ug/l	NC	50
o-Xylene	ND	ND	ug/l	NC	50
Methyl tert butyl ether	ND	ND	ug/l	NC	50
Naphthalene	ND	ND	ug/l	NC	50

Surrogate(s)	Recovery				QC Criteria
2,5-Dibromotoluene-PID	96.0	95.0	%	1	70-130
2,5-Dibromotoluene-FID	104.	102.	%	2	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0405291

Parameter	% Recovery	QC Criteria
Dissolved Metals LCS for sample(s) 01-03 (WG171074)		
Antimony, Dissolved	105	80-120
Arsenic, Dissolved	108	80-120
Beryllium, Dissolved	108	80-120
Cadmium, Dissolved	109	80-120
Chromium, Dissolved	105	80-120
Copper, Dissolved	104	80-120
Lead, Dissolved	109	80-120
Nickel, Dissolved	104	80-120
Selenium, Dissolved	111	80-120
Silver, Dissolved	104	80-120
Thallium, Dissolved	98	80-120
Zinc, Dissolved	106	80-120
Dissolved Metals LCS for sample(s) 01-03 (WG171059)		
Mercury, Dissolved	102	80-120
Volatile Organics by MCP 8260B LCS for sample(s) 01-03 (WG171150)		
Methylene chloride	99	70-130
1,1-Dichloroethane	104	70-130
Chloroform	99	70-130
Carbon tetrachloride	107	70-130
1,2-Dichloropropane	103	70-130
Dibromochloromethane	104	70-130
1,1,2-Trichloroethane	110	70-130
Tetrachloroethene	105	70-130
Chlorobenzene	112	70-130
Trichlorofluoromethane	92	70-130
1,2-Dichloroethane	99	70-130
1,1,1-Trichloroethane	106	70-130
Bromodichloromethane	102	70-130
trans-1,3-Dichloropropene	108	70-130
cis-1,3-Dichloropropene	108	70-130
1,1-Dichloropropene	101	70-130
Bromoform	109	70-130
1,1,2,2-Tetrachloroethane	106	70-130
Benzene	102	70-130
Toluene	108	70-130
Ethylbenzene	111	70-130
Chloromethane	92	70-130
Bromomethane	88	70-130
Vinyl chloride	92	70-130
Chloroethane	97	70-130
1,1-Dichloroethene	92	70-130
trans-1,2-Dichloroethene	99	70-130
Trichloroethene	101	70-130
1,2-Dichlorobenzene	108	70-130
1,3-Dichlorobenzene	112	70-130
1,4-Dichlorobenzene	112	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0405291

Continued

Parameter	% Recovery	QC Criteria
Volatile Organics by MCP 8260B LCS for sample(s) 01-03 (WG171150)		
Methyl tert butyl ether	103	70-130
p/m-Xylene	114	70-130
o-Xylene	110	70-130
cis-1,2-Dichloroethene	102	70-130
Dibromomethane	105	70-130
1,2,3-Trichloropropane	110	70-130
Styrene	111	70-130
Dichlorodifluoromethane	77	70-130
Acetone	108	70-130
Carbon disulfide	89	70-130
2-Butanone	104	70-130
4-Methyl-2-pentanone	106	70-130
2-Hexanone	113	70-130
Bromochloromethane	100	70-130
Tetrahydrofuran	103	70-130
2,2-Dichloropropane	110	70-130
1,2-Dibromoethane	110	70-130
1,3-Dichloropropane	108	70-130
1,1,1,2-Tetrachloroethane	108	70-130
Bromobenzene	107	70-130
n-Butylbenzene	107	70-130
sec-Butylbenzene	118	70-130
tert-Butylbenzene	114	70-130
o-Chlorotoluene	112	70-130
p-Chlorotoluene	113	70-130
1,2-Dibromo-3-chloropropane	105	70-130
Hexachlorobutadiene	99	70-130
Isopropylbenzene	112	70-130
p-Isopropyltoluene	117	70-130
Naphthalene	98	70-130
n-Propylbenzene	114	70-130
1,2,3-Trichlorobenzene	94	70-130
1,2,4-Trichlorobenzene	100	70-130
1,3,5-Trimethylbenzene	114	70-130
1,2,4-Trimethylbenzene	118	70-130
Ethyl ether	87	70-130
Isopropyl Ether	86	70-130
Ethyl-Tert-Butyl-Ether	84	70-130
Tertiary-Amyl Methyl Ether	90	70-130
1,4-Dioxane	116	70-130
Surrogate(s)		
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	105	70-130
4-Bromofluorobenzene	101	70-130
Dibromofluoromethane	98	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0405291

Continued

Parameter	% Recovery	QC Criteria
Volatile Petroleum Hydrocarbons LCS for sample(s) 01-03 (WG171120)		
Benzene	102	70-130
Toluene	101	70-130
Ethylbenzene	97	70-130
p/m-Xylene	95	70-130
o-Xylene	95	70-130
Methyl tert butyl ether	107	70-130
Naphthalene	95	70-130
Surrogate(s)		
2,5-Dibromotoluene-PID	106	70-130
2,5-Dibromotoluene-FID	114	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0405291

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 01-03 (WG171074-1)								
Dissolved Metals								
Antimony, Dissolved	ND	mg/l	0.006	54	6010B	0519 17:25	0520 10:03	RW
Arsenic, Dissolved	ND	mg/l	0.005	54	6010B	0519 17:25	0520 10:03	RW
Beryllium, Dissolved	ND	mg/l	0.004	54	6010B	0519 17:25	0520 10:03	RW
Cadmium, Dissolved	ND	mg/l	0.005	54	6010B	0519 17:25	0520 10:03	RW
Chromium, Dissolved	ND	mg/l	0.01	54	6010B	0519 17:25	0520 10:03	RW
Copper, Dissolved	ND	mg/l	0.01	54	6010B	0519 17:25	0520 10:03	RW
Lead, Dissolved	ND	mg/l	0.010	54	6010B	0519 17:25	0520 10:03	RW
Nickel, Dissolved	ND	mg/l	0.025	54	6010B	0519 17:25	0520 10:03	RW
Selenium, Dissolved	ND	mg/l	0.005	54	6010B	0519 17:25	0520 10:03	RW
Silver, Dissolved	ND	mg/l	0.007	54	6010B	0519 17:25	0520 10:03	RW
Thallium, Dissolved	ND	mg/l	0.002	54	7841	0519 17:25	0520 09:33	AJ
Zinc, Dissolved	ND	mg/l	0.05	54	6010B	0519 17:25	0520 10:03	RW
Blank Analysis for sample(s) 01-03 (WG171059-1)								
Dissolved Metals								
Mercury, Dissolved	ND	mg/l	0.0005	54	7470A	0519 19:00	0520 09:11	DM
Blank Analysis for sample(s) 01-03 (WG171150-2)								
Volatile Organics by MCP 8260B				54	8260B		0520 09:56	RY
Methylene chloride	ND	ug/l	5.0					
1,1-Dichloroethane	ND	ug/l	0.75					
Chloroform	ND	ug/l	0.75					
Carbon tetrachloride	ND	ug/l	0.50					
1,2-Dichloropropane	ND	ug/l	1.8					
Dibromochloromethane	ND	ug/l	0.50					
1,1,2-Trichloroethane	ND	ug/l	0.75					
Tetrachloroethene	ND	ug/l	0.50					
Chlorobenzene	ND	ug/l	0.50					
Trichlorofluoromethane	ND	ug/l	2.5					
1,2-Dichloroethane	ND	ug/l	0.50					
1,1,1-Trichloroethane	ND	ug/l	0.50					
Bromodichloromethane	ND	ug/l	0.50					
trans-1,3-Dichloropropene	ND	ug/l	0.50					
cis-1,3-Dichloropropene	ND	ug/l	0.50					
1,1-Dichloropropene	ND	ug/l	2.5					
Bromoform	ND	ug/l	2.0					
1,1,2,2-Tetrachloroethane	ND	ug/l	0.50					
Benzene	ND	ug/l	0.50					
Toluene	ND	ug/l	0.75					
Ethylbenzene	ND	ug/l	0.50					
Chloromethane	ND	ug/l	2.5					
Bromomethane	ND	ug/l	1.0					
Vinyl chloride	ND	ug/l	1.0					
Chloroethane	ND	ug/l	1.0					
1,1-Dichloroethene	ND	ug/l	0.50					

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0405291

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 01-03 (WG171150-2)							
Volatile Organics by MCP 8260B continued				54 8260B		0520 09:56	RY
trans-1,2-Dichloroethene	ND	ug/l	0.75				
Trichloroethene	ND	ug/l	0.50				
1,2-Dichlorobenzene	ND	ug/l	2.5				
1,3-Dichlorobenzene	ND	ug/l	2.5				
1,4-Dichlorobenzene	ND	ug/l	2.5				
Methyl tert butyl ether	ND	ug/l	1.0				
p/m-Xylene	ND	ug/l	0.50				
o-Xylene	ND	ug/l	0.50				
cis-1,2-Dichloroethene	ND	ug/l	0.50				
Dibromomethane	ND	ug/l	5.0				
1,2,3-Trichloropropane	ND	ug/l	5.0				
Styrene	ND	ug/l	0.50				
Dichlorodifluoromethane	ND	ug/l	5.0				
Acetone	ND	ug/l	5.0				
Carbon disulfide	ND	ug/l	5.0				
2-Butanone	ND	ug/l	5.0				
4-Methyl-2-pentanone	ND	ug/l	5.0				
2-Hexanone	ND	ug/l	5.0				
Bromochloromethane	ND	ug/l	2.5				
Tetrahydrofuran	ND	ug/l	10.				
2,2-Dichloropropane	ND	ug/l	2.5				
1,2-Dibromoethane	ND	ug/l	2.0				
1,3-Dichloropropane	ND	ug/l	2.5				
1,1,1,2-Tetrachloroethane	ND	ug/l	0.50				
Bromobenzene	ND	ug/l	2.5				
n-Butylbenzene	ND	ug/l	0.50				
sec-Butylbenzene	ND	ug/l	0.50				
tert-Butylbenzene	ND	ug/l	2.5				
o-Chlorotoluene	ND	ug/l	2.5				
p-Chlorotoluene	ND	ug/l	2.5				
1,2-Dibromo-3-chloropropane	ND	ug/l	2.5				
Hexachlorobutadiene	ND	ug/l	1.0				
Isopropylbenzene	ND	ug/l	0.50				
p-Isopropyltoluene	ND	ug/l	0.50				
Naphthalene	ND	ug/l	2.5				
n-Propylbenzene	ND	ug/l	0.50				
1,2,3-Trichlorobenzene	ND	ug/l	2.5				
1,2,4-Trichlorobenzene	ND	ug/l	2.5				
1,3,5-Trimethylbenzene	ND	ug/l	2.5				
1,2,4-Trimethylbenzene	ND	ug/l	2.5				
Ethyl ether	ND	ug/l	2.5				
Isopropyl Ether	ND	ug/l	2.0				
Ethyl-Tert-Butyl-Ether	ND	ug/l	2.0				
Tertiary-Amyl Methyl Ether	ND	ug/l	2.0				
1,4-Dioxane	ND	ug/l	250				

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0405291

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 01-03 (WG171150-2)							
Volatile Organics by MCP 8260B continued				54 8260B		0520 09:56	RY
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	99.0	%	70-130				
Toluene-d8	104.	%	70-130				
4-Bromofluorobenzene	116.	%	70-130				
Dibromofluoromethane	97.0	%	70-130				
Blank Analysis for sample(s) 01-03 (WG171120-4)							
Volatile Petroleum Hydrocarbons				47 98-1		0520 08:51	MM
C5-C8 Aliphatics, Unadjusted	ND	ug/l	40.0				
C9-C12 Aliphatics, Unadjusted	ND	ug/l	40.0				
C9-C10 Aromatics	ND	ug/l	40.0				
C5-C8 Aliphatics, Adjusted	ND	ug/l	40.0				
C9-C12 Aliphatics, Adjusted	ND	ug/l	40.0				
Surrogate(s)	Recovery		QC Criteria				
2,5-Dibromotoluene-PID	102.	%	70-130				
2,5-Dibromotoluene-FID	112.	%	70-130				

REFERENCES

47. Method for the Determination of Volatile Petroleum Hydrocarbons (VPH), Massachusetts Department of Environmental Protection, (MADEP-VPH-98-1), January 1998.

54. Compendium of Quality Assurance and Quality Control Requirements and Performance Standards for Selected Analytical Methods. MADEP BWSC. Final Methods. May 2003.

GLOSSARY OF TERMS AND SYMBOLS

REF Reference number in which test method may be found.
METHOD Method number by which analysis was performed.
ID Initials of the analyst.
ND Not detected in comparison to the reported detection limit.

Please note that all solid samples are reported on dry weight basis unless noted otherwise.

LIMITATION OF LIABILITIES

Alpha Analytical, Inc. performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical, Inc., shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical, Inc. be held liable for any incidental consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical, Inc.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding times and splitting of samples in the field.

ALPHA ANALYTICAL LABORATORIES
LOGIN SPECIFIC INFORMATION

Laboratory Job Number: L0405291

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	pH	Temp	Pres	Seal	Analysis
L0405291-01A	Plastic 500ml HNO3 preserved	A	<2	7.2 C	Y	Absent	AG-SI, AS-SI, BE-SI, CD-SI, CR-SI, CU-SI, HG-S, NI-SI, PB-SI, PREPS, SB-SI, SE-SI, TL-SF, ZN-SI
L0405291-01B	Vial HCl preserved	A	NA	7.2 C	Y	Absent	MCP-8260
L0405291-01C	Vial HCl preserved	A	NA	7.2 C	Y	Absent	MCP-8260
L0405291-01D	Vial HCl preserved	A	NA	7.2 C	Y	Absent	VPH
L0405291-01E	Vial HCl preserved	A	NA	7.2 C	Y	Absent	VPH
L0405291-02A	Plastic 500ml HNO3 preserved	A	<2	7.2 C	Y	Absent	AG-SI, AS-SI, BE-SI, CD-SI, CR-SI, CU-SI, HG-S, NI-SI, PB-SI, PREPS, SB-SI, SE-SI, TL-SF, ZN-SI
L0405291-02B	Vial HCl preserved	A	NA	7.2 C	Y	Absent	MCP-8260
L0405291-02C	Vial HCl preserved	A	NA	7.2 C	Y	Absent	MCP-8260
L0405291-02D	Vial HCl preserved	A	NA	7.2 C	Y	Absent	VPH
L0405291-02E	Vial HCl preserved	A	NA	7.2 C	Y	Absent	VPH
L0405291-03A	Plastic 500ml HNO3 preserved	A	<2	7.2 C	Y	Absent	AG-SI, AS-SI, BE-SI, CD-SI, CR-SI, CU-SI, HG-S, NI-SI, PB-SI, PREPS, SB-SI, SE-SI, TL-SF, ZN-SI
L0405291-03B	Vial HCl preserved	A	NA	7.2 C	Y	Absent	MCP-8260
L0405291-03C	Vial HCl preserved	A	NA	7.2 C	Y	Absent	MCP-8260
L0405291-03D	Vial HCl preserved	A	NA	7.2 C	Y	Absent	VPH
L0405291-03E	Vial HCl preserved	A	NA	7.2 C	Y	Absent	VPH

Container Comments

Container ID	Comments
L0405291-01A	Samples received directly from site on ice.
L0405291-01B	Samples received directly from site on ice.
L0405291-01C	Samples received directly from site on ice.
L0405291-01D	Samples received directly from site on ice.
L0405291-01E	Samples received directly from site on ice.
L0405291-02A	Samples received directly from site on ice.
L0405291-02B	Samples received directly from site on ice.
L0405291-02C	Samples received directly from site on ice.

ALPHA ANALYTICAL LABORATORIES
LOGIN SPECIFIC INFORMATION

Laboratory Job Number: L0405291

Continued

Container ID	Comments
L0405291-02D	Samples received directly from site on ice.
L0405291-02E	Samples received directly from site on ice.
L0405291-03A	Samples received directly from site on ice.
L0405291-03B	Samples received directly from site on ice.
L0405291-03C	Samples received directly from site on ice.
L0405291-03D	Samples received directly from site on ice.
L0405291-03E	Samples received directly from site on ice.

APPENDIX E

MAY 19, 2004
SOIL AND GROUNDWATER ANALYTICAL DATA

ALPHA ANALYTICAL LABORATORIES

Eight Walkup Drive
Westborough, Massachusetts 01581-1019
(508) 898-9220 www.alphalab.com

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

CERTIFICATE OF ANALYSIS

Client: URS Corporation

Address: 5 Industrial Way

Salem, NH 03079

Attn: Ms. Amy Pollock

Project Number: 15260048

Site: BERKELEY - WORCESTER COMMONS

Laboratory Job Number: L0405294

Date Received: 19-MAY-2004

Date Reported: 21-MAY-2004

Delivery Method: Client

The following questions pertain only to MCP Analytical Methods

An affirmative response to questions A,B,C & D is required for "Presumptive Certainty" status

A. Were all samples received by the laboratory in a condition consistent with those described on their Chain-of-Custody documentation for the data set?	YES
B. Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	YES
C. Does the analytical data included in this report meet all the requirements for "Presumptive Certainty", as described in section 2.0 of the MADEP document CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	YES
D. **VPH and EPH methods only:** Was the VPH or EPH method run without significant modifications, as specified in Section 11.3?	YES

A response to questions E and F is required for "Presumptive Certainty" status

E. Were all QC performance standards and recommendations for the specified method(s) achieved?	NO
F. Were results for all analyte-list compounds/elements for the specified method(s) reported?	NO

Any answers of NO to the above questions are addressed in the case narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized by: Scott McLean
This document electronically signed

ALPHA ANALYTICAL LABORATORIES

Laboratory Job Number: L0405294
Date Reported: 21-MAY-2004

ALPHA SAMPLE NUMBER	CLIENT IDENTIFICATION	SAMPLE LOCATION
L0405294-01	B-7 (0-6")	WORCESTER, MA
L0405294-02	B-7 (19.5-20')	WORCESTER, MA
L0405294-03	B-8 (0-6")	WORCESTER, MA
L0405294-04	B-8 (18.5-19')	WORCESTER, MA
L0405294-05	B-9 (0-6")	WORCESTER, MA
L0405294-06	B-9 (11.5-12')	WORCESTER, MA
L0405294-07	B-11 (0-6")	WORCESTER, MA
L0405294-08	B-11 (7-7.5')	WORCESTER, MA

ALPHA ANALYTICAL LABORATORIES
NARRATIVE REPORT

Laboratory Job Number: L0405294

MCP Related Narratives

Report Submission

In reference to question F, at the client's request, the samples were analyzed only for the compounds specified on the chain of custody.

Metals

L0405294-01 and L0405294-03 have elevated limits of detection for Thallium due to the 5x dilution required by the spectral interferences encountered during the analysis.

Volatile Organics

In reference to question E:

L0405294-01 is reported with one internal standard below, and one surrogate % recovery (4-Bromofluorobenzene) above, the acceptance criteria for the method. Re-analysis achieved similar results.

L0405294-03 is reported with one surrogate % recovery (4-Bromofluorobenzene 135%) from the May 20th analysis above the acceptance criteria for the method. The analysis from the 21st is reported with one internal standard below, and one surrogate % recovery (4-Bromofluorobenzene) above, the acceptance criteria for the method.

L0405294-07 is reported with one surrogate % recovery (4-Bromofluorobenzene) above the acceptance criteria for the method.

The LCS % recovery for Bromomethane, a difficult analyte, associated with L0405294-03, -04, -06 and -07, is below the acceptance criteria for the method.

The LCS % recoveries for Chloromethane and Bromomethane, both difficult analytes, associated with L0405294-05, -07 and -08, are below the acceptance criteria for the method.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405294-01
B-7 (0-6")
Sample Matrix: SOIL

Date Collected: 19-MAY-2004 09:35
Date Received : 19-MAY-2004
Date Reported : 21-MAY-2004

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 1-Amber,1-Plastic,3-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total	86.	%	0.10	30	2540G		0519 21:00	NS
Total Metals				1	3051			
Antimony, Total	ND	mg/kg	2.3	54	6010B	0519 16:00	0520 12:16	RW
Arsenic, Total	21.	mg/kg	0.46	54	6010B	0519 16:00	0520 12:16	RW
Beryllium, Total	0.37	mg/kg	0.23	54	6010B	0519 16:00	0520 12:16	RW
Cadmium, Total	ND	mg/kg	0.46	54	6010B	0519 16:00	0520 12:16	RW
Chromium, Total	28.	mg/kg	0.46	54	6010B	0519 16:00	0520 12:16	RW
Copper, Total	15.	mg/kg	0.46	54	6010B	0519 16:00	0520 12:16	RW
Lead, Total	19.	mg/kg	2.3	54	6010B	0519 16:00	0520 12:16	RW
Mercury, Total	ND	mg/kg	0.09	54	7471A	0519 18:20	0520 10:43	DM
Nickel, Total	15.	mg/kg	1.1	54	6010B	0519 16:00	0520 12:16	RW
Selenium, Total	ND	mg/kg	0.92	54	6010B	0519 16:00	0520 12:16	RW
Silver, Total	ND	mg/kg	0.46	54	6010B	0519 16:00	0520 12:16	RW
Thallium, Total	ND	mg/kg	2.3	54	6010B	0519 16:00	0521 12:27	RW
Zinc, Total	34.	mg/kg	2.3	54	6010B	0519 16:00	0520 12:16	RW
Volatile Organics by MCP 8260B/5035-Low				54	8260B		0521 10:07	RY
Methylene chloride	ND	ug/kg	15.					
1,1-Dichloroethane	ND	ug/kg	2.2					
Chloroform	ND	ug/kg	2.2					
Carbon tetrachloride	ND	ug/kg	1.5					
1,2-Dichloropropane	ND	ug/kg	5.2					
Dibromochloromethane	ND	ug/kg	1.5					
1,1,2-Trichloroethane	ND	ug/kg	2.2					
Tetrachloroethene	ND	ug/kg	1.5					
Chlorobenzene	ND	ug/kg	1.5					
Trichlorofluoromethane	ND	ug/kg	7.4					
1,2-Dichloroethane	ND	ug/kg	1.5					
1,1,1-Trichloroethane	ND	ug/kg	1.5					
Bromodichloromethane	ND	ug/kg	1.5					
trans-1,3-Dichloropropene	ND	ug/kg	1.5					
cis-1,3-Dichloropropene	ND	ug/kg	1.5					
1,1-Dichloropropene	ND	ug/kg	7.4					
Bromoform	ND	ug/kg	6.0					
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.5					
Benzene	ND	ug/kg	1.5					
Toluene	ND	ug/kg	2.2					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-01
B-7 (0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 10:07	RY
Ethylbenzene	ND	ug/kg	1.5				
Chloromethane	ND	ug/kg	7.4				
Bromomethane	ND	ug/kg	3.0				
Vinyl chloride	ND	ug/kg	3.0				
Chloroethane	ND	ug/kg	3.0				
1,1-Dichloroethene	ND	ug/kg	1.5				
trans-1,2-Dichloroethene	ND	ug/kg	2.2				
Trichloroethene	ND	ug/kg	1.5				
1,2-Dichlorobenzene	ND	ug/kg	7.4				
1,3-Dichlorobenzene	ND	ug/kg	7.4				
1,4-Dichlorobenzene	ND	ug/kg	7.4				
Methyl tert butyl ether	ND	ug/kg	3.0				
p/m-Xylene	ND	ug/kg	1.5				
o-Xylene	ND	ug/kg	1.5				
cis-1,2-Dichloroethene	ND	ug/kg	1.5				
Dibromomethane	ND	ug/kg	15.				
1,2,3-Trichloropropane	ND	ug/kg	15.				
Styrene	ND	ug/kg	1.5				
Dichlorodifluoromethane	ND	ug/kg	15.				
Acetone	44.	ug/kg	15.				
Carbon disulfide	ND	ug/kg	15.				
2-Butanone	ND	ug/kg	15.				
4-Methyl-2-pentanone	ND	ug/kg	15.				
2-Hexanone	ND	ug/kg	15.				
Bromochloromethane	ND	ug/kg	7.4				
Tetrahydrofuran	ND	ug/kg	30.				
2,2-Dichloropropane	ND	ug/kg	7.4				
1,2-Dibromoethane	ND	ug/kg	6.0				
1,3-Dichloropropane	ND	ug/kg	7.4				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.5				
Bromobenzene	ND	ug/kg	7.4				
n-Butylbenzene	ND	ug/kg	1.5				
sec-Butylbenzene	ND	ug/kg	1.5				
tert-Butylbenzene	ND	ug/kg	7.4				
o-Chlorotoluene	ND	ug/kg	7.4				
p-Chlorotoluene	ND	ug/kg	7.4				
1,2-Dibromo-3-chloropropane	ND	ug/kg	7.4				
Hexachlorobutadiene	ND	ug/kg	7.4				
Isopropylbenzene	ND	ug/kg	1.5				
p-Isopropyltoluene	ND	ug/kg	1.5				
Naphthalene	ND	ug/kg	7.4				
n-Propylbenzene	ND	ug/kg	1.5				
1,2,3-Trichlorobenzene	ND	ug/kg	7.4				
1,2,4-Trichlorobenzene	ND	ug/kg	7.4				
1,3,5-Trimethylbenzene	ND	ug/kg	7.4				
1,2,4-Trimethylbenzene	ND	ug/kg	7.4				
Ethyl ether	ND	ug/kg	7.4				
Isopropyl Ether	ND	ug/kg	6.0				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	6.0				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-01
B-7 (0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 10:07	RY
Tertiary-Amyl Methyl Ether	ND	ug/kg	6.0				
1,4-Dioxane	ND	ug/kg	740				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	123.	%	70-130				
Toluene-d8	107.	%	70-130				
4-Bromofluorobenzene	141.	%	70-130				
Dibromofluoromethane	118.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0521 12:29	RY
Methylene chloride	ND	ug/kg	23.				
1,1-Dichloroethane	ND	ug/kg	3.5				
Chloroform	ND	ug/kg	3.5				
Carbon tetrachloride	ND	ug/kg	2.3				
1,2-Dichloropropane	ND	ug/kg	8.1				
Dibromochloromethane	ND	ug/kg	2.3				
1,1,2-Trichloroethane	ND	ug/kg	3.5				
Tetrachloroethene	ND	ug/kg	2.3				
Chlorobenzene	ND	ug/kg	2.3				
Trichlorofluoromethane	ND	ug/kg	12.				
1,2-Dichloroethane	ND	ug/kg	2.3				
1,1,1-Trichloroethane	ND	ug/kg	2.3				
Bromodichloromethane	ND	ug/kg	2.3				
trans-1,3-Dichloropropene	ND	ug/kg	2.3				
cis-1,3-Dichloropropene	ND	ug/kg	2.3				
1,1-Dichloropropene	ND	ug/kg	12.				
Bromoform	ND	ug/kg	9.3				
1,1,2,2-Tetrachloroethane	ND	ug/kg	2.3				
Benzene	ND	ug/kg	2.3				
Toluene	ND	ug/kg	3.5				
Ethylbenzene	ND	ug/kg	2.3				
Chloromethane	ND	ug/kg	12.				
Bromomethane	ND	ug/kg	4.6				
Vinyl chloride	ND	ug/kg	4.6				
Chloroethane	ND	ug/kg	4.6				
1,1-Dichloroethene	ND	ug/kg	2.3				
trans-1,2-Dichloroethene	ND	ug/kg	3.5				
Trichloroethene	ND	ug/kg	2.3				
1,2-Dichlorobenzene	ND	ug/kg	12.				
1,3-Dichlorobenzene	ND	ug/kg	12.				
1,4-Dichlorobenzene	ND	ug/kg	12.				
Methyl tert butyl ether	ND	ug/kg	4.6				
p/m-Xylene	ND	ug/kg	2.3				
o-Xylene	ND	ug/kg	2.3				
cis-1,2-Dichloroethene	ND	ug/kg	2.3				
Dibromomethane	ND	ug/kg	23.				
1,2,3-Trichloropropane	ND	ug/kg	23.				
Styrene	ND	ug/kg	2.3				
Dichlorodifluoromethane	ND	ug/kg	23.				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-01
B-7 (0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 12:29	RY
Acetone	36.	ug/kg	23.				
Carbon disulfide	ND	ug/kg	23.				
2-Butanone	ND	ug/kg	23.				
4-Methyl-2-pentanone	ND	ug/kg	23.				
2-Hexanone	ND	ug/kg	23.				
Bromochloromethane	ND	ug/kg	12.				
Tetrahydrofuran	ND	ug/kg	46.				
2,2-Dichloropropane	ND	ug/kg	12.				
1,2-Dibromoethane	ND	ug/kg	9.3				
1,3-Dichloropropane	ND	ug/kg	12.				
1,1,1,2-Tetrachloroethane	ND	ug/kg	2.3				
Bromobenzene	ND	ug/kg	12.				
n-Butylbenzene	ND	ug/kg	2.3				
sec-Butylbenzene	ND	ug/kg	2.3				
tert-Butylbenzene	ND	ug/kg	12.				
o-Chlorotoluene	ND	ug/kg	12.				
p-Chlorotoluene	ND	ug/kg	12.				
1,2-Dibromo-3-chloropropane	ND	ug/kg	12.				
Hexachlorobutadiene	ND	ug/kg	12.				
Isopropylbenzene	ND	ug/kg	2.3				
p-Isopropyltoluene	ND	ug/kg	2.3				
Naphthalene	ND	ug/kg	12.				
n-Propylbenzene	ND	ug/kg	2.3				
1,2,3-Trichlorobenzene	ND	ug/kg	12.				
1,2,4-Trichlorobenzene	ND	ug/kg	12.				
1,3,5-Trimethylbenzene	ND	ug/kg	12.				
1,2,4-Trimethylbenzene	ND	ug/kg	12.				
Ethyl ether	ND	ug/kg	12.				
Isopropyl Ether	ND	ug/kg	9.3				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	9.3				
Tertiary-Amyl Methyl Ether	ND	ug/kg	9.3				
1,4-Dioxane	ND	ug/kg	1200				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	124.	%	70-130				
Toluene-d8	111.	%	70-130				
4-Bromofluorobenzene	154.	%	70-130				
Dibromofluoromethane	118.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0521 10:07	RY
Tentatively Identified Compounds							
Unknown C3H6 Isomer	3.5	ug/kg					
Pentanal	12.	ug/kg					
2-Furancarboxaldehyde	5.9	ug/kg					
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0521 12:29	RY
Pentanal	18.	ug/kg					
Hexanal	180	ug/kg					
2-Furancarboxaldehyde	4.8	ug/kg					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-01
B-7 (0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0520 15:33	MM

Quality Control Information

Condition of sample received: Satisfactory
Sample temperature upon receipt: Received on Ice
Were samples received in methanol? Yes (Covering the Soil)
Methanol ratio: Below 1:1 +/- 25%
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	ND	mg/kg	4.10
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	4.10
C9-C10 Aromatics	ND	mg/kg	4.10
C5-C8 Aliphatics, Adjusted	ND	mg/kg	4.10
C9-C12 Aliphatics, Adjusted	ND	mg/kg	4.10

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	92.0	%	70-130
2,5-Dibromotoluene-FID	105.	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405294-02
B-7 (19.5-20')
Sample Matrix: SOIL

Date Collected: 19-MAY-2004 10:05
Date Received : 19-MAY-2004
Date Reported : 21-MAY-2004

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 1-Amber,1-Plastic,3-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total	94.	%	0.10	30	2540G		0519 21:00	NS
Total Metals				1	3051			
Antimony, Total	ND	mg/kg	2.1	54	6010B	0519 16:00	0520 12:20	RW
Arsenic, Total	14.	mg/kg	0.41	54	6010B	0519 16:00	0520 12:20	RW
Beryllium, Total	0.23	mg/kg	0.21	54	6010B	0519 16:00	0520 12:20	RW
Cadmium, Total	ND	mg/kg	0.41	54	6010B	0519 16:00	0520 12:20	RW
Chromium, Total	9.9	mg/kg	0.41	54	6010B	0519 16:00	0520 12:20	RW
Copper, Total	7.8	mg/kg	0.41	54	6010B	0519 16:00	0520 12:20	RW
Lead, Total	4.7	mg/kg	2.1	54	6010B	0519 16:00	0520 12:20	RW
Mercury, Total	ND	mg/kg	0.08	54	7471A	0519 18:20	0520 10:44	DM
Nickel, Total	11.	mg/kg	1.0	54	6010B	0519 16:00	0520 12:20	RW
Selenium, Total	ND	mg/kg	0.82	54	6010B	0519 16:00	0520 12:20	RW
Silver, Total	ND	mg/kg	0.41	54	6010B	0519 16:00	0520 12:20	RW
Thallium, Total	ND	mg/kg	0.41	54	6010B	0519 16:00	0520 12:20	RW
Zinc, Total	21.	mg/kg	2.1	54	6010B	0519 16:00	0520 12:20	RW
Volatile Organics by MCP 8260B/5035-Low				54	8260B		0521 10:43	RY
Methylene chloride	ND	ug/kg	12.					
1,1-Dichloroethane	ND	ug/kg	1.8					
Chloroform	ND	ug/kg	1.8					
Carbon tetrachloride	ND	ug/kg	1.2					
1,2-Dichloropropane	ND	ug/kg	4.1					
Dibromochloromethane	ND	ug/kg	1.2					
1,1,2-Trichloroethane	ND	ug/kg	1.8					
Tetrachloroethene	ND	ug/kg	1.2					
Chlorobenzene	ND	ug/kg	1.2					
Trichlorofluoromethane	ND	ug/kg	5.9					
1,2-Dichloroethane	ND	ug/kg	1.2					
1,1,1-Trichloroethane	ND	ug/kg	1.2					
Bromodichloromethane	ND	ug/kg	1.2					
trans-1,3-Dichloropropene	ND	ug/kg	1.2					
cis-1,3-Dichloropropene	ND	ug/kg	1.2					
1,1-Dichloropropene	ND	ug/kg	5.9					
Bromoform	ND	ug/kg	4.7					
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.2					
Benzene	ND	ug/kg	1.2					
Toluene	ND	ug/kg	1.8					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-02
B-7 (19.5-20')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 10:43	RY
Ethylbenzene	ND	ug/kg	1.2				
Chloromethane	ND	ug/kg	5.9				
Bromomethane	ND	ug/kg	2.4				
Vinyl chloride	ND	ug/kg	2.4				
Chloroethane	ND	ug/kg	2.4				
1,1-Dichloroethene	ND	ug/kg	1.2				
trans-1,2-Dichloroethene	ND	ug/kg	1.8				
Trichloroethene	ND	ug/kg	1.2				
1,2-Dichlorobenzene	ND	ug/kg	5.9				
1,3-Dichlorobenzene	ND	ug/kg	5.9				
1,4-Dichlorobenzene	ND	ug/kg	5.9				
Methyl tert butyl ether	ND	ug/kg	2.4				
p/m-Xylene	ND	ug/kg	1.2				
o-Xylene	ND	ug/kg	1.2				
cis-1,2-Dichloroethene	ND	ug/kg	1.2				
Dibromomethane	ND	ug/kg	12.				
1,2,3-Trichloropropane	ND	ug/kg	12.				
Styrene	ND	ug/kg	1.2				
Dichlorodifluoromethane	ND	ug/kg	12.				
Acetone	ND	ug/kg	12.				
Carbon disulfide	ND	ug/kg	12.				
2-Butanone	ND	ug/kg	12.				
4-Methyl-2-pentanone	ND	ug/kg	12.				
2-Hexanone	ND	ug/kg	12.				
Bromochloromethane	ND	ug/kg	5.9				
Tetrahydrofuran	ND	ug/kg	24.				
2,2-Dichloropropane	ND	ug/kg	5.9				
1,2-Dibromoethane	ND	ug/kg	4.7				
1,3-Dichloropropane	ND	ug/kg	5.9				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.2				
Bromobenzene	ND	ug/kg	5.9				
n-Butylbenzene	ND	ug/kg	1.2				
sec-Butylbenzene	ND	ug/kg	1.2				
tert-Butylbenzene	ND	ug/kg	5.9				
o-Chlorotoluene	ND	ug/kg	5.9				
p-Chlorotoluene	ND	ug/kg	5.9				
1,2-Dibromo-3-chloropropane	ND	ug/kg	5.9				
Hexachlorobutadiene	ND	ug/kg	5.9				
Isopropylbenzene	ND	ug/kg	1.2				
p-Isopropyltoluene	ND	ug/kg	1.2				
Naphthalene	ND	ug/kg	5.9				
n-Propylbenzene	ND	ug/kg	1.2				
1,2,3-Trichlorobenzene	ND	ug/kg	5.9				
1,2,4-Trichlorobenzene	ND	ug/kg	5.9				
1,3,5-Trimethylbenzene	ND	ug/kg	5.9				
1,2,4-Trimethylbenzene	ND	ug/kg	5.9				
Ethyl ether	ND	ug/kg	5.9				
Isopropyl Ether	ND	ug/kg	4.7				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	4.7				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-02
B-7 (19.5-20')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 10:43	RY
Tertiary-Amyl Methyl Ether	ND	ug/kg	4.7				
1,4-Dioxane	ND	ug/kg	590				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	124.	%	70-130				
Toluene-d8	103.	%	70-130				
4-Bromofluorobenzene	114.	%	70-130				
Dibromofluoromethane	116.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0521 10:43	RY
Tentatively Identified Compounds							
No Tentatively Identified Compounds	ND	ug/kg					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-02
B-7 (19.5-20')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0520 16:25	MM

Quality Control Information

Condition of sample received: Satisfactory
Sample temperature upon receipt: Received on Ice
Were samples received in methanol? Yes (Covering the Soil)
Methanol ratio: Below 1:1 +/- 25%
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	ND	mg/kg	3.26
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	3.26
C9-C10 Aromatics	ND	mg/kg	3.26
C5-C8 Aliphatics, Adjusted	ND	mg/kg	3.26
C9-C12 Aliphatics, Adjusted	ND	mg/kg	3.26

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	84.0	%	70-130
2,5-Dibromotoluene-FID	97.0	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405294-03
B-8 (0-6")
Sample Matrix: SOIL

Date Collected: 19-MAY-2004 11:15
Date Received : 19-MAY-2004
Date Reported : 21-MAY-2004

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 1-Amber,1-Plastic,3-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total	84.	%	0.10	30	2540G		0519 21:00	NS
Total Metals				1	3051			
Antimony, Total	ND	mg/kg	2.3	54	6010B	0519 16:00	0520 12:24	RW
Arsenic, Total	17.	mg/kg	0.47	54	6010B	0519 16:00	0520 12:24	RW
Beryllium, Total	0.46	mg/kg	0.23	54	6010B	0519 16:00	0520 12:24	RW
Cadmium, Total	ND	mg/kg	0.47	54	6010B	0519 16:00	0520 12:24	RW
Chromium, Total	35.	mg/kg	0.47	54	6010B	0519 16:00	0520 12:24	RW
Copper, Total	16.	mg/kg	0.47	54	6010B	0519 16:00	0520 12:24	RW
Lead, Total	15.	mg/kg	2.3	54	6010B	0519 16:00	0520 12:24	RW
Mercury, Total	ND	mg/kg	0.09	54	7471A	0519 18:20	0520 10:46	DM
Nickel, Total	20.	mg/kg	1.2	54	6010B	0519 16:00	0520 12:24	RW
Selenium, Total	ND	mg/kg	0.93	54	6010B	0519 16:00	0520 12:24	RW
Silver, Total	ND	mg/kg	0.47	54	6010B	0519 16:00	0520 12:24	RW
Thallium, Total	ND	mg/kg	2.3	54	6010B	0519 16:00	0521 12:30	RW
Zinc, Total	100	mg/kg	2.3	54	6010B	0519 16:00	0520 12:24	RW
Volatile Organics by MCP 8260B/5035-Low				54	8260B		0520 19:38	RY
Methylene chloride	ND	ug/kg	11.					
1,1-Dichloroethane	ND	ug/kg	1.6					
Chloroform	ND	ug/kg	1.6					
Carbon tetrachloride	ND	ug/kg	1.1					
1,2-Dichloropropane	ND	ug/kg	3.7					
Dibromochloromethane	ND	ug/kg	1.1					
1,1,2-Trichloroethane	ND	ug/kg	1.6					
Tetrachloroethene	99.	ug/kg	1.1					
Chlorobenzene	ND	ug/kg	1.1					
Trichlorofluoromethane	ND	ug/kg	5.3					
1,2-Dichloroethane	ND	ug/kg	1.1					
1,1,1-Trichloroethane	ND	ug/kg	1.1					
Bromodichloromethane	ND	ug/kg	1.1					
trans-1,3-Dichloropropene	ND	ug/kg	1.1					
cis-1,3-Dichloropropene	ND	ug/kg	1.1					
1,1-Dichloropropene	ND	ug/kg	5.3					
Bromoform	ND	ug/kg	4.2					
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.1					
Benzene	ND	ug/kg	1.1					
Toluene	ND	ug/kg	1.6					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-03
B-8 (0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0520 19:38	RY
Ethylbenzene	ND	ug/kg	1.1				
Chloromethane	ND	ug/kg	5.3				
Bromomethane	ND	ug/kg	2.1				
Vinyl chloride	ND	ug/kg	2.1				
Chloroethane	ND	ug/kg	2.1				
1,1-Dichloroethene	ND	ug/kg	1.1				
trans-1,2-Dichloroethene	ND	ug/kg	1.6				
Trichloroethene	ND	ug/kg	1.1				
1,2-Dichlorobenzene	ND	ug/kg	5.3				
1,3-Dichlorobenzene	ND	ug/kg	5.3				
1,4-Dichlorobenzene	ND	ug/kg	5.3				
Methyl tert butyl ether	ND	ug/kg	2.1				
p/m-Xylene	ND	ug/kg	1.1				
o-Xylene	ND	ug/kg	1.1				
cis-1,2-Dichloroethene	ND	ug/kg	1.1				
Dibromomethane	ND	ug/kg	11.				
1,2,3-Trichloropropane	ND	ug/kg	11.				
Styrene	ND	ug/kg	1.1				
Dichlorodifluoromethane	ND	ug/kg	11.				
Acetone	13.	ug/kg	11.				
Carbon disulfide	ND	ug/kg	11.				
2-Butanone	ND	ug/kg	11.				
4-Methyl-2-pentanone	ND	ug/kg	11.				
2-Hexanone	ND	ug/kg	11.				
Bromochloromethane	ND	ug/kg	5.3				
Tetrahydrofuran	ND	ug/kg	21.				
2,2-Dichloropropane	ND	ug/kg	5.3				
1,2-Dibromoethane	ND	ug/kg	4.2				
1,3-Dichloropropane	ND	ug/kg	5.3				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.1				
Bromobenzene	ND	ug/kg	5.3				
n-Butylbenzene	ND	ug/kg	1.1				
sec-Butylbenzene	ND	ug/kg	1.1				
tert-Butylbenzene	ND	ug/kg	5.3				
o-Chlorotoluene	ND	ug/kg	5.3				
p-Chlorotoluene	ND	ug/kg	5.3				
1,2-Dibromo-3-chloropropane	ND	ug/kg	5.3				
Hexachlorobutadiene	ND	ug/kg	5.3				
Isopropylbenzene	ND	ug/kg	1.1				
p-Isopropyltoluene	ND	ug/kg	1.1				
Naphthalene	ND	ug/kg	5.3				
n-Propylbenzene	ND	ug/kg	1.1				
1,2,3-Trichlorobenzene	ND	ug/kg	5.3				
1,2,4-Trichlorobenzene	ND	ug/kg	5.3				
1,3,5-Trimethylbenzene	ND	ug/kg	5.3				
1,2,4-Trimethylbenzene	ND	ug/kg	5.3				
Ethyl ether	ND	ug/kg	5.3				
Isopropyl Ether	ND	ug/kg	4.2				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	4.2				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-03
B-8 (0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0520 19:38	RY
Tertiary-Amyl Methyl Ether	ND	ug/kg	4.2				
1,4-Dioxane	ND	ug/kg	530				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	126.	%	70-130				
Toluene-d8	105.	%	70-130				
4-Bromofluorobenzene	135.	%	70-130				
Dibromofluoromethane	116.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0521 11:53	RY
Methylene chloride	ND	ug/kg	13.				
1,1-Dichloroethane	ND	ug/kg	2.0				
Chloroform	ND	ug/kg	2.0				
Carbon tetrachloride	ND	ug/kg	1.3				
1,2-Dichloropropane	ND	ug/kg	4.6				
Dibromochloromethane	ND	ug/kg	1.3				
1,1,2-Trichloroethane	ND	ug/kg	2.0				
Tetrachloroethene	160	ug/kg	1.3				
Chlorobenzene	ND	ug/kg	1.3				
Trichlorofluoromethane	ND	ug/kg	6.6				
1,2-Dichloroethane	ND	ug/kg	1.3				
1,1,1-Trichloroethane	ND	ug/kg	1.3				
Bromodichloromethane	ND	ug/kg	1.3				
trans-1,3-Dichloropropene	ND	ug/kg	1.3				
cis-1,3-Dichloropropene	ND	ug/kg	1.3				
1,1-Dichloropropene	ND	ug/kg	6.6				
Bromoform	ND	ug/kg	5.3				
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.3				
Benzene	ND	ug/kg	1.3				
Toluene	ND	ug/kg	2.0				
Ethylbenzene	ND	ug/kg	1.3				
Chloromethane	ND	ug/kg	6.6				
Bromomethane	ND	ug/kg	2.6				
Vinyl chloride	ND	ug/kg	2.6				
Chloroethane	ND	ug/kg	2.6				
1,1-Dichloroethene	ND	ug/kg	1.3				
trans-1,2-Dichloroethene	ND	ug/kg	2.0				
Trichloroethene	ND	ug/kg	1.3				
1,2-Dichlorobenzene	ND	ug/kg	6.6				
1,3-Dichlorobenzene	ND	ug/kg	6.6				
1,4-Dichlorobenzene	ND	ug/kg	6.6				
Methyl tert butyl ether	ND	ug/kg	2.6				
p/m-Xylene	ND	ug/kg	1.3				
o-Xylene	ND	ug/kg	1.3				
cis-1,2-Dichloroethene	ND	ug/kg	1.3				
Dibromomethane	ND	ug/kg	13.				
1,2,3-Trichloropropane	ND	ug/kg	13.				
Styrene	ND	ug/kg	1.3				
Dichlorodifluoromethane	ND	ug/kg	13.				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-03
B-8 (0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 11:53	RY
Acetone	16.	ug/kg	13.				
Carbon disulfide	ND	ug/kg	13.				
2-Butanone	ND	ug/kg	13.				
4-Methyl-2-pentanone	ND	ug/kg	13.				
2-Hexanone	ND	ug/kg	13.				
Bromochloromethane	ND	ug/kg	6.6				
Tetrahydrofuran	ND	ug/kg	26.				
2,2-Dichloropropane	ND	ug/kg	6.6				
1,2-Dibromoethane	ND	ug/kg	5.3				
1,3-Dichloropropane	ND	ug/kg	6.6				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.3				
Bromobenzene	ND	ug/kg	6.6				
n-Butylbenzene	ND	ug/kg	1.3				
sec-Butylbenzene	ND	ug/kg	1.3				
tert-Butylbenzene	ND	ug/kg	6.6				
o-Chlorotoluene	ND	ug/kg	6.6				
p-Chlorotoluene	ND	ug/kg	6.6				
1,2-Dibromo-3-chloropropane	ND	ug/kg	6.6				
Hexachlorobutadiene	ND	ug/kg	6.6				
Isopropylbenzene	ND	ug/kg	1.3				
p-Isopropyltoluene	ND	ug/kg	1.3				
Naphthalene	ND	ug/kg	6.6				
n-Propylbenzene	ND	ug/kg	1.3				
1,2,3-Trichlorobenzene	ND	ug/kg	6.6				
1,2,4-Trichlorobenzene	ND	ug/kg	6.6				
1,3,5-Trimethylbenzene	ND	ug/kg	6.6				
1,2,4-Trimethylbenzene	ND	ug/kg	6.6				
Ethyl ether	ND	ug/kg	6.6				
Isopropyl Ether	ND	ug/kg	5.3				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	5.3				
Tertiary-Amyl Methyl Ether	ND	ug/kg	5.3				
1,4-Dioxane	ND	ug/kg	660				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	125.	%	70-130				
Toluene-d8	108.	%	70-130				
4-Bromofluorobenzene	145.	%	70-130				
Dibromofluoromethane	118.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0520 19:38	RY
Tentatively Identified Compounds							
No Tentatively Identified Compounds	ND	ug/kg					
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0521 11:53	RY
No Tentatively Identified Compounds	ND	ug/kg					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-03
B-8 (0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0520 13:51	MM

Quality Control Information

Condition of sample received: Satisfactory
Sample temperature upon receipt: Received on Ice
Were samples received in methanol? Yes (Covering the Soil)
Methanol ratio: Below 1:1 +/- 25%
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	ND	mg/kg	4.15
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	4.15
C9-C10 Aromatics	ND	mg/kg	4.15
C5-C8 Aliphatics, Adjusted	ND	mg/kg	4.15
C9-C12 Aliphatics, Adjusted	ND	mg/kg	4.15

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	84.0	%	70-130
2,5-Dibromotoluene-FID	94.0	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405294-04
B-8 (18.5-19')
Sample Matrix: SOIL

Date Collected: 19-MAY-2004 12:15
Date Received : 19-MAY-2004
Date Reported : 21-MAY-2004

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 1-Amber,1-Plastic,3-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total	87.	%	0.10	30	2540G		0519 21:00	NS
Total Metals				1	3051			
Antimony, Total	ND	mg/kg	2.2	54	6010B	0519 16:00	0520 12:27	RW
Arsenic, Total	17.	mg/kg	0.45	54	6010B	0519 16:00	0520 12:27	RW
Beryllium, Total	ND	mg/kg	0.22	54	6010B	0519 16:00	0520 12:27	RW
Cadmium, Total	ND	mg/kg	0.45	54	6010B	0519 16:00	0520 12:27	RW
Chromium, Total	6.9	mg/kg	0.45	54	6010B	0519 16:00	0520 12:27	RW
Copper, Total	7.8	mg/kg	0.45	54	6010B	0519 16:00	0520 12:27	RW
Lead, Total	3.2	mg/kg	2.2	54	6010B	0519 16:00	0520 12:27	RW
Mercury, Total	ND	mg/kg	0.08	54	7471A	0519 18:20	0520 10:48	DM
Nickel, Total	8.9	mg/kg	1.1	54	6010B	0519 16:00	0520 12:27	RW
Selenium, Total	ND	mg/kg	0.90	54	6010B	0519 16:00	0520 12:27	RW
Silver, Total	ND	mg/kg	0.45	54	6010B	0519 16:00	0520 12:27	RW
Thallium, Total	ND	mg/kg	0.45	54	6010B	0519 16:00	0520 12:27	RW
Zinc, Total	16.	mg/kg	2.2	54	6010B	0519 16:00	0520 12:27	RW
Volatile Organics by MCP 8260B/5035-Low				54	8260B		0520 20:14	RY
Methylene chloride	ND	ug/kg	15.					
1,1-Dichloroethane	ND	ug/kg	2.2					
Chloroform	ND	ug/kg	2.2					
Carbon tetrachloride	ND	ug/kg	1.5					
1,2-Dichloropropane	ND	ug/kg	5.2					
Dibromochloromethane	ND	ug/kg	1.5					
1,1,2-Trichloroethane	ND	ug/kg	2.2					
Tetrachloroethene	ND	ug/kg	1.5					
Chlorobenzene	ND	ug/kg	1.5					
Trichlorofluoromethane	ND	ug/kg	7.4					
1,2-Dichloroethane	ND	ug/kg	1.5					
1,1,1-Trichloroethane	ND	ug/kg	1.5					
Bromodichloromethane	ND	ug/kg	1.5					
trans-1,3-Dichloropropene	ND	ug/kg	1.5					
cis-1,3-Dichloropropene	ND	ug/kg	1.5					
1,1-Dichloropropene	ND	ug/kg	7.4					
Bromoform	ND	ug/kg	5.9					
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.5					
Benzene	ND	ug/kg	1.5					
Toluene	ND	ug/kg	2.2					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-04
B-8 (18.5-19')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0520 20:14	RY
Ethylbenzene	ND	ug/kg	1.5				
Chloromethane	ND	ug/kg	7.4				
Bromomethane	ND	ug/kg	2.9				
Vinyl chloride	ND	ug/kg	2.9				
Chloroethane	ND	ug/kg	2.9				
1,1-Dichloroethene	ND	ug/kg	1.5				
trans-1,2-Dichloroethene	ND	ug/kg	2.2				
Trichloroethene	ND	ug/kg	1.5				
1,2-Dichlorobenzene	ND	ug/kg	7.4				
1,3-Dichlorobenzene	ND	ug/kg	7.4				
1,4-Dichlorobenzene	ND	ug/kg	7.4				
Methyl tert butyl ether	ND	ug/kg	2.9				
p/m-Xylene	ND	ug/kg	1.5				
o-Xylene	ND	ug/kg	1.5				
cis-1,2-Dichloroethene	ND	ug/kg	1.5				
Dibromomethane	ND	ug/kg	15.				
1,2,3-Trichloropropane	ND	ug/kg	15.				
Styrene	ND	ug/kg	1.5				
Dichlorodifluoromethane	ND	ug/kg	15.				
Acetone	ND	ug/kg	15.				
Carbon disulfide	ND	ug/kg	15.				
2-Butanone	ND	ug/kg	15.				
4-Methyl-2-pentanone	ND	ug/kg	15.				
2-Hexanone	ND	ug/kg	15.				
Bromochloromethane	ND	ug/kg	7.4				
Tetrahydrofuran	ND	ug/kg	29.				
2,2-Dichloropropane	ND	ug/kg	7.4				
1,2-Dibromoethane	ND	ug/kg	5.9				
1,3-Dichloropropane	ND	ug/kg	7.4				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.5				
Bromobenzene	ND	ug/kg	7.4				
n-Butylbenzene	ND	ug/kg	1.5				
sec-Butylbenzene	ND	ug/kg	1.5				
tert-Butylbenzene	ND	ug/kg	7.4				
o-Chlorotoluene	ND	ug/kg	7.4				
p-Chlorotoluene	ND	ug/kg	7.4				
1,2-Dibromo-3-chloropropane	ND	ug/kg	7.4				
Hexachlorobutadiene	ND	ug/kg	7.4				
Isopropylbenzene	ND	ug/kg	1.5				
p-Isopropyltoluene	ND	ug/kg	1.5				
Naphthalene	ND	ug/kg	7.4				
n-Propylbenzene	ND	ug/kg	1.5				
1,2,3-Trichlorobenzene	ND	ug/kg	7.4				
1,2,4-Trichlorobenzene	ND	ug/kg	7.4				
1,3,5-Trimethylbenzene	ND	ug/kg	7.4				
1,2,4-Trimethylbenzene	ND	ug/kg	7.4				
Ethyl ether	ND	ug/kg	7.4				
Isopropyl Ether	ND	ug/kg	5.9				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	5.9				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-04
B-8 (18.5-19')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0520 20:14	RY
Tertiary-Amyl Methyl Ether	ND	ug/kg	5.9				
1,4-Dioxane	ND	ug/kg	740				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	126.	%	70-130				
Toluene-d8	103.	%	70-130				
4-Bromofluorobenzene	113.	%	70-130				
Dibromofluoromethane	114.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0520 20:14	RY
Tentatively Identified Compounds							
No Tentatively Identified Compounds	ND	ug/kg					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-04
B-8 (18.5-19')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0520 14:42	MM

Quality Control Information

Condition of sample received: Satisfactory
Sample temperature upon receipt: Received on Ice
Were samples received in methanol? Yes (Covering the Soil)
Methanol ratio: Below 1:1 +/- 25%
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	ND	mg/kg	4.01
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	4.01
C9-C10 Aromatics	ND	mg/kg	4.01
C5-C8 Aliphatics, Adjusted	ND	mg/kg	4.01
C9-C12 Aliphatics, Adjusted	ND	mg/kg	4.01

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	93.0	%	70-130
2,5-Dibromotoluene-FID	106.	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405294-05
B-9 (0-6")
Sample Matrix: SOIL

Date Collected: 19-MAY-2004 14:30
Date Received : 19-MAY-2004
Date Reported : 21-MAY-2004

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 1-Amber,1-Plastic,3-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total	96.	%	0.10	30	2540G		0519 21:00	NS
Total Metals				1	3051			
Antimony, Total	ND	mg/kg	2.1	54	6010B	0519 16:00	0520 12:44	RW
Arsenic, Total	43.	mg/kg	0.41	54	6010B	0519 16:00	0520 12:44	RW
Beryllium, Total	0.29	mg/kg	0.21	54	6010B	0519 16:00	0520 12:44	RW
Cadmium, Total	ND	mg/kg	0.41	54	6010B	0519 16:00	0520 12:44	RW
Chromium, Total	14.	mg/kg	0.41	54	6010B	0519 16:00	0520 12:44	RW
Copper, Total	22.	mg/kg	0.41	54	6010B	0519 16:00	0520 12:44	RW
Lead, Total	16.	mg/kg	2.1	54	6010B	0519 16:00	0520 12:44	RW
Mercury, Total	ND	mg/kg	0.08	54	7471A	0519 18:20	0520 10:50	DM
Nickel, Total	19.	mg/kg	1.0	54	6010B	0519 16:00	0520 12:44	RW
Selenium, Total	ND	mg/kg	0.83	54	6010B	0519 16:00	0520 12:44	RW
Silver, Total	ND	mg/kg	0.41	54	6010B	0519 16:00	0520 12:44	RW
Thallium, Total	ND	mg/kg	0.41	54	6010B	0519 16:00	0520 12:44	RW
Zinc, Total	38.	mg/kg	2.1	54	6010B	0519 16:00	0520 12:44	RW
Volatile Organics by MCP 8260B/5035-Low				54	8260B		0520 14:14	RY
Methylene chloride	ND	ug/kg	10.					
1,1-Dichloroethane	ND	ug/kg	1.6					
Chloroform	ND	ug/kg	1.6					
Carbon tetrachloride	ND	ug/kg	1.0					
1,2-Dichloropropane	ND	ug/kg	3.6					
Dibromochloromethane	ND	ug/kg	1.0					
1,1,2-Trichloroethane	ND	ug/kg	1.6					
Tetrachloroethene	ND	ug/kg	1.0					
Chlorobenzene	ND	ug/kg	1.0					
Trichlorofluoromethane	ND	ug/kg	5.2					
1,2-Dichloroethane	ND	ug/kg	1.0					
1,1,1-Trichloroethane	ND	ug/kg	1.0					
Bromodichloromethane	ND	ug/kg	1.0					
trans-1,3-Dichloropropene	ND	ug/kg	1.0					
cis-1,3-Dichloropropene	ND	ug/kg	1.0					
1,1-Dichloropropene	ND	ug/kg	5.2					
Bromoform	ND	ug/kg	4.2					
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.0					
Benzene	ND	ug/kg	1.0					
Toluene	ND	ug/kg	1.6					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-05
B-9 (0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0520 14:14	RY
Ethylbenzene	ND	ug/kg	1.0				
Chloromethane	ND	ug/kg	5.2				
Bromomethane	ND	ug/kg	2.1				
Vinyl chloride	ND	ug/kg	2.1				
Chloroethane	ND	ug/kg	2.1				
1,1-Dichloroethene	ND	ug/kg	1.0				
trans-1,2-Dichloroethene	ND	ug/kg	1.6				
Trichloroethene	ND	ug/kg	1.0				
1,2-Dichlorobenzene	ND	ug/kg	5.2				
1,3-Dichlorobenzene	ND	ug/kg	5.2				
1,4-Dichlorobenzene	ND	ug/kg	5.2				
Methyl tert butyl ether	ND	ug/kg	2.1				
p/m-Xylene	ND	ug/kg	1.0				
o-Xylene	ND	ug/kg	1.0				
cis-1,2-Dichloroethene	ND	ug/kg	1.0				
Dibromomethane	ND	ug/kg	10.				
1,2,3-Trichloropropane	ND	ug/kg	10.				
Styrene	ND	ug/kg	1.0				
Dichlorodifluoromethane	ND	ug/kg	10.				
Acetone	ND	ug/kg	10.				
Carbon disulfide	ND	ug/kg	10.				
2-Butanone	ND	ug/kg	10.				
4-Methyl-2-pentanone	ND	ug/kg	10.				
2-Hexanone	ND	ug/kg	10.				
Bromochloromethane	ND	ug/kg	5.2				
Tetrahydrofuran	ND	ug/kg	21.				
2,2-Dichloropropane	ND	ug/kg	5.2				
1,2-Dibromoethane	ND	ug/kg	4.2				
1,3-Dichloropropane	ND	ug/kg	5.2				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.0				
Bromobenzene	ND	ug/kg	5.2				
n-Butylbenzene	ND	ug/kg	1.0				
sec-Butylbenzene	ND	ug/kg	1.0				
tert-Butylbenzene	ND	ug/kg	5.2				
o-Chlorotoluene	ND	ug/kg	5.2				
p-Chlorotoluene	ND	ug/kg	5.2				
1,2-Dibromo-3-chloropropane	ND	ug/kg	5.2				
Hexachlorobutadiene	ND	ug/kg	5.2				
Isopropylbenzene	ND	ug/kg	1.0				
p-Isopropyltoluene	ND	ug/kg	1.0				
Naphthalene	ND	ug/kg	5.2				
n-Propylbenzene	ND	ug/kg	1.0				
1,2,3-Trichlorobenzene	ND	ug/kg	5.2				
1,2,4-Trichlorobenzene	ND	ug/kg	5.2				
1,3,5-Trimethylbenzene	ND	ug/kg	5.2				
1,2,4-Trimethylbenzene	ND	ug/kg	5.2				
Ethyl ether	ND	ug/kg	5.2				
Isopropyl Ether	ND	ug/kg	4.2				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	4.2				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-05
B-9 (0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0520 14:14	RY
Tertiary-Amyl Methyl Ether	ND	ug/kg	4.2				
1,4-Dioxane	ND	ug/kg	520				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	114.	%	70-130				
Toluene-d8	95.0	%	70-130				
4-Bromofluorobenzene	121.	%	70-130				
Dibromofluoromethane	105.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0520 14:14	RY
Tentatively Identified Compounds							
No Tentatively Identified Compounds	ND	ug/kg					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-05
B-9 (0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0520 17:16	MM

Quality Control Information

Condition of sample received: Satisfactory
Sample temperature upon receipt: Received on Ice
Were samples received in methanol? Yes (Covering the Soil)
Methanol ratio: Below 1:1 +/- 25%
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	ND	mg/kg	3.91
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	3.91
C9-C10 Aromatics	ND	mg/kg	3.91
C5-C8 Aliphatics, Adjusted	ND	mg/kg	3.91
C9-C12 Aliphatics, Adjusted	ND	mg/kg	3.91

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	92.0	%	70-130
2,5-Dibromotoluene-FID	105.	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405294-06
B-9 (11.5-12')
Sample Matrix: SOIL

Date Collected: 19-MAY-2004 14:40
Date Received : 19-MAY-2004
Date Reported : 21-MAY-2004

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 1-Amber,1-Plastic,3-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total	81.	%	0.10	30	2540G		0519 21:00	NS
Total Metals				1	3051			
Antimony, Total	ND	mg/kg	2.4	54	6010B	0519 16:00	0520 12:48	RW
Arsenic, Total	12.	mg/kg	0.49	54	6010B	0519 16:00	0520 12:48	RW
Beryllium, Total	ND	mg/kg	0.24	54	6010B	0519 16:00	0520 12:48	RW
Cadmium, Total	ND	mg/kg	0.49	54	6010B	0519 16:00	0520 12:48	RW
Chromium, Total	6.7	mg/kg	0.49	54	6010B	0519 16:00	0520 12:48	RW
Copper, Total	5.5	mg/kg	0.49	54	6010B	0519 16:00	0520 12:48	RW
Lead, Total	3.0	mg/kg	2.4	54	6010B	0519 16:00	0520 12:48	RW
Mercury, Total	ND	mg/kg	0.1	54	7471A	0519 18:20	0520 10:52	DM
Nickel, Total	7.3	mg/kg	1.2	54	6010B	0519 16:00	0520 12:48	RW
Selenium, Total	ND	mg/kg	0.98	54	6010B	0519 16:00	0520 12:48	RW
Silver, Total	ND	mg/kg	0.49	54	6010B	0519 16:00	0520 12:48	RW
Thallium, Total	ND	mg/kg	0.49	54	6010B	0519 16:00	0520 12:48	RW
Zinc, Total	15.	mg/kg	2.4	54	6010B	0519 16:00	0520 12:48	RW
Volatile Organics by MCP 8260B/5035-Low				54	8260B		0520 22:00	RY
Methylene chloride	ND	ug/kg	15.					
1,1-Dichloroethane	ND	ug/kg	2.3					
Chloroform	ND	ug/kg	2.3					
Carbon tetrachloride	ND	ug/kg	1.5					
1,2-Dichloropropane	ND	ug/kg	5.4					
Dibromochloromethane	ND	ug/kg	1.5					
1,1,2-Trichloroethane	ND	ug/kg	2.3					
Tetrachloroethene	ND	ug/kg	1.5					
Chlorobenzene	ND	ug/kg	1.5					
Trichlorofluoromethane	ND	ug/kg	7.7					
1,2-Dichloroethane	ND	ug/kg	1.5					
1,1,1-Trichloroethane	ND	ug/kg	1.5					
Bromodichloromethane	ND	ug/kg	1.5					
trans-1,3-Dichloropropene	ND	ug/kg	1.5					
cis-1,3-Dichloropropene	ND	ug/kg	1.5					
1,1-Dichloropropene	ND	ug/kg	7.7					
Bromoform	ND	ug/kg	6.2					
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.5					
Benzene	ND	ug/kg	1.5					
Toluene	ND	ug/kg	2.3					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-06
B-9 (11.5-12')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0520 22:00	RY
Ethylbenzene	ND	ug/kg	1.5				
Chloromethane	ND	ug/kg	7.7				
Bromomethane	ND	ug/kg	3.1				
Vinyl chloride	ND	ug/kg	3.1				
Chloroethane	ND	ug/kg	3.1				
1,1-Dichloroethene	ND	ug/kg	1.5				
trans-1,2-Dichloroethene	ND	ug/kg	2.3				
Trichloroethene	ND	ug/kg	1.5				
1,2-Dichlorobenzene	ND	ug/kg	7.7				
1,3-Dichlorobenzene	ND	ug/kg	7.7				
1,4-Dichlorobenzene	ND	ug/kg	7.7				
Methyl tert butyl ether	ND	ug/kg	3.1				
p/m-Xylene	ND	ug/kg	1.5				
o-Xylene	ND	ug/kg	1.5				
cis-1,2-Dichloroethene	ND	ug/kg	1.5				
Dibromomethane	ND	ug/kg	15.				
1,2,3-Trichloropropane	ND	ug/kg	15.				
Styrene	ND	ug/kg	1.5				
Dichlorodifluoromethane	ND	ug/kg	15.				
Acetone	ND	ug/kg	15.				
Carbon disulfide	ND	ug/kg	15.				
2-Butanone	ND	ug/kg	15.				
4-Methyl-2-pentanone	ND	ug/kg	15.				
2-Hexanone	ND	ug/kg	15.				
Bromochloromethane	ND	ug/kg	7.7				
Tetrahydrofuran	ND	ug/kg	31.				
2,2-Dichloropropane	ND	ug/kg	7.7				
1,2-Dibromoethane	ND	ug/kg	6.2				
1,3-Dichloropropane	ND	ug/kg	7.7				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.5				
Bromobenzene	ND	ug/kg	7.7				
n-Butylbenzene	ND	ug/kg	1.5				
sec-Butylbenzene	ND	ug/kg	1.5				
tert-Butylbenzene	ND	ug/kg	7.7				
o-Chlorotoluene	ND	ug/kg	7.7				
p-Chlorotoluene	ND	ug/kg	7.7				
1,2-Dibromo-3-chloropropane	ND	ug/kg	7.7				
Hexachlorobutadiene	ND	ug/kg	7.7				
Isopropylbenzene	ND	ug/kg	1.5				
p-Isopropyltoluene	ND	ug/kg	1.5				
Naphthalene	ND	ug/kg	7.7				
n-Propylbenzene	ND	ug/kg	1.5				
1,2,3-Trichlorobenzene	ND	ug/kg	7.7				
1,2,4-Trichlorobenzene	ND	ug/kg	7.7				
1,3,5-Trimethylbenzene	ND	ug/kg	7.7				
1,2,4-Trimethylbenzene	ND	ug/kg	7.7				
Ethyl ether	ND	ug/kg	7.7				
Isopropyl Ether	ND	ug/kg	6.2				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	6.2				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-06
B-9 (11.5-12')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0520 22:00	RY
Tertiary-Amyl Methyl Ether	ND	ug/kg	6.2				
1,4-Dioxane	ND	ug/kg	770				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	124.	%	70-130				
Toluene-d8	106.	%	70-130				
4-Bromofluorobenzene	120.	%	70-130				
Dibromofluoromethane	113.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0520 22:00	RY
Tentatively Identified Compounds							
No Tentatively Identified Compounds	ND	ug/kg					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-06
B-9 (11.5-12')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0520 18:08	MM

Quality Control Information

Condition of sample received: Satisfactory
Sample temperature upon receipt: Received on Ice
Were samples received in methanol? Yes (Covering the Soil)
Methanol ratio: Below 1:1 +/- 25%
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	ND	mg/kg	4.21
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	4.21
C9-C10 Aromatics	ND	mg/kg	4.21
C5-C8 Aliphatics, Adjusted	ND	mg/kg	4.21
C9-C12 Aliphatics, Adjusted	ND	mg/kg	4.21

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	93.0	%	70-130
2,5-Dibromotoluene-FID	104.	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405294-07
B-11 (0-6")
Sample Matrix: SOIL

Date Collected: 19-MAY-2004 15:10
Date Received : 19-MAY-2004
Date Reported : 21-MAY-2004

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 1-Amber,1-Plastic,3-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total	90.	%	0.10	30	2540G		0519 21:00	NS
Total Metals				1	3051			
Antimony, Total	ND	mg/kg	2.2	54	6010B	0519 16:00	0520 12:52	RW
Arsenic, Total	9.5	mg/kg	0.44	54	6010B	0519 16:00	0520 12:52	RW
Beryllium, Total	ND	mg/kg	0.22	54	6010B	0519 16:00	0520 12:52	RW
Cadmium, Total	ND	mg/kg	0.44	54	6010B	0519 16:00	0520 12:52	RW
Chromium, Total	13.	mg/kg	0.44	54	6010B	0519 16:00	0520 12:52	RW
Copper, Total	12.	mg/kg	0.44	54	6010B	0519 16:00	0520 12:52	RW
Lead, Total	12.	mg/kg	2.2	54	6010B	0519 16:00	0520 12:52	RW
Mercury, Total	ND	mg/kg	0.09	54	7471A	0519 18:20	0520 10:54	DM
Nickel, Total	6.4	mg/kg	1.1	54	6010B	0519 16:00	0520 12:52	RW
Selenium, Total	ND	mg/kg	0.88	54	6010B	0519 16:00	0520 12:52	RW
Silver, Total	ND	mg/kg	0.44	54	6010B	0519 16:00	0520 12:52	RW
Thallium, Total	ND	mg/kg	0.44	54	6010B	0519 16:00	0520 12:52	RW
Zinc, Total	41.	mg/kg	2.2	54	6010B	0519 16:00	0520 12:52	RW
Volatile Organics by MCP 8260B/5035-Low				54	8260B		0520 12:15	RY
Methylene chloride	ND	ug/kg	12.					
1,1-Dichloroethane	ND	ug/kg	1.8					
Chloroform	ND	ug/kg	1.8					
Carbon tetrachloride	ND	ug/kg	1.2					
1,2-Dichloropropane	ND	ug/kg	4.1					
Dibromochloromethane	ND	ug/kg	1.2					
1,1,2-Trichloroethane	ND	ug/kg	1.8					
Tetrachloroethene	ND	ug/kg	1.2					
Chlorobenzene	ND	ug/kg	1.2					
Trichlorofluoromethane	ND	ug/kg	5.9					
1,2-Dichloroethane	ND	ug/kg	1.2					
1,1,1-Trichloroethane	ND	ug/kg	1.2					
Bromodichloromethane	ND	ug/kg	1.2					
trans-1,3-Dichloropropene	ND	ug/kg	1.2					
cis-1,3-Dichloropropene	ND	ug/kg	1.2					
1,1-Dichloropropene	ND	ug/kg	5.9					
Bromoform	ND	ug/kg	4.7					
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.2					
Benzene	ND	ug/kg	1.2					
Toluene	14.	ug/kg	1.8					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-07
B-11 (0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0520 12:15	RY
Ethylbenzene	ND	ug/kg	1.2				
Chloromethane	ND	ug/kg	5.9				
Bromomethane	ND	ug/kg	2.4				
Vinyl chloride	ND	ug/kg	2.4				
Chloroethane	ND	ug/kg	2.4				
1,1-Dichloroethene	ND	ug/kg	1.2				
trans-1,2-Dichloroethene	ND	ug/kg	1.8				
Trichloroethene	ND	ug/kg	1.2				
1,2-Dichlorobenzene	ND	ug/kg	5.9				
1,3-Dichlorobenzene	ND	ug/kg	5.9				
1,4-Dichlorobenzene	ND	ug/kg	5.9				
Methyl tert butyl ether	ND	ug/kg	2.4				
p/m-Xylene	ND	ug/kg	1.2				
o-Xylene	ND	ug/kg	1.2				
cis-1,2-Dichloroethene	ND	ug/kg	1.2				
Dibromomethane	ND	ug/kg	12.				
1,2,3-Trichloropropane	ND	ug/kg	12.				
Styrene	ND	ug/kg	1.2				
Dichlorodifluoromethane	ND	ug/kg	12.				
Acetone	ND	ug/kg	12.				
Carbon disulfide	ND	ug/kg	12.				
2-Butanone	ND	ug/kg	12.				
4-Methyl-2-pentanone	ND	ug/kg	12.				
2-Hexanone	ND	ug/kg	12.				
Bromochloromethane	ND	ug/kg	5.9				
Tetrahydrofuran	ND	ug/kg	24.				
2,2-Dichloropropane	ND	ug/kg	5.9				
1,2-Dibromoethane	ND	ug/kg	4.7				
1,3-Dichloropropane	ND	ug/kg	5.9				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.2				
Bromobenzene	ND	ug/kg	5.9				
n-Butylbenzene	ND	ug/kg	1.2				
sec-Butylbenzene	ND	ug/kg	1.2				
tert-Butylbenzene	ND	ug/kg	5.9				
o-Chlorotoluene	ND	ug/kg	5.9				
p-Chlorotoluene	ND	ug/kg	5.9				
1,2-Dibromo-3-chloropropane	ND	ug/kg	5.9				
Hexachlorobutadiene	ND	ug/kg	5.9				
Isopropylbenzene	ND	ug/kg	1.2				
p-Isopropyltoluene	ND	ug/kg	1.2				
Naphthalene	ND	ug/kg	5.9				
n-Propylbenzene	ND	ug/kg	1.2				
1,2,3-Trichlorobenzene	ND	ug/kg	5.9				
1,2,4-Trichlorobenzene	ND	ug/kg	5.9				
1,3,5-Trimethylbenzene	ND	ug/kg	5.9				
1,2,4-Trimethylbenzene	ND	ug/kg	5.9				
Ethyl ether	ND	ug/kg	5.9				
Isopropyl Ether	ND	ug/kg	4.7				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	4.7				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-07
B-11 (0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0520 12:15	RY
Tertiary-Amyl Methyl Ether	ND	ug/kg	4.7				
1,4-Dioxane	ND	ug/kg	590				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	115.	%	70-130				
Toluene-d8	98.0	%	70-130				
4-Bromofluorobenzene	140.	%	70-130				
Dibromofluoromethane	111.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0520 21:25	RY
Methylene chloride	ND	ug/kg	9.2				
1,1-Dichloroethane	ND	ug/kg	1.4				
Chloroform	ND	ug/kg	1.4				
Carbon tetrachloride	ND	ug/kg	0.92				
1,2-Dichloropropane	ND	ug/kg	3.2				
Dibromochloromethane	ND	ug/kg	0.92				
1,1,2-Trichloroethane	ND	ug/kg	1.4				
Tetrachloroethene	ND	ug/kg	0.92				
Chlorobenzene	ND	ug/kg	0.92				
Trichlorofluoromethane	ND	ug/kg	4.6				
1,2-Dichloroethane	ND	ug/kg	0.92				
1,1,1-Trichloroethane	ND	ug/kg	0.92				
Bromodichloromethane	ND	ug/kg	0.92				
trans-1,3-Dichloropropene	ND	ug/kg	0.92				
cis-1,3-Dichloropropene	ND	ug/kg	0.92				
1,1-Dichloropropene	ND	ug/kg	4.6				
Bromoform	ND	ug/kg	3.7				
1,1,2,2-Tetrachloroethane	ND	ug/kg	0.92				
Benzene	ND	ug/kg	0.92				
Toluene	12.	ug/kg	1.4				
Ethylbenzene	ND	ug/kg	0.92				
Chloromethane	ND	ug/kg	4.6				
Bromomethane	ND	ug/kg	1.8				
Vinyl chloride	ND	ug/kg	1.8				
Chloroethane	ND	ug/kg	1.8				
1,1-Dichloroethene	ND	ug/kg	0.92				
trans-1,2-Dichloroethene	ND	ug/kg	1.4				
Trichloroethene	ND	ug/kg	0.92				
1,2-Dichlorobenzene	ND	ug/kg	4.6				
1,3-Dichlorobenzene	ND	ug/kg	4.6				
1,4-Dichlorobenzene	ND	ug/kg	4.6				
Methyl tert butyl ether	ND	ug/kg	1.8				
p/m-Xylene	ND	ug/kg	0.92				
o-Xylene	ND	ug/kg	0.92				
cis-1,2-Dichloroethene	ND	ug/kg	0.92				
Dibromomethane	ND	ug/kg	9.2				
1,2,3-Trichloropropane	ND	ug/kg	9.2				
Styrene	ND	ug/kg	0.92				
Dichlorodifluoromethane	ND	ug/kg	9.2				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-07
B-11 (0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0520 21:25	RY
Acetone	ND	ug/kg	9.2				
Carbon disulfide	ND	ug/kg	9.2				
2-Butanone	ND	ug/kg	9.2				
4-Methyl-2-pentanone	ND	ug/kg	9.2				
2-Hexanone	ND	ug/kg	9.2				
Bromochloromethane	ND	ug/kg	4.6				
Tetrahydrofuran	ND	ug/kg	18.				
2,2-Dichloropropane	ND	ug/kg	4.6				
1,2-Dibromoethane	ND	ug/kg	3.7				
1,3-Dichloropropane	ND	ug/kg	4.6				
1,1,1,2-Tetrachloroethane	ND	ug/kg	0.92				
Bromobenzene	ND	ug/kg	4.6				
n-Butylbenzene	ND	ug/kg	0.92				
sec-Butylbenzene	ND	ug/kg	0.92				
tert-Butylbenzene	ND	ug/kg	4.6				
o-Chlorotoluene	ND	ug/kg	4.6				
p-Chlorotoluene	ND	ug/kg	4.6				
1,2-Dibromo-3-chloropropane	ND	ug/kg	4.6				
Hexachlorobutadiene	ND	ug/kg	4.6				
Isopropylbenzene	ND	ug/kg	0.92				
p-Isopropyltoluene	ND	ug/kg	0.92				
Naphthalene	ND	ug/kg	4.6				
n-Propylbenzene	ND	ug/kg	0.92				
1,2,3-Trichlorobenzene	ND	ug/kg	4.6				
1,2,4-Trichlorobenzene	ND	ug/kg	4.6				
1,3,5-Trimethylbenzene	ND	ug/kg	4.6				
1,2,4-Trimethylbenzene	ND	ug/kg	4.6				
Ethyl ether	ND	ug/kg	4.6				
Isopropyl Ether	ND	ug/kg	3.7				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	3.7				
Tertiary-Amyl Methyl Ether	ND	ug/kg	3.7				
1,4-Dioxane	ND	ug/kg	460				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	126.	%	70-130				
Toluene-d8	107.	%	70-130				
4-Bromofluorobenzene	146.	%	70-130				
Dibromofluoromethane	121.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0520 12:15	RY
Tentatively Identified Compounds							
Propene	4.8	ug/kg					
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0520 21:25	RY
Propene	4.1	ug/kg					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-07
B-11 (0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0520 19:00	MM

Quality Control Information

Condition of sample received: Satisfactory
Sample temperature upon receipt: Received on Ice
Were samples received in methanol? Yes (Covering the Soil)
Methanol ratio: Below 1:1 +/- 25%
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	ND	mg/kg	3.55
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	3.55
C9-C10 Aromatics	ND	mg/kg	3.55
C5-C8 Aliphatics, Adjusted	ND	mg/kg	3.55
C9-C12 Aliphatics, Adjusted	ND	mg/kg	3.55

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	86.0	%	70-130
2,5-Dibromotoluene-FID	99.0	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405294-08
B-11 (7-7.5')
Sample Matrix: SOIL

Date Collected: 19-MAY-2004 15:25
Date Received : 19-MAY-2004
Date Reported : 21-MAY-2004

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 1-Amber,1-Plastic,3-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total	90.	%	0.10	30	2540G		0519 21:00	NS
Total Metals				1	3051			
Antimony, Total	ND	mg/kg	2.2	54	6010B	0519 16:00	0520 13:00	RW
Arsenic, Total	19.	mg/kg	0.44	54	6010B	0519 16:00	0520 13:00	RW
Beryllium, Total	0.33	mg/kg	0.22	54	6010B	0519 16:00	0520 13:00	RW
Cadmium, Total	ND	mg/kg	0.44	54	6010B	0519 16:00	0520 13:00	RW
Chromium, Total	23.	mg/kg	0.44	54	6010B	0519 16:00	0520 13:00	RW
Copper, Total	14.	mg/kg	0.44	54	6010B	0519 16:00	0520 13:00	RW
Lead, Total	35.	mg/kg	2.2	54	6010B	0519 16:00	0520 13:00	RW
Mercury, Total	ND	mg/kg	0.09	54	7471A	0519 18:20	0520 10:59	DM
Nickel, Total	13.	mg/kg	1.1	54	6010B	0519 16:00	0520 13:00	RW
Selenium, Total	ND	mg/kg	0.88	54	6010B	0519 16:00	0520 13:00	RW
Silver, Total	ND	mg/kg	0.44	54	6010B	0519 16:00	0520 13:00	RW
Thallium, Total	ND	mg/kg	0.44	54	6010B	0519 16:00	0520 13:00	RW
Zinc, Total	32.	mg/kg	2.2	54	6010B	0519 16:00	0520 13:00	RW
Volatile Organics by MCP 8260B/5035-Low				54	8260B		0520 12:51	RY
Methylene chloride	ND	ug/kg	11.					
1,1-Dichloroethane	ND	ug/kg	1.7					
Chloroform	ND	ug/kg	1.7					
Carbon tetrachloride	ND	ug/kg	1.1					
1,2-Dichloropropane	ND	ug/kg	3.9					
Dibromochloromethane	ND	ug/kg	1.1					
1,1,2-Trichloroethane	ND	ug/kg	1.7					
Tetrachloroethene	ND	ug/kg	1.1					
Chlorobenzene	ND	ug/kg	1.1					
Trichlorofluoromethane	ND	ug/kg	5.6					
1,2-Dichloroethane	ND	ug/kg	1.1					
1,1,1-Trichloroethane	ND	ug/kg	1.1					
Bromodichloromethane	ND	ug/kg	1.1					
trans-1,3-Dichloropropene	ND	ug/kg	1.1					
cis-1,3-Dichloropropene	ND	ug/kg	1.1					
1,1-Dichloropropene	ND	ug/kg	5.6					
Bromoform	ND	ug/kg	4.4					
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.1					
Benzene	ND	ug/kg	1.1					
Toluene	ND	ug/kg	1.7					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-08
B-11 (7-7.5')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0520 12:51	RY
Ethylbenzene	ND	ug/kg	1.1				
Chloromethane	ND	ug/kg	5.6				
Bromomethane	ND	ug/kg	2.2				
Vinyl chloride	ND	ug/kg	2.2				
Chloroethane	ND	ug/kg	2.2				
1,1-Dichloroethene	ND	ug/kg	1.1				
trans-1,2-Dichloroethene	ND	ug/kg	1.7				
Trichloroethene	ND	ug/kg	1.1				
1,2-Dichlorobenzene	ND	ug/kg	5.6				
1,3-Dichlorobenzene	ND	ug/kg	5.6				
1,4-Dichlorobenzene	ND	ug/kg	5.6				
Methyl tert butyl ether	ND	ug/kg	2.2				
p/m-Xylene	ND	ug/kg	1.1				
o-Xylene	ND	ug/kg	1.1				
cis-1,2-Dichloroethene	ND	ug/kg	1.1				
Dibromomethane	ND	ug/kg	11.				
1,2,3-Trichloropropane	ND	ug/kg	11.				
Styrene	ND	ug/kg	1.1				
Dichlorodifluoromethane	ND	ug/kg	11.				
Acetone	ND	ug/kg	11.				
Carbon disulfide	ND	ug/kg	11.				
2-Butanone	ND	ug/kg	11.				
4-Methyl-2-pentanone	ND	ug/kg	11.				
2-Hexanone	ND	ug/kg	11.				
Bromochloromethane	ND	ug/kg	5.6				
Tetrahydrofuran	ND	ug/kg	22.				
2,2-Dichloropropane	ND	ug/kg	5.6				
1,2-Dibromoethane	ND	ug/kg	4.4				
1,3-Dichloropropane	ND	ug/kg	5.6				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.1				
Bromobenzene	ND	ug/kg	5.6				
n-Butylbenzene	ND	ug/kg	1.1				
sec-Butylbenzene	ND	ug/kg	1.1				
tert-Butylbenzene	ND	ug/kg	5.6				
o-Chlorotoluene	ND	ug/kg	5.6				
p-Chlorotoluene	ND	ug/kg	5.6				
1,2-Dibromo-3-chloropropane	ND	ug/kg	5.6				
Hexachlorobutadiene	ND	ug/kg	5.6				
Isopropylbenzene	ND	ug/kg	1.1				
p-Isopropyltoluene	ND	ug/kg	1.1				
Naphthalene	ND	ug/kg	5.6				
n-Propylbenzene	ND	ug/kg	1.1				
1,2,3-Trichlorobenzene	ND	ug/kg	5.6				
1,2,4-Trichlorobenzene	ND	ug/kg	5.6				
1,3,5-Trimethylbenzene	ND	ug/kg	5.6				
1,2,4-Trimethylbenzene	ND	ug/kg	5.6				
Ethyl ether	ND	ug/kg	5.6				
Isopropyl Ether	ND	ug/kg	4.4				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	4.4				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-08
B-11 (7-7.5')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0520 12:51	RY
Tertiary-Amyl Methyl Ether	ND	ug/kg	4.4				
1,4-Dioxane	ND	ug/kg	560				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	110.	%	70-130				
Toluene-d8	97.0	%	70-130				
4-Bromofluorobenzene	117.	%	70-130				
Dibromofluoromethane	108.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0520 12:51	RY
Tentatively Identified Compounds							
No Tentatively Identified Compounds	ND	ug/kg					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405294-08
B-11 (7-7.5')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0520 19:51	MM

Quality Control Information

Condition of sample received: Satisfactory
Sample temperature upon receipt: Received on Ice
Were samples received in methanol? Yes (Covering the Soil)
Methanol ratio: Below 1:1 +/- 25%
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	ND	mg/kg	3.92
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	3.92
C9-C10 Aromatics	ND	mg/kg	3.92
C5-C8 Aliphatics, Adjusted	ND	mg/kg	3.92
C9-C12 Aliphatics, Adjusted	ND	mg/kg	3.92

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	84.0	%	70-130
2,5-Dibromotoluene-FID	96.0	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH DUPLICATE ANALYSIS

Laboratory Job Number: L0405294

Parameter	Value 1	Value 2	Units	RPD	RPD Limits
Solids, Total for sample(s) 01-08 (L0405294-01, WG171060)					
Solids, Total	86.	85.	%	1	
Volatile Petroleum Hydrocarbons for sample(s) 01-08 (L0405266-09, WG171123)					
C5-C8 Aliphatics	ND	ND	mg/kg	NC	50
C9-C12 Aliphatics	ND	ND	mg/kg	NC	50
C9-C10 Aromatics	ND	ND	mg/kg	NC	50
C5-C8 Aliphatics, Adjusted	ND	ND	mg/kg	NC	50
C9-C12 Aliphatics, Adjusted	ND	ND	mg/kg	NC	50
Benzene	ND	ND	mg/kg	NC	50
Toluene	ND	ND	mg/kg	NC	50
Ethylbenzene	ND	ND	mg/kg	NC	50
p/m-Xylene	ND	ND	mg/kg	NC	50
o-Xylene	ND	ND	mg/kg	NC	50
Methyl tert butyl ether	ND	ND	mg/kg	NC	50
Naphthalene	ND	ND	mg/kg	NC	50
Surrogate(s)	Recovery				QC Criteria
2,5-Dibromotoluene-PID	92.0	91.0	%	1	70-130
2,5-Dibromotoluene-FID	106.	104.	%	2	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0405294

Parameter	% Recovery	QC Criteria
Total Metals LCS for sample(s) 01-08 (WG171073)		
Antimony, Total	90	75-125
Arsenic, Total	103	75-125
Beryllium, Total	100	75-125
Cadmium, Total	98	75-125
Chromium, Total	92	75-125
Copper, Total	98	75-125
Lead, Total	98	75-125
Nickel, Total	96	75-125
Selenium, Total	98	75-125
Silver, Total	100	75-125
Thallium, Total	96	75-125
Zinc, Total	100	75-125
Total Metals LCS for sample(s) 01-08 (WG171056)		
Mercury, Total	91	75-125
Volatile Organics by MCP 8260B/5035-Low LCS for sample(s) 05,07-08 (WG171113)		
Methylene chloride	111	70-130
1,1-Dichloroethane	108	70-130
Chloroform	105	70-130
Carbon tetrachloride	99	70-130
1,2-Dichloropropane	107	70-130
Dibromochloromethane	98	70-130
1,1,2-Trichloroethane	105	70-130
Tetrachloroethene	101	70-130
Chlorobenzene	105	70-130
Trichlorofluoromethane	87	70-130
1,2-Dichloroethane	104	70-130
1,1,1-Trichloroethane	105	70-130
Bromodichloromethane	104	70-130
trans-1,3-Dichloropropene	95	70-130
cis-1,3-Dichloropropene	104	70-130
1,1-Dichloropropene	99	70-130
Bromoform	95	70-130
1,1,2,2-Tetrachloroethane	108	70-130
Benzene	106	70-130
Toluene	99	70-130
Ethylbenzene	107	70-130
Chloromethane	67	70-130
Bromomethane	53	70-130
Vinyl chloride	81	70-130
Chloroethane	98	70-130
1,1-Dichloroethene	88	70-130
trans-1,2-Dichloroethene	97	70-130
Trichloroethene	99	70-130
1,2-Dichlorobenzene	104	70-130
1,3-Dichlorobenzene	103	70-130
1,4-Dichlorobenzene	105	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0405294

Continued

Parameter	% Recovery	QC Criteria
Volatile Organics by MCP 8260B/5035-Low LCS for sample(s) 05,07-08 (WG171113)		
Methyl tert butyl ether	104	70-130
p/m-Xylene	111	70-130
o-Xylene	111	70-130
cis-1,2-Dichloroethene	108	70-130
Dibromomethane	109	70-130
1,2,3-Trichloropropane	107	70-130
Styrene	106	70-130
Dichlorodifluoromethane	80	70-130
Acetone	117	70-130
Carbon disulfide	98	70-130
2-Butanone	101	70-130
4-Methyl-2-pentanone	94	70-130
2-Hexanone	88	70-130
Bromochloromethane	110	70-130
Tetrahydrofuran	122	70-130
2,2-Dichloropropane	107	70-130
1,2-Dibromoethane	98	70-130
1,3-Dichloropropane	103	70-130
1,1,1,2-Tetrachloroethane	99	70-130
Bromobenzene	103	70-130
n-Butylbenzene	107	70-130
sec-Butylbenzene	110	70-130
tert-Butylbenzene	100	70-130
o-Chlorotoluene	108	70-130
p-Chlorotoluene	105	70-130
1,2-Dibromo-3-chloropropane	102	70-130
Hexachlorobutadiene	100	70-130
Isopropylbenzene	98	70-130
p-Isopropyltoluene	98	70-130
Naphthalene	93	70-130
n-Propylbenzene	108	70-130
1,2,3-Trichlorobenzene	104	70-130
1,2,4-Trichlorobenzene	92	70-130
1,3,5-Trimethylbenzene	105	70-130
1,2,4-Trimethylbenzene	109	70-130
Ethyl ether	96	70-130
Isopropyl Ether	86	70-130
Ethyl-Tert-Butyl-Ether	85	70-130
Tertiary-Amyl Methyl Ether	90	70-130
1,4-Dioxane	97	70-130
Surrogate(s)		
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	101	70-130
Dibromofluoromethane	106	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0405294

Continued

Parameter	% Recovery	QC Criteria
Volatile Organics by MCP 8260B/5035-Low LCS for sample(s) 03-04,06-07 (WG171113)		
Methylene chloride	106	70-130
1,1-Dichloroethane	104	70-130
Chloroform	99	70-130
Carbon tetrachloride	97	70-130
1,2-Dichloropropane	102	70-130
Dibromochloromethane	98	70-130
1,1,2-Trichloroethane	104	70-130
Tetrachloroethene	101	70-130
Chlorobenzene	101	70-130
Trichlorofluoromethane	99	70-130
1,2-Dichloroethane	100	70-130
1,1,1-Trichloroethane	99	70-130
Bromodichloromethane	96	70-130
trans-1,3-Dichloropropene	102	70-130
cis-1,3-Dichloropropene	99	70-130
1,1-Dichloropropene	102	70-130
Bromoform	93	70-130
1,1,2,2-Tetrachloroethane	105	70-130
Benzene	103	70-130
Toluene	102	70-130
Ethylbenzene	108	70-130
Chloromethane	78	70-130
Bromomethane	58	70-130
Vinyl chloride	99	70-130
Chloroethane	102	70-130
1,1-Dichloroethene	98	70-130
trans-1,2-Dichloroethene	101	70-130
Trichloroethene	94	70-130
1,2-Dichlorobenzene	102	70-130
1,3-Dichlorobenzene	101	70-130
1,4-Dichlorobenzene	100	70-130
Methyl tert butyl ether	97	70-130
p/m-Xylene	110	70-130
o-Xylene	112	70-130
cis-1,2-Dichloroethene	104	70-130
Dibromomethane	99	70-130
1,2,3-Trichloropropane	106	70-130
Styrene	109	70-130
Dichlorodifluoromethane	93	70-130
Acetone	99	70-130
Carbon disulfide	108	70-130
2-Butanone	88	70-130
4-Methyl-2-pentanone	80	70-130
2-Hexanone	84	70-130
Bromochloromethane	102	70-130
Tetrahydrofuran	94	70-130
2,2-Dichloropropane	101	70-130
1,2-Dibromoethane	97	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0405294

Continued

Parameter	% Recovery	QC Criteria
Volatile Organics by MCP 8260B/5035-Low LCS for sample(s) 03-04,06-07 (WG171113)		
1,3-Dichloropropane	101	70-130
1,1,1,2-Tetrachloroethane	98	70-130
Bromobenzene	104	70-130
n-Butylbenzene	108	70-130
sec-Butylbenzene	110	70-130
tert-Butylbenzene	101	70-130
o-Chlorotoluene	108	70-130
p-Chlorotoluene	105	70-130
1,2-Dibromo-3-chloropropane	99	70-130
Hexachlorobutadiene	100	70-130
Isopropylbenzene	99	70-130
p-Isopropyltoluene	100	70-130
Naphthalene	86	70-130
n-Propylbenzene	109	70-130
1,2,3-Trichlorobenzene	99	70-130
1,2,4-Trichlorobenzene	90	70-130
1,3,5-Trimethylbenzene	108	70-130
1,2,4-Trimethylbenzene	108	70-130
Ethyl ether	105	70-130
Isopropyl Ether	100	70-130
Ethyl-Tert-Butyl-Ether	98	70-130
Tertiary-Amyl Methyl Ether	99	70-130
1,4-Dioxane	94	70-130
Surrogate(s)		
1,2-Dichloroethane-d4	110	70-130
Toluene-d8	112	70-130
4-Bromofluorobenzene	108	70-130
Dibromofluoromethane	110	70-130
Volatile Organics by MCP 8260B/5035-Low LCS for sample(s) 01-03 (WG171113)		
Methylene chloride	125	70-130
1,1-Dichloroethane	107	70-130
Chloroform	104	70-130
Carbon tetrachloride	104	70-130
1,2-Dichloropropane	106	70-130
Dibromochloromethane	99	70-130
1,1,2-Trichloroethane	101	70-130
Tetrachloroethene	105	70-130
Chlorobenzene	105	70-130
Trichlorofluoromethane	91	70-130
1,2-Dichloroethane	101	70-130
1,1,1-Trichloroethane	105	70-130
Bromodichloromethane	101	70-130
trans-1,3-Dichloropropene	97	70-130
cis-1,3-Dichloropropene	102	70-130
1,1-Dichloropropene	101	70-130
Bromoform	97	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0405294

Continued

Parameter	% Recovery	QC Criteria
Volatile Organics by MCP 8260B/5035-Low LCS for sample(s) 01-03 (WG171113)		
1,1,2,2-Tetrachloroethane	108	70-130
Benzene	107	70-130
Toluene	102	70-130
Ethylbenzene	109	70-130
Chloromethane	71	70-130
Bromomethane	44	70-130
Vinyl chloride	81	70-130
Chloroethane	96	70-130
1,1-Dichloroethene	88	70-130
trans-1,2-Dichloroethene	98	70-130
Trichloroethene	101	70-130
1,2-Dichlorobenzene	103	70-130
1,3-Dichlorobenzene	104	70-130
1,4-Dichlorobenzene	106	70-130
Methyl tert butyl ether	100	70-130
p/m-Xylene	113	70-130
o-Xylene	111	70-130
cis-1,2-Dichloroethene	107	70-130
Dibromomethane	104	70-130
1,2,3-Trichloropropane	104	70-130
Styrene	107	70-130
Dichlorodifluoromethane	74	70-130
Acetone	102	70-130
Carbon disulfide	93	70-130
2-Butanone	90	70-130
4-Methyl-2-pentanone	83	70-130
2-Hexanone	85	70-130
Bromochloromethane	110	70-130
Tetrahydrofuran	97	70-130
2,2-Dichloropropane	107	70-130
1,2-Dibromoethane	94	70-130
1,3-Dichloropropane	101	70-130
1,1,1,2-Tetrachloroethane	101	70-130
Bromobenzene	104	70-130
n-Butylbenzene	112	70-130
sec-Butylbenzene	116	70-130
tert-Butylbenzene	104	70-130
o-Chlorotoluene	112	70-130
p-Chlorotoluene	108	70-130
1,2-Dibromo-3-chloropropane	103	70-130
Hexachlorobutadiene	101	70-130
Isopropylbenzene	101	70-130
p-Isopropyltoluene	102	70-130
Naphthalene	88	70-130
n-Propylbenzene	114	70-130
1,2,3-Trichlorobenzene	100	70-130
1,2,4-Trichlorobenzene	90	70-130
1,3,5-Trimethylbenzene	109	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0405294

Continued

Parameter	% Recovery	QC Criteria
Volatile Organics by MCP 8260B/5035-Low LCS for sample(s) 01-03 (WG171113)		
1,2,4-Trimethylbenzene	112	70-130
Ethyl ether	88	70-130
Isopropyl Ether	82	70-130
Ethyl-Tert-Butyl-Ether	81	70-130
Tertiary-Amyl Methyl Ether	85	70-130
1,4-Dioxane	90	70-130
Surrogate(s)		
1,2-Dichloroethane-d4	109	70-130
Toluene-d8	108	70-130
4-Bromofluorobenzene	107	70-130
Dibromofluoromethane	109	70-130
Volatile Petroleum Hydrocarbons LCS for sample(s) 01-08 (WG171123)		
Benzene	96	70-130
Toluene	88	70-130
Ethylbenzene	87	70-130
p/m-Xylene	84	70-130
o-Xylene	82	70-130
Methyl tert butyl ether	91	70-130
Naphthalene	92	70-130
Surrogate(s)		
2,5-Dibromotoluene-PID	87	70-130
2,5-Dibromotoluene-FID	102	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0405294

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 01-08 (WG171073-1)								
Total Metals				1	3051			
Antimony, Total	ND	mg/kg	2.0	54	6010B	0519 16:00	0520 12:08	RW
Arsenic, Total	ND	mg/kg	0.40	54	6010B	0519 16:00	0520 12:08	RW
Beryllium, Total	ND	mg/kg	0.20	54	6010B	0519 16:00	0520 12:08	RW
Cadmium, Total	ND	mg/kg	0.40	54	6010B	0519 16:00	0520 12:08	RW
Chromium, Total	ND	mg/kg	0.40	54	6010B	0519 16:00	0520 12:08	RW
Copper, Total	ND	mg/kg	0.40	54	6010B	0519 16:00	0520 12:08	RW
Lead, Total	ND	mg/kg	2.0	54	6010B	0519 16:00	0520 12:08	RW
Nickel, Total	ND	mg/kg	1.0	54	6010B	0519 16:00	0520 12:08	RW
Selenium, Total	ND	mg/kg	0.80	54	6010B	0519 16:00	0520 12:08	RW
Silver, Total	ND	mg/kg	0.40	54	6010B	0519 16:00	0520 12:08	RW
Thallium, Total	ND	mg/kg	0.40	54	6010B	0519 16:00	0520 12:08	RW
Zinc, Total	ND	mg/kg	2.0	54	6010B	0519 16:00	0520 12:08	RW
Blank Analysis for sample(s) 01-08 (WG171056-1)								
Total Metals								
Mercury, Total	ND	mg/kg	0.08	54	7471A	0519 18:20	0520 10:37	DM
Blank Analysis for sample(s) 05,07-08 (WG171113-4)								
Volatile Organics by MCP 8260B/5035-Low				54	8260B		0520 09:54	RY
Methylene chloride	ND	ug/kg	10.					
1,1-Dichloroethane	ND	ug/kg	1.5					
Chloroform	ND	ug/kg	1.5					
Carbon tetrachloride	ND	ug/kg	1.0					
1,2-Dichloropropane	ND	ug/kg	3.5					
Dibromochloromethane	ND	ug/kg	1.0					
1,1,2-Trichloroethane	ND	ug/kg	1.5					
Tetrachloroethene	ND	ug/kg	1.0					
Chlorobenzene	ND	ug/kg	1.0					
Trichlorofluoromethane	ND	ug/kg	5.0					
1,2-Dichloroethane	ND	ug/kg	1.0					
1,1,1-Trichloroethane	ND	ug/kg	1.0					
Bromodichloromethane	ND	ug/kg	1.0					
trans-1,3-Dichloropropene	ND	ug/kg	1.0					
cis-1,3-Dichloropropene	ND	ug/kg	1.0					
1,1-Dichloropropene	ND	ug/kg	5.0					
Bromoform	ND	ug/kg	4.0					
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.0					
Benzene	ND	ug/kg	1.0					
Toluene	ND	ug/kg	1.5					
Ethylbenzene	ND	ug/kg	1.0					
Chloromethane	ND	ug/kg	5.0					
Bromomethane	ND	ug/kg	2.0					
Vinyl chloride	ND	ug/kg	2.0					
Chloroethane	ND	ug/kg	2.0					
1,1-Dichloroethene	ND	ug/kg	1.0					

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0405294

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 05,07-08 (WG171113-4)							
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0520 09:54	RY
trans-1,2-Dichloroethene	ND	ug/kg	1.5				
Trichloroethene	ND	ug/kg	1.0				
1,2-Dichlorobenzene	ND	ug/kg	5.0				
1,3-Dichlorobenzene	ND	ug/kg	5.0				
1,4-Dichlorobenzene	ND	ug/kg	5.0				
Methyl tert butyl ether	ND	ug/kg	2.0				
p/m-Xylene	ND	ug/kg	1.0				
o-Xylene	ND	ug/kg	1.0				
cis-1,2-Dichloroethene	ND	ug/kg	1.0				
Dibromomethane	ND	ug/kg	10.				
1,2,3-Trichloropropane	ND	ug/kg	10.				
Styrene	ND	ug/kg	1.0				
Dichlorodifluoromethane	ND	ug/kg	10.				
Acetone	ND	ug/kg	10.				
Carbon disulfide	ND	ug/kg	10.				
2-Butanone	ND	ug/kg	10.				
4-Methyl-2-pentanone	ND	ug/kg	10.				
2-Hexanone	ND	ug/kg	10.				
Bromochloromethane	ND	ug/kg	5.0				
Tetrahydrofuran	ND	ug/kg	20.				
2,2-Dichloropropane	ND	ug/kg	5.0				
1,2-Dibromoethane	ND	ug/kg	4.0				
1,3-Dichloropropane	ND	ug/kg	5.0				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.0				
Bromobenzene	ND	ug/kg	5.0				
n-Butylbenzene	ND	ug/kg	1.0				
sec-Butylbenzene	ND	ug/kg	1.0				
tert-Butylbenzene	ND	ug/kg	5.0				
o-Chlorotoluene	ND	ug/kg	5.0				
p-Chlorotoluene	ND	ug/kg	5.0				
1,2-Dibromo-3-chloropropane	ND	ug/kg	5.0				
Hexachlorobutadiene	ND	ug/kg	5.0				
Isopropylbenzene	ND	ug/kg	1.0				
p-Isopropyltoluene	ND	ug/kg	1.0				
Naphthalene	ND	ug/kg	5.0				
n-Propylbenzene	ND	ug/kg	1.0				
1,2,3-Trichlorobenzene	ND	ug/kg	5.0				
1,2,4-Trichlorobenzene	ND	ug/kg	5.0				
1,3,5-Trimethylbenzene	ND	ug/kg	5.0				
1,2,4-Trimethylbenzene	ND	ug/kg	5.0				
Ethyl ether	ND	ug/kg	5.0				
Isopropyl Ether	ND	ug/kg	4.0				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	4.0				
Tertiary-Amyl Methyl Ether	ND	ug/kg	4.0				
1,4-Dioxane	ND	ug/kg	500				

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0405294

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 05,07-08 (WG171113-4)							
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0520 09:54	RY
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	110.	%	70-130				
Toluene-d8	95.0	%	70-130				
4-Bromofluorobenzene	107.	%	70-130				
Dibromofluoromethane	99.0	%	70-130				
Blank Analysis for sample(s) 03-04,06-07 (WG171113-6)							
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0520 17:16	RY
Methylene chloride	ND	ug/kg	10.				
1,1-Dichloroethane	ND	ug/kg	1.5				
Chloroform	ND	ug/kg	1.5				
Carbon tetrachloride	ND	ug/kg	1.0				
1,2-Dichloropropane	ND	ug/kg	3.5				
Dibromochloromethane	ND	ug/kg	1.0				
1,1,2-Trichloroethane	ND	ug/kg	1.5				
Tetrachloroethene	ND	ug/kg	1.0				
Chlorobenzene	ND	ug/kg	1.0				
Trichlorofluoromethane	ND	ug/kg	5.0				
1,2-Dichloroethane	ND	ug/kg	1.0				
1,1,1-Trichloroethane	ND	ug/kg	1.0				
Bromodichloromethane	ND	ug/kg	1.0				
trans-1,3-Dichloropropene	ND	ug/kg	1.0				
cis-1,3-Dichloropropene	ND	ug/kg	1.0				
1,1-Dichloropropene	ND	ug/kg	5.0				
Bromoform	ND	ug/kg	4.0				
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.0				
Benzene	ND	ug/kg	1.0				
Toluene	ND	ug/kg	1.5				
Ethylbenzene	ND	ug/kg	1.0				
Chloromethane	ND	ug/kg	5.0				
Bromomethane	ND	ug/kg	2.0				
Vinyl chloride	ND	ug/kg	2.0				
Chloroethane	ND	ug/kg	2.0				
1,1-Dichloroethene	ND	ug/kg	1.0				
trans-1,2-Dichloroethene	ND	ug/kg	1.5				
Trichloroethene	ND	ug/kg	1.0				
1,2-Dichlorobenzene	ND	ug/kg	5.0				
1,3-Dichlorobenzene	ND	ug/kg	5.0				
1,4-Dichlorobenzene	ND	ug/kg	5.0				
Methyl tert butyl ether	ND	ug/kg	2.0				
p/m-Xylene	ND	ug/kg	1.0				
o-Xylene	ND	ug/kg	1.0				
cis-1,2-Dichloroethene	ND	ug/kg	1.0				
Dibromomethane	ND	ug/kg	10.				
1,2,3-Trichloropropane	ND	ug/kg	10.				
Styrene	ND	ug/kg	1.0				
Dichlorodifluoromethane	ND	ug/kg	10.				

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0405294

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 03-04,06-07 (WG171113-6)							
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0520 17:16	RY
Acetone	ND	ug/kg	10.				
Carbon disulfide	ND	ug/kg	10.				
2-Butanone	ND	ug/kg	10.				
4-Methyl-2-pentanone	ND	ug/kg	10.				
2-Hexanone	ND	ug/kg	10.				
Bromochloromethane	ND	ug/kg	5.0				
Tetrahydrofuran	ND	ug/kg	20.				
2,2-Dichloropropane	ND	ug/kg	5.0				
1,2-Dibromoethane	ND	ug/kg	4.0				
1,3-Dichloropropane	ND	ug/kg	5.0				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.0				
Bromobenzene	ND	ug/kg	5.0				
n-Butylbenzene	ND	ug/kg	1.0				
sec-Butylbenzene	ND	ug/kg	1.0				
tert-Butylbenzene	ND	ug/kg	5.0				
o-Chlorotoluene	ND	ug/kg	5.0				
p-Chlorotoluene	ND	ug/kg	5.0				
1,2-Dibromo-3-chloropropane	ND	ug/kg	5.0				
Hexachlorobutadiene	ND	ug/kg	5.0				
Isopropylbenzene	ND	ug/kg	1.0				
p-Isopropyltoluene	ND	ug/kg	1.0				
Naphthalene	ND	ug/kg	5.0				
n-Propylbenzene	ND	ug/kg	1.0				
1,2,3-Trichlorobenzene	ND	ug/kg	5.0				
1,2,4-Trichlorobenzene	ND	ug/kg	5.0				
1,3,5-Trimethylbenzene	ND	ug/kg	5.0				
1,2,4-Trimethylbenzene	ND	ug/kg	5.0				
Ethyl ether	ND	ug/kg	5.0				
Isopropyl Ether	ND	ug/kg	4.0				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	4.0				
Tertiary-Amyl Methyl Ether	ND	ug/kg	4.0				
1,4-Dioxane	ND	ug/kg	500				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	124.	%	70-130				
Toluene-d8	105.	%	70-130				
4-Bromofluorobenzene	115.	%	70-130				
Dibromofluoromethane	106.	%	70-130				
Blank Analysis for sample(s) 01-03 (WG171113-8)							
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0521 09:32	RY
Methylene chloride	ND	ug/kg	10.				
1,1-Dichloroethane	ND	ug/kg	1.5				
Chloroform	ND	ug/kg	1.5				
Carbon tetrachloride	ND	ug/kg	1.0				
1,2-Dichloropropane	ND	ug/kg	3.5				
Dibromochloromethane	ND	ug/kg	1.0				

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0405294

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 01-03 (WG171113-8)							
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 09:32	RY
1,1,2-Trichloroethane	ND	ug/kg	1.5				
Tetrachloroethene	ND	ug/kg	1.0				
Chlorobenzene	ND	ug/kg	1.0				
Trichlorofluoromethane	ND	ug/kg	5.0				
1,2-Dichloroethane	ND	ug/kg	1.0				
1,1,1-Trichloroethane	ND	ug/kg	1.0				
Bromodichloromethane	ND	ug/kg	1.0				
trans-1,3-Dichloropropene	ND	ug/kg	1.0				
cis-1,3-Dichloropropene	ND	ug/kg	1.0				
1,1-Dichloropropene	ND	ug/kg	5.0				
Bromoform	ND	ug/kg	4.0				
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.0				
Benzene	ND	ug/kg	1.0				
Toluene	ND	ug/kg	1.5				
Ethylbenzene	ND	ug/kg	1.0				
Chloromethane	ND	ug/kg	5.0				
Bromomethane	ND	ug/kg	2.0				
Vinyl chloride	ND	ug/kg	2.0				
Chloroethane	ND	ug/kg	2.0				
1,1-Dichloroethene	ND	ug/kg	1.0				
trans-1,2-Dichloroethene	ND	ug/kg	1.5				
Trichloroethene	ND	ug/kg	1.0				
1,2-Dichlorobenzene	ND	ug/kg	5.0				
1,3-Dichlorobenzene	ND	ug/kg	5.0				
1,4-Dichlorobenzene	ND	ug/kg	5.0				
Methyl tert butyl ether	ND	ug/kg	2.0				
p/m-Xylene	ND	ug/kg	1.0				
o-Xylene	ND	ug/kg	1.0				
cis-1,2-Dichloroethene	ND	ug/kg	1.0				
Dibromomethane	ND	ug/kg	10.				
1,2,3-Trichloropropane	ND	ug/kg	10.				
Styrene	ND	ug/kg	1.0				
Dichlorodifluoromethane	ND	ug/kg	10.				
Acetone	ND	ug/kg	10.				
Carbon disulfide	ND	ug/kg	10.				
2-Butanone	ND	ug/kg	10.				
4-Methyl-2-pentanone	ND	ug/kg	10.				
2-Hexanone	ND	ug/kg	10.				
Bromochloromethane	ND	ug/kg	5.0				
Tetrahydrofuran	ND	ug/kg	20.				
2,2-Dichloropropane	ND	ug/kg	5.0				
1,2-Dibromoethane	ND	ug/kg	4.0				
1,3-Dichloropropane	ND	ug/kg	5.0				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.0				
Bromobenzene	ND	ug/kg	5.0				
n-Butylbenzene	ND	ug/kg	1.0				
sec-Butylbenzene	ND	ug/kg	1.0				

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0405294

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 01-03 (WG171113-8)							
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 09:32	RY
tert-Butylbenzene	ND	ug/kg	5.0				
o-Chlorotoluene	ND	ug/kg	5.0				
p-Chlorotoluene	ND	ug/kg	5.0				
1,2-Dibromo-3-chloropropane	ND	ug/kg	5.0				
Hexachlorobutadiene	ND	ug/kg	5.0				
Isopropylbenzene	ND	ug/kg	1.0				
p-Isopropyltoluene	ND	ug/kg	1.0				
Naphthalene	ND	ug/kg	5.0				
n-Propylbenzene	ND	ug/kg	1.0				
1,2,3-Trichlorobenzene	ND	ug/kg	5.0				
1,2,4-Trichlorobenzene	ND	ug/kg	5.0				
1,3,5-Trimethylbenzene	ND	ug/kg	5.0				
1,2,4-Trimethylbenzene	ND	ug/kg	5.0				
Ethyl ether	ND	ug/kg	5.0				
Isopropyl Ether	ND	ug/kg	4.0				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	4.0				
Tertiary-Amyl Methyl Ether	ND	ug/kg	4.0				
1,4-Dioxane	ND	ug/kg	500				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	123.	%	70-130				
Toluene-d8	106.	%	70-130				
4-Bromofluorobenzene	118.	%	70-130				
Dibromofluoromethane	102.	%	70-130				
Blank Analysis for sample(s) 01-08 (WG171123-5)							
Volatile Petroleum Hydrocarbons				47 98-1		0520 08:52	MM
C5-C8 Aliphatics, Unadjusted	ND	mg/kg	2.00				
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	2.00				
C9-C10 Aromatics	ND	mg/kg	2.00				
C5-C8 Aliphatics, Adjusted	ND	mg/kg	2.00				
C9-C12 Aliphatics, Adjusted	ND	mg/kg	2.00				
Surrogate(s)	Recovery		QC Criteria				
2,5-Dibromotoluene-PID	90.0	%	70-130				
2,5-Dibromotoluene-FID	102.	%	70-130				

REFERENCES

1. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IIIA, 1997.

30. Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WPCF. 18th Edition. 1992.

47. Method for the Determination of Volatile Petroleum Hydrocarbons (VPH), Massachusetts Department of Environmental Protection, (MADEP-VPH-98-1), January 1998.

54. Compendium of Quality Assurance and Quality Control Requirements and Performance Standards for Selected Analytical Methods. MADEP BWSC. Final Methods. May 2003.

GLOSSARY OF TERMS AND SYMBOLS

REF Reference number in which test method may be found.
METHOD Method number by which analysis was performed.
ID Initials of the analyst.
ND Not detected in comparison to the reported detection limit.

Please note that all solid samples are reported on dry weight basis unless noted otherwise.

LIMITATION OF LIABILITIES

Alpha Analytical, Inc. performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical, Inc., shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical, Inc. be held liable for any incidental consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical, Inc.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding times and splitting of samples in the field.

ALPHA ANALYTICAL LABORATORIES
LOGIN SPECIFIC INFORMATION

Laboratory Job Number: L0405294

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	pH	Temp	Pres	Seal	Analysis
L0405294-01A	Vial MeOH preserved	A	NA	7.2 C	Y	Absent	VPH
L0405294-01B	Vial NaHSO4 preserved	A	NA	7.2 C	Y	Absent	MCP-8260L-G
L0405294-01C	Vial NaHSO4 preserved	A	NA	7.2 C	Y	Absent	MCP-8260L-G
L0405294-01D	Amber 250ml unpreserved	A	NA	7.2 C	Y	Absent	AG-TI, AS-TI, BE-TI, CD-TI, CR-TI, CU-TI, HG-T, NI-TI, PB-TI, PREPT, SB-TI, SE-TI, TL-TI, ZN-TI
L0405294-01E	Plastic 2oz unpreserved for TS	A	NA	7.2 C	Y	Absent	TS
L0405294-02A	Vial MeOH preserved	A	NA	7.2 C	Y	Absent	VPH
L0405294-02B	Vial NaHSO4 preserved	A	NA	7.2 C	Y	Absent	MCP-8260L-G
L0405294-02C	Vial NaHSO4 preserved	A	NA	7.2 C	Y	Absent	MCP-8260L-G
L0405294-02D	Amber 250ml unpreserved	A	NA	7.2 C	Y	Absent	AG-TI, AS-TI, BE-TI, CD-TI, CR-TI, CU-TI, HG-T, NI-TI, PB-TI, PREPT, SB-TI, SE-TI, TL-TI, ZN-TI
L0405294-02E	Plastic 2oz unpreserved for TS	A	NA	7.2 C	Y	Absent	TS
L0405294-03A	Vial MeOH preserved	A	NA	7.2 C	Y	Absent	VPH
L0405294-03B	Vial NaHSO4 preserved	A	NA	7.2 C	Y	Absent	MCP-8260L-G
L0405294-03C	Vial NaHSO4 preserved	A	NA	7.2 C	Y	Absent	MCP-8260L-G
L0405294-03D	Amber 250ml unpreserved	A	NA	7.2 C	Y	Absent	AG-TI, AS-TI, BE-TI, CD-TI, CR-TI, CU-TI, HG-T, NI-TI, PB-TI, PREPT, SB-TI, SE-TI, TL-TI, ZN-TI
L0405294-03E	Plastic 2oz unpreserved for TS	A	NA	7.2 C	Y	Absent	TS
L0405294-04A	Vial MeOH preserved	A	NA	7.2 C	Y	Absent	VPH
L0405294-04B	Vial NaHSO4 preserved	A	NA	7.2 C	Y	Absent	MCP-8260L-G
L0405294-04C	Vial NaHSO4 preserved	A	NA	7.2 C	Y	Absent	MCP-8260L-G
L0405294-04D	Amber 250ml unpreserved	A	NA	7.2 C	Y	Absent	AG-TI, AS-TI, BE-TI, CD-TI, CR-TI, CU-TI, HG-T, NI-TI, PB-TI, PREPT, SB-TI, SE-TI, TL-TI, ZN-TI
L0405294-04E	Plastic 2oz unpreserved for TS	A	NA	7.2 C	Y	Absent	TS
L0405294-05A	Vial MeOH preserved	A	NA	7.2 C	Y	Absent	VPH
L0405294-05B	Vial NaHSO4 preserved	A	NA	7.2 C	Y	Absent	MCP-8260L-G
L0405294-05C	Vial NaHSO4 preserved	A	NA	7.2 C	Y	Absent	MCP-8260L-G

ALPHA ANALYTICAL LABORATORIES
LOGIN SPECIFIC INFORMATION

Laboratory Job Number: L0405294

Continued

Container ID	Container Type	Cooler	pH	Temp	Pres	Seal	Analysis
L0405294-05D	Amber 250ml unpreserved	A	NA	7.2 C	Y	Absent	AG-TI, AS-TI, BE-TI, CD-TI, CR-TI, CU-TI, HG-T, NI-TI, PB-TI, PREPT, SB-TI, SE-TI, TL-TI, ZN-TI
L0405294-05E	Plastic 2oz unpreserved for TS	A	NA	7.2 C	Y	Absent	TS
L0405294-06A	Vial MeOH preserved	A	NA	7.2 C	Y	Absent	VPH
L0405294-06B	Vial NaHSO4 preserved	A	NA	7.2 C	Y	Absent	MCP-8260L-G
L0405294-06C	Vial NaHSO4 preserved	A	NA	7.2 C	Y	Absent	MCP-8260L-G
L0405294-06D	Amber 250ml unpreserved	A	NA	7.2 C	Y	Absent	AG-TI, AS-TI, BE-TI, CD-TI, CR-TI, CU-TI, HG-T, NI-TI, PB-TI, PREPT, SB-TI, SE-TI, TL-TI, ZN-TI
L0405294-06E	Plastic 2oz unpreserved for TS	A	NA	7.2 C	Y	Absent	TS
L0405294-07A	Vial MeOH preserved	A	NA	7.2 C	Y	Absent	VPH
L0405294-07B	Vial NaHSO4 preserved	A	NA	7.2 C	Y	Absent	MCP-8260L-G
L0405294-07C	Vial NaHSO4 preserved	A	NA	7.2 C	Y	Absent	MCP-8260L-G
L0405294-07D	Amber 250ml unpreserved	A	NA	7.2 C	Y	Absent	AG-TI, AS-TI, BE-TI, CD-TI, CR-TI, CU-TI, HG-T, NI-TI, PB-TI, PREPT, SB-TI, SE-TI, TL-TI, ZN-TI
L0405294-07E	Plastic 2oz unpreserved for TS	A	NA	7.2 C	Y	Absent	TS
L0405294-08A	Vial MeOH preserved	A	NA	7.2 C	Y	Absent	VPH
L0405294-08B	Vial NaHSO4 preserved	A	NA	7.2 C	Y	Absent	MCP-8260L-G
L0405294-08C	Vial NaHSO4 preserved	A	NA	7.2 C	Y	Absent	MCP-8260L-G
L0405294-08D	Amber 250ml unpreserved	A	NA	7.2 C	Y	Absent	AG-TI, AS-TI, BE-TI, CD-TI, CR-TI, CU-TI, HG-T, NI-TI, PB-TI, PREPT, SB-TI, SE-TI, TL-TI, ZN-TI
L0405294-08E	Plastic 2oz unpreserved for TS	A	NA	7.2 C	Y	Absent	TS

Container Comments

Container ID	Comments

APPENDIX F

MAY 20, 2004
SOIL AND GROUNDWATER ANALYTICAL DATA

ALPHA ANALYTICAL LABORATORIES

Eight Walkup Drive
Westborough, Massachusetts 01581-1019
(508) 898-9220 www.alphalab.com

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

CERTIFICATE OF ANALYSIS

Client: URS Corporation

Address: 5 Industrial Way

Salem, NH 03079

Attn: Ms. Amy Pollock

Project Number: 15260048

Site: BERKELEY - WORCESTER COMMONS

Laboratory Job Number: L0405367

Date Received: 20-MAY-2004

Date Reported: 24-MAY-2004

Delivery Method: Client

The following questions pertain only to MCP Analytical Methods

An affirmative response to questions A,B,C & D is required for "Presumptive Certainty" status

A. Were all samples received by the laboratory in a condition consistent with those described on their Chain-of-Custody documentation for the data set?	YES
B. Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	YES
C. Does the analytical data included in this report meet all the requirements for "Presumptive Certainty", as described in section 2.0 of the MADEP document CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	YES
D. **VPH and EPH methods only:** Was the VPH or EPH method run without significant modifications, as specified in Section 11.3?	NA

A response to questions E and F is required for "Presumptive Certainty" status

E. Were all QC performance standards and recommendations for the specified method(s) achieved?	NO
F. Were results for all analyte-list compounds/elements for the specified method(s) reported?	NO

Any answers of NO to the above questions are addressed in the case narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized by: Scott McLean
This document electronically signed

ALPHA ANALYTICAL LABORATORIES

Laboratory Job Number: L0405367
Date Reported: 24-MAY-2004

ALPHA SAMPLE NUMBER	CLIENT IDENTIFICATION	SAMPLE LOCATION
L0405367-01	B-10(0-6")	WORCESTER, MA
L0405367-02	B-10(4.5-5')	WORCESTER, MA
L0405367-03	B-12(0-6")	WORCESTER, MA
L0405367-04	B-12(4-4.5')	WORCESTER, MA
L0405367-05	B-13(0-6")	WORCESTER, MA
L0405367-06	B-13(8.5-9')	WORCESTER, MA

ALPHA ANALYTICAL LABORATORIES
NARRATIVE REPORT

Laboratory Job Number: L0405367

MCP Related Narratives

Report Submission

In reference to question F, at the client's request, the samples were analyzed only for the compounds specified on the chain of custody.

Volatile Organics

In reference to question E:

L0405367-02 is reported with 2 or 3 internal standards below, and multiple surrogate % recoveries above, the acceptance criteria for the method. Re-analysis achieved similar results. Both sets of results are reported. On the May 21 analysis, the result for Toluene should be considered an estimate becasuse it was quantitated against an internal standard that failed low. On the May 24 analysis, all target hits and TICS should be considered estimates because all of the internal standards were low.

L0405367-03 is reported with 3 internal standards below and multiple surrogate % recoveries above, the acceptance criteria for the method. Re-analysis achieved similar results. Both sets of results are reported. All target hits should be considered estimates because all of the internal standards were low.

Associated with L0405367-02 through -06:

The LCS % recovery for Bromomethane is below the acceptance criteria for the method.

The LCS % recovery for Dichlorodifluoromethane is above the acceptance criteria for the method. Both of these are considered "difficult analytes".

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405367-01
B-10(0-6")
Sample Matrix: SOIL

Date Collected: 20-MAY-2004 11:55
Date Received : 20-MAY-2004
Date Reported : 24-MAY-2004

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 1-Amber,1-Plastic,3-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total	92.	%	0.10	30	2540G		0521 16:27	DP
Total Metals				1	3051			
Antimony, Total	ND	mg/kg	2.1	54	6010B	0521 17:00	0524 10:00	RW
Arsenic, Total	22.	mg/kg	0.43	54	6010B	0521 17:00	0524 10:00	RW
Beryllium, Total	0.44	mg/kg	0.21	54	6010B	0521 17:00	0524 10:00	RW
Cadmium, Total	ND	mg/kg	0.43	54	6010B	0521 17:00	0524 10:00	RW
Chromium, Total	24.	mg/kg	0.43	54	6010B	0521 17:00	0524 10:00	RW
Copper, Total	20.	mg/kg	0.43	54	6010B	0521 17:00	0524 10:00	RW
Lead, Total	17.	mg/kg	2.1	54	6010B	0521 17:00	0524 10:00	RW
Mercury, Total	ND	mg/kg	0.08	54	7471A	0520 18:15	0521 12:41	DM
Nickel, Total	18.	mg/kg	1.1	54	6010B	0521 17:00	0524 10:00	RW
Selenium, Total	ND	mg/kg	0.86	54	6010B	0521 17:00	0524 10:00	RW
Silver, Total	ND	mg/kg	0.43	54	6010B	0521 17:00	0524 10:00	RW
Thallium, Total	ND	mg/kg	0.43	54	6010B	0521 17:00	0524 10:00	RW
Zinc, Total	32.	mg/kg	2.1	54	6010B	0521 17:00	0524 10:00	RW
Volatile Organics by MCP 8260B/5035-Low				54	8260B		0524 11:54	RY
Methylene chloride	ND	ug/kg	18.					
1,1-Dichloroethane	ND	ug/kg	2.7					
Chloroform	ND	ug/kg	2.7					
Carbon tetrachloride	ND	ug/kg	1.8					
1,2-Dichloropropane	ND	ug/kg	6.3					
Dibromochloromethane	ND	ug/kg	1.8					
1,1,2-Trichloroethane	ND	ug/kg	2.7					
Tetrachloroethene	ND	ug/kg	1.8					
Chlorobenzene	ND	ug/kg	1.8					
Trichlorofluoromethane	ND	ug/kg	9.0					
1,2-Dichloroethane	ND	ug/kg	1.8					
1,1,1-Trichloroethane	ND	ug/kg	1.8					
Bromodichloromethane	ND	ug/kg	1.8					
trans-1,3-Dichloropropene	ND	ug/kg	1.8					
cis-1,3-Dichloropropene	ND	ug/kg	1.8					
1,1-Dichloropropene	ND	ug/kg	9.0					
Bromoform	ND	ug/kg	7.2					
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.8					
Benzene	ND	ug/kg	1.8					
Toluene	ND	ug/kg	2.7					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-01
B-10(0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0524 11:54	RY
Ethylbenzene	ND	ug/kg	1.8				
Chloromethane	ND	ug/kg	9.0				
Bromomethane	ND	ug/kg	3.6				
Vinyl chloride	ND	ug/kg	3.6				
Chloroethane	ND	ug/kg	3.6				
1,1-Dichloroethene	ND	ug/kg	1.8				
trans-1,2-Dichloroethene	ND	ug/kg	2.7				
Trichloroethene	ND	ug/kg	1.8				
1,2-Dichlorobenzene	ND	ug/kg	9.0				
1,3-Dichlorobenzene	ND	ug/kg	9.0				
1,4-Dichlorobenzene	ND	ug/kg	9.0				
Methyl tert butyl ether	ND	ug/kg	3.6				
p/m-Xylene	ND	ug/kg	1.8				
o-Xylene	ND	ug/kg	1.8				
cis-1,2-Dichloroethene	ND	ug/kg	1.8				
Dibromomethane	ND	ug/kg	18.				
1,2,3-Trichloropropane	ND	ug/kg	18.				
Styrene	ND	ug/kg	1.8				
Dichlorodifluoromethane	ND	ug/kg	18.				
Acetone	ND	ug/kg	18.				
Carbon disulfide	ND	ug/kg	18.				
2-Butanone	ND	ug/kg	18.				
4-Methyl-2-pentanone	ND	ug/kg	18.				
2-Hexanone	ND	ug/kg	18.				
Bromochloromethane	ND	ug/kg	9.0				
Tetrahydrofuran	ND	ug/kg	36.				
2,2-Dichloropropane	ND	ug/kg	9.0				
1,2-Dibromoethane	ND	ug/kg	7.2				
1,3-Dichloropropane	ND	ug/kg	9.0				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.8				
Bromobenzene	ND	ug/kg	9.0				
n-Butylbenzene	ND	ug/kg	1.8				
sec-Butylbenzene	ND	ug/kg	1.8				
tert-Butylbenzene	ND	ug/kg	9.0				
o-Chlorotoluene	ND	ug/kg	9.0				
p-Chlorotoluene	ND	ug/kg	9.0				
1,2-Dibromo-3-chloropropane	ND	ug/kg	9.0				
Hexachlorobutadiene	ND	ug/kg	9.0				
Isopropylbenzene	ND	ug/kg	1.8				
p-Isopropyltoluene	ND	ug/kg	1.8				
Naphthalene	ND	ug/kg	9.0				
n-Propylbenzene	ND	ug/kg	1.8				
1,2,3-Trichlorobenzene	ND	ug/kg	9.0				
1,2,4-Trichlorobenzene	ND	ug/kg	9.0				
1,3,5-Trimethylbenzene	ND	ug/kg	9.0				
1,2,4-Trimethylbenzene	ND	ug/kg	9.0				
Ethyl ether	ND	ug/kg	9.0				
Isopropyl Ether	ND	ug/kg	7.2				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	7.2				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-01
B-10(0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0524 11:54	RY
Tertiary-Amyl Methyl Ether	ND	ug/kg	7.2				
1,4-Dioxane	ND	ug/kg	900				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	109.	%	70-130				
Toluene-d8	107.	%	70-130				
4-Bromofluorobenzene	117.	%	70-130				
Dibromofluoromethane	97.0	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0524 11:54	RY
Tentatively Identified Compounds							
No Tentatively Identified Compounds	ND	ug/kg					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-01
B-10(0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0521 10:26	MM

Quality Control Information

Condition of sample received: Satisfactory
Sample temperature upon receipt: Received on Ice
Were samples received in methanol? Yes (Covering the Soil)
Methanol ratio: Below 1:1 +/- 25%
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	ND	mg/kg	3.47
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	3.47
C9-C10 Aromatics	ND	mg/kg	3.47
C5-C8 Aliphatics, Adjusted	ND	mg/kg	3.47
C9-C12 Aliphatics, Adjusted	ND	mg/kg	3.47

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	91.0	%	70-130
2,5-Dibromotoluene-FID	104.	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405367-02
B-10(4.5-5')
Sample Matrix: SOIL

Date Collected: 20-MAY-2004 12:00
Date Received : 20-MAY-2004
Date Reported : 24-MAY-2004

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 1-Amber,1-Plastic,3-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total	30.	%	0.10	30	2540G		0521 16:27	DP
Total Metals				1	3051			
Antimony, Total	ND	mg/kg	6.6	54	6010B	0521 17:00	0524 10:09	RW
Arsenic, Total	8.1	mg/kg	1.3	54	6010B	0521 17:00	0524 10:09	RW
Beryllium, Total	2.7	mg/kg	0.66	54	6010B	0521 17:00	0524 10:09	RW
Cadmium, Total	ND	mg/kg	1.3	54	6010B	0521 17:00	0524 10:09	RW
Chromium, Total	7.4	mg/kg	1.3	54	6010B	0521 17:00	0524 10:09	RW
Copper, Total	17.	mg/kg	1.3	54	6010B	0521 17:00	0524 10:09	RW
Lead, Total	ND	mg/kg	6.6	54	6010B	0521 17:00	0524 10:09	RW
Mercury, Total	ND	mg/kg	0.23	54	7471A	0520 18:15	0521 12:43	DM
Nickel, Total	9.6	mg/kg	3.3	54	6010B	0521 17:00	0524 10:09	RW
Selenium, Total	4.2	mg/kg	2.6	54	6010B	0521 17:00	0524 10:09	RW
Silver, Total	ND	mg/kg	1.3	54	6010B	0521 17:00	0524 10:09	RW
Thallium, Total	ND	mg/kg	1.3	54	6010B	0521 17:00	0524 10:09	RW
Zinc, Total	ND	mg/kg	6.6	54	6010B	0521 17:00	0524 10:09	RW
Volatile Organics by MCP 8260B/5035-Low				54	8260B		0521 19:07	RY
Methylene chloride	ND	ug/kg	98.					
1,1-Dichloroethane	ND	ug/kg	15.					
Chloroform	ND	ug/kg	15.					
Carbon tetrachloride	ND	ug/kg	9.8					
1,2-Dichloropropane	ND	ug/kg	34.					
Dibromochloromethane	ND	ug/kg	9.8					
1,1,2-Trichloroethane	ND	ug/kg	15.					
Tetrachloroethene	ND	ug/kg	9.8					
Chlorobenzene	ND	ug/kg	9.8					
Trichlorofluoromethane	ND	ug/kg	49.					
1,2-Dichloroethane	ND	ug/kg	9.8					
1,1,1-Trichloroethane	ND	ug/kg	9.8					
Bromodichloromethane	ND	ug/kg	9.8					
trans-1,3-Dichloropropene	ND	ug/kg	9.8					
cis-1,3-Dichloropropene	ND	ug/kg	9.8					
1,1-Dichloropropene	ND	ug/kg	49.					
Bromoform	ND	ug/kg	39.					
1,1,2,2-Tetrachloroethane	ND	ug/kg	9.8					
Benzene	ND	ug/kg	9.8					
Toluene	15.	ug/kg	15.					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-02
B-10(4.5-5')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 19:07	RY
Ethylbenzene	ND	ug/kg	9.8				
Chloromethane	ND	ug/kg	49.				
Bromomethane	ND	ug/kg	20.				
Vinyl chloride	ND	ug/kg	20.				
Chloroethane	ND	ug/kg	20.				
1,1-Dichloroethene	ND	ug/kg	9.8				
trans-1,2-Dichloroethene	ND	ug/kg	15.				
Trichloroethene	ND	ug/kg	9.8				
1,2-Dichlorobenzene	ND	ug/kg	49.				
1,3-Dichlorobenzene	ND	ug/kg	49.				
1,4-Dichlorobenzene	ND	ug/kg	49.				
Methyl tert butyl ether	ND	ug/kg	20.				
p/m-Xylene	ND	ug/kg	9.8				
o-Xylene	ND	ug/kg	9.8				
cis-1,2-Dichloroethene	ND	ug/kg	9.8				
Dibromomethane	ND	ug/kg	98.				
1,2,3-Trichloropropane	ND	ug/kg	98.				
Styrene	ND	ug/kg	9.8				
Dichlorodifluoromethane	ND	ug/kg	98.				
Acetone	620	ug/kg	98.				
Carbon disulfide	ND	ug/kg	98.				
2-Butanone	100	ug/kg	98.				
4-Methyl-2-pentanone	ND	ug/kg	98.				
2-Hexanone	ND	ug/kg	98.				
Bromochloromethane	ND	ug/kg	49.				
Tetrahydrofuran	ND	ug/kg	200				
2,2-Dichloropropane	ND	ug/kg	49.				
1,2-Dibromoethane	ND	ug/kg	39.				
1,3-Dichloropropane	ND	ug/kg	49.				
1,1,1,2-Tetrachloroethane	ND	ug/kg	9.8				
Bromobenzene	ND	ug/kg	49.				
n-Butylbenzene	ND	ug/kg	9.8				
sec-Butylbenzene	ND	ug/kg	9.8				
tert-Butylbenzene	ND	ug/kg	49.				
o-Chlorotoluene	ND	ug/kg	49.				
p-Chlorotoluene	ND	ug/kg	49.				
1,2-Dibromo-3-chloropropane	ND	ug/kg	49.				
Hexachlorobutadiene	ND	ug/kg	49.				
Isopropylbenzene	ND	ug/kg	9.8				
p-Isopropyltoluene	ND	ug/kg	9.8				
Naphthalene	ND	ug/kg	49.				
n-Propylbenzene	ND	ug/kg	9.8				
1,2,3-Trichlorobenzene	ND	ug/kg	49.				
1,2,4-Trichlorobenzene	ND	ug/kg	49.				
1,3,5-Trimethylbenzene	ND	ug/kg	49.				
1,2,4-Trimethylbenzene	ND	ug/kg	49.				
Ethyl ether	ND	ug/kg	49.				
Isopropyl Ether	ND	ug/kg	39.				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	39.				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-02
B-10(4.5-5')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 19:07	RY
Tertiary-Amyl Methyl Ether	ND	ug/kg	39.				
1,4-Dioxane	ND	ug/kg	4900				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	135.	%	70-130				
Toluene-d8	128.	%	70-130				
4-Bromofluorobenzene	91.0	%	70-130				
Dibromofluoromethane	128.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0524 12:29	RY
Methylene chloride	ND	ug/kg	54.				
1,1-Dichloroethane	ND	ug/kg	8.1				
Chloroform	ND	ug/kg	8.1				
Carbon tetrachloride	ND	ug/kg	5.4				
1,2-Dichloropropane	ND	ug/kg	19.				
Dibromochloromethane	ND	ug/kg	5.4				
1,1,2-Trichloroethane	ND	ug/kg	8.1				
Tetrachloroethene	ND	ug/kg	5.4				
Chlorobenzene	ND	ug/kg	5.4				
Trichlorofluoromethane	ND	ug/kg	27.				
1,2-Dichloroethane	ND	ug/kg	5.4				
1,1,1-Trichloroethane	ND	ug/kg	5.4				
Bromodichloromethane	ND	ug/kg	5.4				
trans-1,3-Dichloropropene	ND	ug/kg	5.4				
cis-1,3-Dichloropropene	ND	ug/kg	5.4				
1,1-Dichloropropene	ND	ug/kg	27.				
Bromoform	ND	ug/kg	22.				
1,1,2,2-Tetrachloroethane	ND	ug/kg	5.4				
Benzene	6.3	ug/kg	5.4				
Toluene	ND	ug/kg	8.1				
Ethylbenzene	ND	ug/kg	5.4				
Chloromethane	ND	ug/kg	27.				
Bromomethane	ND	ug/kg	11.				
Vinyl chloride	ND	ug/kg	11.				
Chloroethane	ND	ug/kg	11.				
1,1-Dichloroethene	ND	ug/kg	5.4				
trans-1,2-Dichloroethene	ND	ug/kg	8.1				
Trichloroethene	ND	ug/kg	5.4				
1,2-Dichlorobenzene	ND	ug/kg	27.				
1,3-Dichlorobenzene	ND	ug/kg	27.				
1,4-Dichlorobenzene	ND	ug/kg	27.				
Methyl tert butyl ether	ND	ug/kg	11.				
p/m-Xylene	ND	ug/kg	5.4				
o-Xylene	ND	ug/kg	5.4				
cis-1,2-Dichloroethene	10.	ug/kg	5.4				
Dibromomethane	ND	ug/kg	54.				
1,2,3-Trichloropropane	ND	ug/kg	54.				
Styrene	ND	ug/kg	5.4				
Dichlorodifluoromethane	ND	ug/kg	54.				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-02
B-10(4.5-5')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0524 12:29	RY
Acetone	1100	ug/kg	54.				
Carbon disulfide	83.	ug/kg	54.				
2-Butanone	210	ug/kg	54.				
4-Methyl-2-pentanone	ND	ug/kg	54.				
2-Hexanone	ND	ug/kg	54.				
Bromochloromethane	ND	ug/kg	27.				
Tetrahydrofuran	ND	ug/kg	110				
2,2-Dichloropropane	ND	ug/kg	27.				
1,2-Dibromoethane	ND	ug/kg	22.				
1,3-Dichloropropane	ND	ug/kg	27.				
1,1,1,2-Tetrachloroethane	ND	ug/kg	5.4				
Bromobenzene	ND	ug/kg	27.				
n-Butylbenzene	ND	ug/kg	5.4				
sec-Butylbenzene	ND	ug/kg	5.4				
tert-Butylbenzene	ND	ug/kg	27.				
o-Chlorotoluene	ND	ug/kg	27.				
p-Chlorotoluene	ND	ug/kg	27.				
1,2-Dibromo-3-chloropropane	ND	ug/kg	27.				
Hexachlorobutadiene	ND	ug/kg	27.				
Isopropylbenzene	ND	ug/kg	5.4				
p-Isopropyltoluene	ND	ug/kg	5.4				
Naphthalene	ND	ug/kg	27.				
n-Propylbenzene	ND	ug/kg	5.4				
1,2,3-Trichlorobenzene	ND	ug/kg	27.				
1,2,4-Trichlorobenzene	ND	ug/kg	27.				
1,3,5-Trimethylbenzene	ND	ug/kg	27.				
1,2,4-Trimethylbenzene	ND	ug/kg	27.				
Ethyl ether	ND	ug/kg	27.				
Isopropyl Ether	ND	ug/kg	22.				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	22.				
Tertiary-Amyl Methyl Ether	ND	ug/kg	22.				
1,4-Dioxane	ND	ug/kg	2700				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	154.	%	70-130				
Toluene-d8	168.	%	70-130				
4-Bromofluorobenzene	169.	%	70-130				
Dibromofluoromethane	145.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0521 19:07	RY
Tentatively Identified Compounds							
Unknown	28.	ug/kg					
Acetaldehyde	30.	ug/kg					
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0524 12:29	RY
Unknown	34.	ug/kg					
Acetaldehyde	40.	ug/kg					
Butane, 2-methyl-	17.	ug/kg					
Unknown C4H8O Isomer	16.	ug/kg					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-02
B-10(4.5-5')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0521 11:18	MM

Quality Control Information

Condition of sample received: Satisfactory
Sample temperature upon receipt: Received on Ice
Were samples received in methanol? Yes (Covering the Soil)
Methanol ratio: Below 1:1 +/- 25%
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	ND	mg/kg	27.8
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	27.8
C9-C10 Aromatics	ND	mg/kg	27.8
C5-C8 Aliphatics, Adjusted	ND	mg/kg	27.8
C9-C12 Aliphatics, Adjusted	ND	mg/kg	27.8

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	81.0	%	70-130
2,5-Dibromotoluene-FID	94.0	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405367-03
B-12(0-6")
Sample Matrix: SOIL

Date Collected: 20-MAY-2004 08:30
Date Received : 20-MAY-2004
Date Reported : 24-MAY-2004

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 1-Amber,1-Plastic,3-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total	91.	%	0.10	30	2540G		0521 16:27	DP
Total Metals				1	3051			
Antimony, Total	ND	mg/kg	2.2	54	6010B	0521 17:00	0524 10:13	RW
Arsenic, Total	14.	mg/kg	0.43	54	6010B	0521 17:00	0524 10:13	RW
Beryllium, Total	ND	mg/kg	0.22	54	6010B	0521 17:00	0524 10:13	RW
Cadmium, Total	ND	mg/kg	0.43	54	6010B	0521 17:00	0524 10:13	RW
Chromium, Total	7.5	mg/kg	0.43	54	6010B	0521 17:00	0524 10:13	RW
Copper, Total	8.6	mg/kg	0.43	54	6010B	0521 17:00	0524 10:13	RW
Lead, Total	6.6	mg/kg	2.2	54	6010B	0521 17:00	0524 10:13	RW
Mercury, Total	ND	mg/kg	0.08	54	7471A	0520 18:15	0521 12:45	DM
Nickel, Total	8.2	mg/kg	1.1	54	6010B	0521 17:00	0524 10:13	RW
Selenium, Total	ND	mg/kg	0.86	54	6010B	0521 17:00	0524 10:13	RW
Silver, Total	ND	mg/kg	0.43	54	6010B	0521 17:00	0524 10:13	RW
Thallium, Total	ND	mg/kg	0.43	54	6010B	0521 17:00	0524 10:13	RW
Zinc, Total	19.	mg/kg	2.2	54	6010B	0521 17:00	0524 10:13	RW
Volatile Organics by MCP 8260B/5035-Low				54	8260B		0521 20:19	RY
Methylene chloride	ND	ug/kg	9.8					
1,1-Dichloroethane	ND	ug/kg	1.5					
Chloroform	ND	ug/kg	1.5					
Carbon tetrachloride	ND	ug/kg	0.98					
1,2-Dichloropropane	ND	ug/kg	3.4					
Dibromochloromethane	ND	ug/kg	0.98					
1,1,2-Trichloroethane	ND	ug/kg	1.5					
Tetrachloroethene	ND	ug/kg	0.98					
Chlorobenzene	ND	ug/kg	0.98					
Trichlorofluoromethane	ND	ug/kg	4.9					
1,2-Dichloroethane	ND	ug/kg	0.98					
1,1,1-Trichloroethane	ND	ug/kg	0.98					
Bromodichloromethane	ND	ug/kg	0.98					
trans-1,3-Dichloropropene	ND	ug/kg	0.98					
cis-1,3-Dichloropropene	ND	ug/kg	0.98					
1,1-Dichloropropene	ND	ug/kg	4.9					
Bromoform	ND	ug/kg	3.9					
1,1,2,2-Tetrachloroethane	ND	ug/kg	0.98					
Benzene	ND	ug/kg	0.98					
Toluene	ND	ug/kg	1.5					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-03
B-12(0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 20:19	RY
Ethylbenzene	ND	ug/kg	0.98				
Chloromethane	ND	ug/kg	4.9				
Bromomethane	ND	ug/kg	2.0				
Vinyl chloride	ND	ug/kg	2.0				
Chloroethane	ND	ug/kg	2.0				
1,1-Dichloroethene	ND	ug/kg	0.98				
trans-1,2-Dichloroethene	ND	ug/kg	1.5				
Trichloroethene	ND	ug/kg	0.98				
1,2-Dichlorobenzene	ND	ug/kg	4.9				
1,3-Dichlorobenzene	ND	ug/kg	4.9				
1,4-Dichlorobenzene	ND	ug/kg	4.9				
Methyl tert butyl ether	ND	ug/kg	2.0				
p/m-Xylene	ND	ug/kg	0.98				
o-Xylene	ND	ug/kg	0.98				
cis-1,2-Dichloroethene	ND	ug/kg	0.98				
Dibromomethane	ND	ug/kg	9.8				
1,2,3-Trichloropropane	ND	ug/kg	9.8				
Styrene	ND	ug/kg	0.98				
Dichlorodifluoromethane	ND	ug/kg	9.8				
Acetone	17.	ug/kg	9.8				
Carbon disulfide	ND	ug/kg	9.8				
2-Butanone	ND	ug/kg	9.8				
4-Methyl-2-pentanone	ND	ug/kg	9.8				
2-Hexanone	ND	ug/kg	9.8				
Bromochloromethane	ND	ug/kg	4.9				
Tetrahydrofuran	ND	ug/kg	20.				
2,2-Dichloropropane	ND	ug/kg	4.9				
1,2-Dibromoethane	ND	ug/kg	3.9				
1,3-Dichloropropane	ND	ug/kg	4.9				
1,1,1,2-Tetrachloroethane	ND	ug/kg	0.98				
Bromobenzene	ND	ug/kg	4.9				
n-Butylbenzene	ND	ug/kg	0.98				
sec-Butylbenzene	ND	ug/kg	0.98				
tert-Butylbenzene	ND	ug/kg	4.9				
o-Chlorotoluene	ND	ug/kg	4.9				
p-Chlorotoluene	ND	ug/kg	4.9				
1,2-Dibromo-3-chloropropane	ND	ug/kg	4.9				
Hexachlorobutadiene	ND	ug/kg	4.9				
Isopropylbenzene	ND	ug/kg	0.98				
p-Isopropyltoluene	ND	ug/kg	0.98				
Naphthalene	ND	ug/kg	4.9				
n-Propylbenzene	ND	ug/kg	0.98				
1,2,3-Trichlorobenzene	ND	ug/kg	4.9				
1,2,4-Trichlorobenzene	ND	ug/kg	4.9				
1,3,5-Trimethylbenzene	ND	ug/kg	4.9				
1,2,4-Trimethylbenzene	ND	ug/kg	4.9				
Ethyl ether	ND	ug/kg	4.9				
Isopropyl Ether	ND	ug/kg	3.9				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	3.9				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-03
B-12(0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 20:19	RY
Tertiary-Amyl Methyl Ether	ND	ug/kg	3.9				
1,4-Dioxane	ND	ug/kg	490				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	195.	%	70-130				
Toluene-d8	90.0	%	70-130				
4-Bromofluorobenzene	112.	%	70-130				
Dibromofluoromethane	158.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0524 13:40	RY
Methylene chloride	ND	ug/kg	15.				
1,1-Dichloroethane	ND	ug/kg	2.3				
Chloroform	ND	ug/kg	2.3				
Carbon tetrachloride	ND	ug/kg	1.5				
1,2-Dichloropropane	ND	ug/kg	5.3				
Dibromochloromethane	ND	ug/kg	1.5				
1,1,2-Trichloroethane	ND	ug/kg	2.3				
Tetrachloroethene	ND	ug/kg	1.5				
Chlorobenzene	ND	ug/kg	1.5				
Trichlorofluoromethane	ND	ug/kg	7.6				
1,2-Dichloroethane	ND	ug/kg	1.5				
1,1,1-Trichloroethane	ND	ug/kg	1.5				
Bromodichloromethane	ND	ug/kg	1.5				
trans-1,3-Dichloropropene	ND	ug/kg	1.5				
cis-1,3-Dichloropropene	ND	ug/kg	1.5				
1,1-Dichloropropene	ND	ug/kg	7.6				
Bromoform	ND	ug/kg	6.1				
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.5				
Benzene	ND	ug/kg	1.5				
Toluene	ND	ug/kg	2.3				
Ethylbenzene	ND	ug/kg	1.5				
Chloromethane	ND	ug/kg	7.6				
Bromomethane	ND	ug/kg	3.0				
Vinyl chloride	ND	ug/kg	3.0				
Chloroethane	ND	ug/kg	3.0				
1,1-Dichloroethene	ND	ug/kg	1.5				
trans-1,2-Dichloroethene	ND	ug/kg	2.3				
Trichloroethene	ND	ug/kg	1.5				
1,2-Dichlorobenzene	ND	ug/kg	7.6				
1,3-Dichlorobenzene	ND	ug/kg	7.6				
1,4-Dichlorobenzene	ND	ug/kg	7.6				
Methyl tert butyl ether	ND	ug/kg	3.0				
p/m-Xylene	ND	ug/kg	1.5				
o-Xylene	ND	ug/kg	1.5				
cis-1,2-Dichloroethene	ND	ug/kg	1.5				
Dibromomethane	ND	ug/kg	15.				
1,2,3-Trichloropropane	ND	ug/kg	15.				
Styrene	ND	ug/kg	1.5				
Dichlorodifluoromethane	ND	ug/kg	15.				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-03
B-12(0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0524 13:40	RY
Acetone	18.	ug/kg	15.				
Carbon disulfide	ND	ug/kg	15.				
2-Butanone	ND	ug/kg	15.				
4-Methyl-2-pentanone	ND	ug/kg	15.				
2-Hexanone	ND	ug/kg	15.				
Bromochloromethane	ND	ug/kg	7.6				
Tetrahydrofuran	ND	ug/kg	30.				
2,2-Dichloropropane	ND	ug/kg	7.6				
1,2-Dibromoethane	ND	ug/kg	6.1				
1,3-Dichloropropane	ND	ug/kg	7.6				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.5				
Bromobenzene	ND	ug/kg	7.6				
n-Butylbenzene	ND	ug/kg	1.5				
sec-Butylbenzene	ND	ug/kg	1.5				
tert-Butylbenzene	ND	ug/kg	7.6				
o-Chlorotoluene	ND	ug/kg	7.6				
p-Chlorotoluene	ND	ug/kg	7.6				
1,2-Dibromo-3-chloropropane	ND	ug/kg	7.6				
Hexachlorobutadiene	ND	ug/kg	7.6				
Isopropylbenzene	ND	ug/kg	1.5				
p-Isopropyltoluene	ND	ug/kg	1.5				
Naphthalene	ND	ug/kg	7.6				
n-Propylbenzene	ND	ug/kg	1.5				
1,2,3-Trichlorobenzene	ND	ug/kg	7.6				
1,2,4-Trichlorobenzene	ND	ug/kg	7.6				
1,3,5-Trimethylbenzene	ND	ug/kg	7.6				
1,2,4-Trimethylbenzene	ND	ug/kg	7.6				
Ethyl ether	ND	ug/kg	7.6				
Isopropyl Ether	ND	ug/kg	6.1				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	6.1				
Tertiary-Amyl Methyl Ether	ND	ug/kg	6.1				
1,4-Dioxane	ND	ug/kg	760				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	169.	%	70-130				
Toluene-d8	100.	%	70-130				
4-Bromofluorobenzene	119.	%	70-130				
Dibromofluoromethane	142.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0521 20:19	RY
Tentatively Identified Compounds							
No Tentatively Identified Compounds	ND	ug/kg					
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0524 13:40	RY
No Tentatively Identified Compounds	ND	ug/kg					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-03
B-12(0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0521 12:09	MM

Quality Control Information

Condition of sample received: Satisfactory
Sample temperature upon receipt: Received on Ice
Were samples received in methanol? Yes (Covering the Soil)
Methanol ratio: Below 1:1 +/- 25%
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	ND	mg/kg	3.83
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	3.83
C9-C10 Aromatics	ND	mg/kg	3.83
C5-C8 Aliphatics, Adjusted	ND	mg/kg	3.83
C9-C12 Aliphatics, Adjusted	ND	mg/kg	3.83

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	94.0	%	70-130
2,5-Dibromotoluene-FID	109.	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405367-04
B-12(4-4.5')
Sample Matrix: SOIL

Date Collected: 20-MAY-2004 08:35
Date Received : 20-MAY-2004
Date Reported : 24-MAY-2004

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 1-Amber,1-Plastic,3-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total	83.	%	0.10	30	2540G		0521 16:27	DP
Total Metals				1	3051			
Antimony, Total	ND	mg/kg	2.3	54	6010B	0521 17:00	0524 10:17	RW
Arsenic, Total	20.	mg/kg	0.47	54	6010B	0521 17:00	0524 10:17	RW
Beryllium, Total	ND	mg/kg	0.23	54	6010B	0521 17:00	0524 10:17	RW
Cadmium, Total	ND	mg/kg	0.47	54	6010B	0521 17:00	0524 10:17	RW
Chromium, Total	6.8	mg/kg	0.47	54	6010B	0521 17:00	0524 10:17	RW
Copper, Total	7.2	mg/kg	0.47	54	6010B	0521 17:00	0524 10:17	RW
Lead, Total	5.7	mg/kg	2.3	54	6010B	0521 17:00	0524 10:17	RW
Mercury, Total	ND	mg/kg	0.09	54	7471A	0520 18:15	0521 12:47	DM
Nickel, Total	7.7	mg/kg	1.2	54	6010B	0521 17:00	0524 10:17	RW
Selenium, Total	ND	mg/kg	0.94	54	6010B	0521 17:00	0524 10:17	RW
Silver, Total	ND	mg/kg	0.47	54	6010B	0521 17:00	0524 10:17	RW
Thallium, Total	ND	mg/kg	0.47	54	6010B	0521 17:00	0524 10:17	RW
Zinc, Total	14.	mg/kg	2.3	54	6010B	0521 17:00	0524 10:17	RW
Volatile Organics by MCP 8260B/5035-Low				54	8260B		0521 20:54	RY
Methylene chloride	ND	ug/kg	13.					
1,1-Dichloroethane	ND	ug/kg	2.0					
Chloroform	ND	ug/kg	2.0					
Carbon tetrachloride	ND	ug/kg	1.3					
1,2-Dichloropropane	ND	ug/kg	4.7					
Dibromochloromethane	ND	ug/kg	1.3					
1,1,2-Trichloroethane	ND	ug/kg	2.0					
Tetrachloroethene	ND	ug/kg	1.3					
Chlorobenzene	ND	ug/kg	1.3					
Trichlorofluoromethane	ND	ug/kg	6.7					
1,2-Dichloroethane	ND	ug/kg	1.3					
1,1,1-Trichloroethane	ND	ug/kg	1.3					
Bromodichloromethane	ND	ug/kg	1.3					
trans-1,3-Dichloropropene	ND	ug/kg	1.3					
cis-1,3-Dichloropropene	ND	ug/kg	1.3					
1,1-Dichloropropene	ND	ug/kg	6.7					
Bromoform	ND	ug/kg	5.4					
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.3					
Benzene	ND	ug/kg	1.3					
Toluene	ND	ug/kg	2.0					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-04
B-12(4-4.5')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 20:54	RY
Ethylbenzene	ND	ug/kg	1.3				
Chloromethane	ND	ug/kg	6.7				
Bromomethane	ND	ug/kg	2.7				
Vinyl chloride	ND	ug/kg	2.7				
Chloroethane	ND	ug/kg	2.7				
1,1-Dichloroethene	ND	ug/kg	1.3				
trans-1,2-Dichloroethene	ND	ug/kg	2.0				
Trichloroethene	ND	ug/kg	1.3				
1,2-Dichlorobenzene	ND	ug/kg	6.7				
1,3-Dichlorobenzene	ND	ug/kg	6.7				
1,4-Dichlorobenzene	ND	ug/kg	6.7				
Methyl tert butyl ether	ND	ug/kg	2.7				
p/m-Xylene	ND	ug/kg	1.3				
o-Xylene	ND	ug/kg	1.3				
cis-1,2-Dichloroethene	ND	ug/kg	1.3				
Dibromomethane	ND	ug/kg	13.				
1,2,3-Trichloropropane	ND	ug/kg	13.				
Styrene	ND	ug/kg	1.3				
Dichlorodifluoromethane	ND	ug/kg	13.				
Acetone	ND	ug/kg	13.				
Carbon disulfide	ND	ug/kg	13.				
2-Butanone	ND	ug/kg	13.				
4-Methyl-2-pentanone	ND	ug/kg	13.				
2-Hexanone	ND	ug/kg	13.				
Bromochloromethane	ND	ug/kg	6.7				
Tetrahydrofuran	ND	ug/kg	27.				
2,2-Dichloropropane	ND	ug/kg	6.7				
1,2-Dibromoethane	ND	ug/kg	5.4				
1,3-Dichloropropane	ND	ug/kg	6.7				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.3				
Bromobenzene	ND	ug/kg	6.7				
n-Butylbenzene	ND	ug/kg	1.3				
sec-Butylbenzene	ND	ug/kg	1.3				
tert-Butylbenzene	ND	ug/kg	6.7				
o-Chlorotoluene	ND	ug/kg	6.7				
p-Chlorotoluene	ND	ug/kg	6.7				
1,2-Dibromo-3-chloropropane	ND	ug/kg	6.7				
Hexachlorobutadiene	ND	ug/kg	6.7				
Isopropylbenzene	ND	ug/kg	1.3				
p-Isopropyltoluene	ND	ug/kg	1.3				
Naphthalene	ND	ug/kg	6.7				
n-Propylbenzene	ND	ug/kg	1.3				
1,2,3-Trichlorobenzene	ND	ug/kg	6.7				
1,2,4-Trichlorobenzene	ND	ug/kg	6.7				
1,3,5-Trimethylbenzene	ND	ug/kg	6.7				
1,2,4-Trimethylbenzene	ND	ug/kg	6.7				
Ethyl ether	ND	ug/kg	6.7				
Isopropyl Ether	ND	ug/kg	5.4				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	5.4				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-04
B-12(4-4.5')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 20:54	RY
Tertiary-Amyl Methyl Ether	ND	ug/kg	5.4				
1,4-Dioxane	ND	ug/kg	670				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	119.	%	70-130				
Toluene-d8	105.	%	70-130				
4-Bromofluorobenzene	121.	%	70-130				
Dibromofluoromethane	108.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0521 20:54	RY
Tentatively Identified Compounds							
Propene	3.5	ug/kg					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-04
B-12(4-4.5')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0521 10:31	MM

Quality Control Information

Condition of sample received: Satisfactory
Sample temperature upon receipt: Received on Ice
Were samples received in methanol? Yes (Covering the Soil)
Methanol ratio: Below 1:1 +/- 25%
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	ND	mg/kg	4.76
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	4.76
C9-C10 Aromatics	ND	mg/kg	4.76
C5-C8 Aliphatics, Adjusted	ND	mg/kg	4.76
C9-C12 Aliphatics, Adjusted	ND	mg/kg	4.76

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	125.	%	70-130
2,5-Dibromotoluene-FID	124.	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405367-05
B-13(0-6")
Sample Matrix: SOIL

Date Collected: 20-MAY-2004 09:15
Date Received : 20-MAY-2004
Date Reported : 24-MAY-2004

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 1-Amber,1-Plastic,3-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total	95.	%	0.10	30	2540G		0521 16:27	DP
Total Metals				1	3051			
Antimony, Total	ND	mg/kg	2.1	54	6010B	0521 17:00	0524 10:38	RW
Arsenic, Total	31.	mg/kg	0.42	54	6010B	0521 17:00	0524 10:38	RW
Beryllium, Total	0.35	mg/kg	0.21	54	6010B	0521 17:00	0524 10:38	RW
Cadmium, Total	ND	mg/kg	0.42	54	6010B	0521 17:00	0524 10:38	RW
Chromium, Total	15.	mg/kg	0.42	54	6010B	0521 17:00	0524 10:38	RW
Copper, Total	19.	mg/kg	0.42	54	6010B	0521 17:00	0524 10:38	RW
Lead, Total	44.	mg/kg	2.1	54	6010B	0521 17:00	0524 10:38	RW
Mercury, Total	ND	mg/kg	0.08	54	7471A	0520 18:15	0521 12:48	DM
Nickel, Total	14.	mg/kg	1.0	54	6010B	0521 17:00	0524 10:38	RW
Selenium, Total	ND	mg/kg	0.83	54	6010B	0521 17:00	0524 10:38	RW
Silver, Total	ND	mg/kg	0.42	54	6010B	0521 17:00	0524 10:38	RW
Thallium, Total	ND	mg/kg	0.42	54	6010B	0521 17:00	0524 10:38	RW
Zinc, Total	43.	mg/kg	2.1	54	6010B	0521 17:00	0524 10:38	RW
Volatile Organics by MCP 8260B/5035-Low				54	8260B		0521 22:06	RY
Methylene chloride	ND	ug/kg	13.					
1,1-Dichloroethane	ND	ug/kg	2.0					
Chloroform	ND	ug/kg	2.0					
Carbon tetrachloride	ND	ug/kg	1.3					
1,2-Dichloropropane	ND	ug/kg	4.6					
Dibromochloromethane	ND	ug/kg	1.3					
1,1,2-Trichloroethane	ND	ug/kg	2.0					
Tetrachloroethene	ND	ug/kg	1.3					
Chlorobenzene	ND	ug/kg	1.3					
Trichlorofluoromethane	ND	ug/kg	6.6					
1,2-Dichloroethane	ND	ug/kg	1.3					
1,1,1-Trichloroethane	ND	ug/kg	1.3					
Bromodichloromethane	ND	ug/kg	1.3					
trans-1,3-Dichloropropene	ND	ug/kg	1.3					
cis-1,3-Dichloropropene	ND	ug/kg	1.3					
1,1-Dichloropropene	ND	ug/kg	6.6					
Bromoform	ND	ug/kg	5.3					
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.3					
Benzene	ND	ug/kg	1.3					
Toluene	ND	ug/kg	2.0					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-05
B-13(0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 22:06	RY
Ethylbenzene	ND	ug/kg	1.3				
Chloromethane	ND	ug/kg	6.6				
Bromomethane	ND	ug/kg	2.6				
Vinyl chloride	ND	ug/kg	2.6				
Chloroethane	ND	ug/kg	2.6				
1,1-Dichloroethene	ND	ug/kg	1.3				
trans-1,2-Dichloroethene	ND	ug/kg	2.0				
Trichloroethene	ND	ug/kg	1.3				
1,2-Dichlorobenzene	ND	ug/kg	6.6				
1,3-Dichlorobenzene	ND	ug/kg	6.6				
1,4-Dichlorobenzene	ND	ug/kg	6.6				
Methyl tert butyl ether	ND	ug/kg	2.6				
p/m-Xylene	ND	ug/kg	1.3				
o-Xylene	ND	ug/kg	1.3				
cis-1,2-Dichloroethene	ND	ug/kg	1.3				
Dibromomethane	ND	ug/kg	13.				
1,2,3-Trichloropropane	ND	ug/kg	13.				
Styrene	ND	ug/kg	1.3				
Dichlorodifluoromethane	ND	ug/kg	13.				
Acetone	20.	ug/kg	13.				
Carbon disulfide	ND	ug/kg	13.				
2-Butanone	ND	ug/kg	13.				
4-Methyl-2-pentanone	ND	ug/kg	13.				
2-Hexanone	ND	ug/kg	13.				
Bromochloromethane	ND	ug/kg	6.6				
Tetrahydrofuran	ND	ug/kg	26.				
2,2-Dichloropropane	ND	ug/kg	6.6				
1,2-Dibromoethane	ND	ug/kg	5.3				
1,3-Dichloropropane	ND	ug/kg	6.6				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.3				
Bromobenzene	ND	ug/kg	6.6				
n-Butylbenzene	ND	ug/kg	1.3				
sec-Butylbenzene	ND	ug/kg	1.3				
tert-Butylbenzene	ND	ug/kg	6.6				
o-Chlorotoluene	ND	ug/kg	6.6				
p-Chlorotoluene	ND	ug/kg	6.6				
1,2-Dibromo-3-chloropropane	ND	ug/kg	6.6				
Hexachlorobutadiene	ND	ug/kg	6.6				
Isopropylbenzene	ND	ug/kg	1.3				
p-Isopropyltoluene	ND	ug/kg	1.3				
Naphthalene	ND	ug/kg	6.6				
n-Propylbenzene	ND	ug/kg	1.3				
1,2,3-Trichlorobenzene	ND	ug/kg	6.6				
1,2,4-Trichlorobenzene	ND	ug/kg	6.6				
1,3,5-Trimethylbenzene	ND	ug/kg	6.6				
1,2,4-Trimethylbenzene	ND	ug/kg	6.6				
Ethyl ether	ND	ug/kg	6.6				
Isopropyl Ether	ND	ug/kg	5.3				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	5.3				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-05
B-13(0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 22:06	RY
Tertiary-Amyl Methyl Ether	ND	ug/kg	5.3				
1,4-Dioxane	ND	ug/kg	660				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	120.	%	70-130				
Toluene-d8	107.	%	70-130				
4-Bromofluorobenzene	118.	%	70-130				
Dibromofluoromethane	116.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0521 22:06	RY
Tentatively Identified Compounds							
No Tentatively Identified Compounds	ND	ug/kg					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-05
B-13(0-6")

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0521 11:21	MM

Quality Control Information

Condition of sample received: Satisfactory
Sample temperature upon receipt: Received on Ice
Were samples received in methanol? Yes (Covering the Soil)
Methanol ratio: Below 1:1 +/- 25%
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	ND	mg/kg	3.40
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	3.40
C9-C10 Aromatics	ND	mg/kg	3.40
C5-C8 Aliphatics, Adjusted	ND	mg/kg	3.40
C9-C12 Aliphatics, Adjusted	ND	mg/kg	3.40

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	113.	%	70-130
2,5-Dibromotoluene-FID	110.	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0405367-06
B-13(8.5-9')
Sample Matrix: SOIL

Date Collected: 20-MAY-2004 09:20
Date Received : 20-MAY-2004
Date Reported : 24-MAY-2004

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 1-Amber,1-Plastic,3-Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total	90.	%	0.10	30	2540G		0521 16:27	DP
Total Metals				1	3051			
Antimony, Total	ND	mg/kg	2.2	54	6010B	0521 17:00	0524 10:42	RW
Arsenic, Total	20.	mg/kg	0.43	54	6010B	0521 17:00	0524 10:42	RW
Beryllium, Total	0.22	mg/kg	0.22	54	6010B	0521 17:00	0524 10:42	RW
Cadmium, Total	ND	mg/kg	0.43	54	6010B	0521 17:00	0524 10:42	RW
Chromium, Total	8.6	mg/kg	0.43	54	6010B	0521 17:00	0524 10:42	RW
Copper, Total	18.	mg/kg	0.43	54	6010B	0521 17:00	0524 10:42	RW
Lead, Total	30.	mg/kg	2.2	54	6010B	0521 17:00	0524 10:42	RW
Mercury, Total	0.12	mg/kg	0.08	54	7471A	0520 18:15	0521 12:54	DM
Nickel, Total	10.	mg/kg	1.1	54	6010B	0521 17:00	0524 10:42	RW
Selenium, Total	ND	mg/kg	0.87	54	6010B	0521 17:00	0524 10:42	RW
Silver, Total	ND	mg/kg	0.43	54	6010B	0521 17:00	0524 10:42	RW
Thallium, Total	ND	mg/kg	0.43	54	6010B	0521 17:00	0524 10:42	RW
Zinc, Total	55.	mg/kg	2.2	54	6010B	0521 17:00	0524 10:42	RW
Volatile Organics by MCP 8260B/5035-Low				54	8260B		0521 22:42	RY
Methylene chloride	ND	ug/kg	12.					
1,1-Dichloroethane	ND	ug/kg	1.8					
Chloroform	ND	ug/kg	1.8					
Carbon tetrachloride	ND	ug/kg	1.2					
1,2-Dichloropropane	ND	ug/kg	4.3					
Dibromochloromethane	ND	ug/kg	1.2					
1,1,2-Trichloroethane	ND	ug/kg	1.8					
Tetrachloroethene	ND	ug/kg	1.2					
Chlorobenzene	ND	ug/kg	1.2					
Trichlorofluoromethane	ND	ug/kg	6.2					
1,2-Dichloroethane	ND	ug/kg	1.2					
1,1,1-Trichloroethane	ND	ug/kg	1.2					
Bromodichloromethane	ND	ug/kg	1.2					
trans-1,3-Dichloropropene	ND	ug/kg	1.2					
cis-1,3-Dichloropropene	ND	ug/kg	1.2					
1,1-Dichloropropene	ND	ug/kg	6.2					
Bromoform	ND	ug/kg	4.9					
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.2					
Benzene	ND	ug/kg	1.2					
Toluene	ND	ug/kg	1.8					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-06
B-13(8.5-9')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 22:42	RY
Ethylbenzene	ND	ug/kg	1.2				
Chloromethane	ND	ug/kg	6.2				
Bromomethane	ND	ug/kg	2.5				
Vinyl chloride	ND	ug/kg	2.5				
Chloroethane	ND	ug/kg	2.5				
1,1-Dichloroethene	ND	ug/kg	1.2				
trans-1,2-Dichloroethene	ND	ug/kg	1.8				
Trichloroethene	ND	ug/kg	1.2				
1,2-Dichlorobenzene	ND	ug/kg	6.2				
1,3-Dichlorobenzene	ND	ug/kg	6.2				
1,4-Dichlorobenzene	ND	ug/kg	6.2				
Methyl tert butyl ether	ND	ug/kg	2.5				
p/m-Xylene	ND	ug/kg	1.2				
o-Xylene	ND	ug/kg	1.2				
cis-1,2-Dichloroethene	ND	ug/kg	1.2				
Dibromomethane	ND	ug/kg	12.				
1,2,3-Trichloropropane	ND	ug/kg	12.				
Styrene	ND	ug/kg	1.2				
Dichlorodifluoromethane	ND	ug/kg	12.				
Acetone	ND	ug/kg	12.				
Carbon disulfide	ND	ug/kg	12.				
2-Butanone	ND	ug/kg	12.				
4-Methyl-2-pentanone	ND	ug/kg	12.				
2-Hexanone	ND	ug/kg	12.				
Bromochloromethane	ND	ug/kg	6.2				
Tetrahydrofuran	ND	ug/kg	25.				
2,2-Dichloropropane	ND	ug/kg	6.2				
1,2-Dibromoethane	ND	ug/kg	4.9				
1,3-Dichloropropane	ND	ug/kg	6.2				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.2				
Bromobenzene	ND	ug/kg	6.2				
n-Butylbenzene	ND	ug/kg	1.2				
sec-Butylbenzene	ND	ug/kg	1.2				
tert-Butylbenzene	ND	ug/kg	6.2				
o-Chlorotoluene	ND	ug/kg	6.2				
p-Chlorotoluene	ND	ug/kg	6.2				
1,2-Dibromo-3-chloropropane	ND	ug/kg	6.2				
Hexachlorobutadiene	ND	ug/kg	6.2				
Isopropylbenzene	ND	ug/kg	1.2				
p-Isopropyltoluene	ND	ug/kg	1.2				
Naphthalene	ND	ug/kg	6.2				
n-Propylbenzene	ND	ug/kg	1.2				
1,2,3-Trichlorobenzene	ND	ug/kg	6.2				
1,2,4-Trichlorobenzene	ND	ug/kg	6.2				
1,3,5-Trimethylbenzene	ND	ug/kg	6.2				
1,2,4-Trimethylbenzene	ND	ug/kg	6.2				
Ethyl ether	ND	ug/kg	6.2				
Isopropyl Ether	ND	ug/kg	4.9				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	4.9				

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-06
B-13(8.5-9')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 22:42	RY
Tertiary-Amyl Methyl Ether	ND	ug/kg	4.9				
1,4-Dioxane	ND	ug/kg	620				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	122.	%	70-130				
Toluene-d8	105.	%	70-130				
4-Bromofluorobenzene	113.	%	70-130				
Dibromofluoromethane	109.	%	70-130				
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0521 22:42	RY
Tentatively Identified Compounds							
No Tentatively Identified Compounds	ND	ug/kg					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

Laboratory Sample Number: L0405367-06
B-13(8.5-9')

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Volatile Petroleum Hydrocarbons				47 98-1		0521 12:12	MM

Quality Control Information

Condition of sample received: Satisfactory
Sample temperature upon receipt: Received on Ice
Were samples received in methanol? Yes (Covering the Soil)
Methanol ratio: Below 1:1 +/- 25%
Were all QA/QC procedures REQUIRED by the method followed? YES
Were all performance/acceptance standards for the required procedures achieved? YES
Were significant modifications made to the method as specified in Sect 11.3? NO
VPH Standard analysis reports only range data with no adjustments.
The normal acceptance range for the surrogate, 2,5-Dibromotoluene, is 70-130%.

C5-C8 Aliphatics, Unadjusted	ND	mg/kg	3.47
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	3.47
C9-C10 Aromatics	ND	mg/kg	3.47
C5-C8 Aliphatics, Adjusted	ND	mg/kg	3.47
C9-C12 Aliphatics, Adjusted	ND	mg/kg	3.47

Surrogate(s)	Recovery		QC Criteria
2,5-Dibromotoluene-PID	114.	%	70-130
2,5-Dibromotoluene-FID	115.	%	70-130

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH DUPLICATE ANALYSIS

Laboratory Job Number: L0405367

Parameter	Value 1	Value 2	Units	RPD	RPD Limits
Solids, Total for sample(s) 01-06 (L0405296-04, WG171302)					
Solids, Total	94.	94.	%	0	
Volatile Petroleum Hydrocarbons for sample(s) 01-03 (L0405367-01, WG171407)					
C5-C8 Aliphatics	ND	ND	mg/kg	NC	50
C9-C12 Aliphatics	ND	ND	mg/kg	NC	50
C9-C10 Aromatics	ND	ND	mg/kg	NC	50
C5-C8 Aliphatics, Adjusted	ND	ND	mg/kg	NC	50
C9-C12 Aliphatics, Adjusted	ND	ND	mg/kg	NC	50
Benzene	ND	ND	mg/kg	NC	50
Toluene	ND	ND	mg/kg	NC	50
Ethylbenzene	ND	ND	mg/kg	NC	50
p/m-Xylene	ND	ND	mg/kg	NC	50
o-Xylene	ND	ND	mg/kg	NC	50
Methyl tert butyl ether	ND	ND	mg/kg	NC	50
Naphthalene	ND	ND	mg/kg	NC	50
Surrogate(s)	Recovery				QC Criteria
2,5-Dibromotoluene-PID	91.0	94.0	%	3	70-130
2,5-Dibromotoluene-FID	104.	107.	%	3	70-130
Volatile Petroleum Hydrocarbons for sample(s) 04-06 (L0405367-06, WG171414)					
C5-C8 Aliphatics	ND	ND	mg/kg	NC	50
C9-C12 Aliphatics	ND	ND	mg/kg	NC	50
C9-C10 Aromatics	ND	ND	mg/kg	NC	50
C5-C8 Aliphatics, Adjusted	ND	ND	mg/kg	NC	50
C9-C12 Aliphatics, Adjusted	ND	ND	mg/kg	NC	50
Benzene	ND	ND	mg/kg	NC	50
Toluene	ND	ND	mg/kg	NC	50
Ethylbenzene	ND	ND	mg/kg	NC	50
p/m-Xylene	ND	ND	mg/kg	NC	50
o-Xylene	ND	ND	mg/kg	NC	50
Methyl tert butyl ether	ND	ND	mg/kg	NC	50
Naphthalene	ND	ND	mg/kg	NC	50
Surrogate(s)	Recovery				QC Criteria
2,5-Dibromotoluene-PID	114.	113.	%	1	70-130
2,5-Dibromotoluene-FID	115.	116.	%	1	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0405367

Parameter	% Recovery	QC Criteria
Total Metals LCS for sample(s) 01-06 (WG171341)		
Antimony, Total	97	75-125
Arsenic, Total	106	75-125
Beryllium, Total	102	75-125
Cadmium, Total	105	75-125
Chromium, Total	93	75-125
Copper, Total	97	75-125
Lead, Total	105	75-125
Nickel, Total	97	75-125
Selenium, Total	110	75-125
Silver, Total	93	75-125
Thallium, Total	104	75-125
Zinc, Total	102	75-125
Total Metals LCS for sample(s) 01-06 (WG171204)		
Mercury, Total	102	75-125
Volatile Organics by MCP 8260B/5035-Low LCS for sample(s) 02-06 (WG171399)		
Methylene chloride	102	70-130
1,1-Dichloroethane	100	70-130
Chloroform	95	70-130
Carbon tetrachloride	96	70-130
1,2-Dichloropropane	102	70-130
Dibromochloromethane	97	70-130
1,1,2-Trichloroethane	96	70-130
Tetrachloroethene	102	70-130
Chlorobenzene	103	70-130
Trichlorofluoromethane	88	70-130
1,2-Dichloroethane	92	70-130
1,1,1-Trichloroethane	98	70-130
Bromodichloromethane	98	70-130
trans-1,3-Dichloropropene	96	70-130
cis-1,3-Dichloropropene	105	70-130
1,1-Dichloropropene	101	70-130
Bromoform	102	70-130
1,1,2,2-Tetrachloroethane	105	70-130
Benzene	100	70-130
Toluene	99	70-130
Ethylbenzene	106	70-130
Chloromethane	92	70-130
Bromomethane	31	70-130
Vinyl chloride	93	70-130
Chloroethane	113	70-130
1,1-Dichloroethene	94	70-130
trans-1,2-Dichloroethene	95	70-130
Trichloroethene	98	70-130
1,2-Dichlorobenzene	107	70-130
1,3-Dichlorobenzene	106	70-130
1,4-Dichlorobenzene	108	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0405367

Continued

Parameter	% Recovery	QC Criteria
Volatile Organics by MCP 8260B/5035-Low LCS for sample(s) 02-06 (WG171399)		
Methyl tert butyl ether	99	70-130
p/m-Xylene	110	70-130
o-Xylene	110	70-130
cis-1,2-Dichloroethene	102	70-130
Dibromomethane	99	70-130
1,2,3-Trichloropropane	104	70-130
Styrene	104	70-130
Dichlorodifluoromethane	132	70-130
Acetone	78	70-130
Carbon disulfide	101	70-130
2-Butanone	83	70-130
4-Methyl-2-pentanone	100	70-130
2-Hexanone	81	70-130
Bromochloromethane	107	70-130
Tetrahydrofuran	101	70-130
2,2-Dichloropropane	105	70-130
1,2-Dibromoethane	99	70-130
1,3-Dichloropropane	100	70-130
1,1,1,2-Tetrachloroethane	98	70-130
Bromobenzene	104	70-130
n-Butylbenzene	118	70-130
sec-Butylbenzene	119	70-130
tert-Butylbenzene	111	70-130
o-Chlorotoluene	110	70-130
p-Chlorotoluene	108	70-130
1,2-Dibromo-3-chloropropane	108	70-130
Hexachlorobutadiene	109	70-130
Isopropylbenzene	101	70-130
p-Isopropyltoluene	109	70-130
Naphthalene	117	70-130
n-Propylbenzene	112	70-130
1,2,3-Trichlorobenzene	121	70-130
1,2,4-Trichlorobenzene	115	70-130
1,3,5-Trimethylbenzene	117	70-130
1,2,4-Trimethylbenzene	120	70-130
Ethyl ether	93	70-130
Isopropyl Ether	103	70-130
Ethyl-Tert-Butyl-Ether	102	70-130
Tertiary-Amyl Methyl Ether	107	70-130
1,4-Dioxane	102	70-130
Surrogate(s)		
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	108	70-130
4-Bromofluorobenzene	105	70-130
Dibromofluoromethane	103	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0405367

Continued

Parameter	% Recovery	QC Criteria
Volatile Organics by MCP 8260B/5035-Low LCS for sample(s) 01-03 (WG171399)		
Methylene chloride	99	70-130
1,1-Dichloroethane	101	70-130
Chloroform	97	70-130
Carbon tetrachloride	100	70-130
1,2-Dichloropropane	103	70-130
Dibromochloromethane	97	70-130
1,1,2-Trichloroethane	92	70-130
Tetrachloroethene	104	70-130
Chlorobenzene	102	70-130
Trichlorofluoromethane	91	70-130
1,2-Dichloroethane	92	70-130
1,1,1-Trichloroethane	103	70-130
Bromodichloromethane	97	70-130
trans-1,3-Dichloropropene	96	70-130
cis-1,3-Dichloropropene	107	70-130
1,1-Dichloropropene	108	70-130
Bromoform	99	70-130
1,1,2,2-Tetrachloroethane	99	70-130
Benzene	102	70-130
Toluene	100	70-130
Ethylbenzene	106	70-130
Chloromethane	96	70-130
Bromomethane	78	70-130
Vinyl chloride	109	70-130
Chloroethane	110	70-130
1,1-Dichloroethene	100	70-130
trans-1,2-Dichloroethene	100	70-130
Trichloroethene	102	70-130
1,2-Dichlorobenzene	104	70-130
1,3-Dichlorobenzene	104	70-130
1,4-Dichlorobenzene	107	70-130
Methyl tert butyl ether	104	70-130
p/m-Xylene	110	70-130
o-Xylene	109	70-130
cis-1,2-Dichloroethene	103	70-130
Dibromomethane	97	70-130
1,2,3-Trichloropropane	96	70-130
Styrene	103	70-130
Dichlorodifluoromethane	125	70-130
Acetone	80	70-130
Carbon disulfide	99	70-130
2-Butanone	75	70-130
4-Methyl-2-pentanone	95	70-130
2-Hexanone	72	70-130
Bromochloromethane	105	70-130
Tetrahydrofuran	101	70-130
2,2-Dichloropropane	111	70-130
1,2-Dibromoethane	96	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0405367

Continued

Parameter	% Recovery	QC Criteria
Volatile Organics by MCP 8260B/5035-Low LCS for sample(s) 01-03 (WG171399)		
1,3-Dichloropropane	97	70-130
1,1,1,2-Tetrachloroethane	98	70-130
Bromobenzene	101	70-130
n-Butylbenzene	127	70-130
sec-Butylbenzene	124	70-130
tert-Butylbenzene	115	70-130
o-Chlorotoluene	108	70-130
p-Chlorotoluene	107	70-130
1,2-Dibromo-3-chloropropane	103	70-130
Hexachlorobutadiene	107	70-130
Isopropylbenzene	103	70-130
p-Isopropyltoluene	117	70-130
Naphthalene	111	70-130
n-Propylbenzene	115	70-130
1,2,3-Trichlorobenzene	118	70-130
1,2,4-Trichlorobenzene	112	70-130
1,3,5-Trimethylbenzene	119	70-130
1,2,4-Trimethylbenzene	124	70-130
Ethyl ether	105	70-130
Isopropyl Ether	102	70-130
Ethyl-Tert-Butyl-Ether	105	70-130
Tertiary-Amyl Methyl Ether	109	70-130
1,4-Dioxane	95	70-130
Surrogate(s)		
1,2-Dichloroethane-d4	95	70-130
Toluene-d8	107	70-130
4-Bromofluorobenzene	102	70-130
Dibromofluoromethane	99	70-130
Volatile Petroleum Hydrocarbons LCS for sample(s) 01-03 (WG171407)		
Benzene	85	70-130
Toluene	81	70-130
Ethylbenzene	83	70-130
p/m-Xylene	80	70-130
o-Xylene	78	70-130
Methyl tert butyl ether	85	70-130
Naphthalene	77	70-130
Surrogate(s)		
2,5-Dibromotoluene-PID	84	70-130
2,5-Dibromotoluene-FID	97	70-130
Volatile Petroleum Hydrocarbons LCS for sample(s) 04-06 (WG171414)		
Benzene	110	70-130
Toluene	101	70-130
Ethylbenzene	113	70-130
p/m-Xylene	100	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0405367

Continued

Parameter	% Recovery	QC Criteria
Volatile Petroleum Hydrocarbons LCS for sample(s) 04-06 (WG171414)		
o-Xylene	102	70-130
Methyl tert butyl ether	98	70-130
Naphthalene	114	70-130
Surrogate(s)		
2,5-Dibromotoluene-PID	112	70-130
2,5-Dibromotoluene-FID	121	70-130

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0405367

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 01-06 (WG171341-1)								
Total Metals				1	3051			
Antimony, Total	ND	mg/kg	2.0	54	6010B	0521 17:00	0524 09:48	RW
Arsenic, Total	ND	mg/kg	0.40	54	6010B	0521 17:00	0524 09:48	RW
Beryllium, Total	ND	mg/kg	0.20	54	6010B	0521 17:00	0524 09:48	RW
Cadmium, Total	ND	mg/kg	0.40	54	6010B	0521 17:00	0524 09:48	RW
Chromium, Total	ND	mg/kg	0.40	54	6010B	0521 17:00	0524 09:48	RW
Copper, Total	ND	mg/kg	0.40	54	6010B	0521 17:00	0524 09:48	RW
Lead, Total	ND	mg/kg	2.0	54	6010B	0521 17:00	0524 09:48	RW
Nickel, Total	ND	mg/kg	1.0	54	6010B	0521 17:00	0524 09:48	RW
Selenium, Total	ND	mg/kg	0.80	54	6010B	0521 17:00	0524 09:48	RW
Silver, Total	ND	mg/kg	0.40	54	6010B	0521 17:00	0524 09:48	RW
Thallium, Total	ND	mg/kg	0.40	54	6010B	0521 17:00	0524 09:48	RW
Zinc, Total	ND	mg/kg	2.0	54	6010B	0521 17:00	0524 09:48	RW
Blank Analysis for sample(s) 01-06 (WG171204-1)								
Total Metals								
Mercury, Total	ND	mg/kg	0.08	54	7471A	0520 18:15	0521 12:17	DM
Blank Analysis for sample(s) 02-06 (WG171399-2)								
Volatile Organics by MCP 8260B/5035-Low				54	8260B		0521 16:09	RY
Methylene chloride	ND	ug/kg	10.					
1,1-Dichloroethane	ND	ug/kg	1.5					
Chloroform	ND	ug/kg	1.5					
Carbon tetrachloride	ND	ug/kg	1.0					
1,2-Dichloropropane	ND	ug/kg	3.5					
Dibromochloromethane	ND	ug/kg	1.0					
1,1,2-Trichloroethane	ND	ug/kg	1.5					
Tetrachloroethene	ND	ug/kg	1.0					
Chlorobenzene	ND	ug/kg	1.0					
Trichlorofluoromethane	ND	ug/kg	5.0					
1,2-Dichloroethane	ND	ug/kg	1.0					
1,1,1-Trichloroethane	ND	ug/kg	1.0					
Bromodichloromethane	ND	ug/kg	1.0					
trans-1,3-Dichloropropene	ND	ug/kg	1.0					
cis-1,3-Dichloropropene	ND	ug/kg	1.0					
1,1-Dichloropropene	ND	ug/kg	5.0					
Bromoform	ND	ug/kg	4.0					
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.0					
Benzene	ND	ug/kg	1.0					
Toluene	ND	ug/kg	1.5					
Ethylbenzene	ND	ug/kg	1.0					
Chloromethane	ND	ug/kg	5.0					
Bromomethane	ND	ug/kg	2.0					
Vinyl chloride	ND	ug/kg	2.0					
Chloroethane	ND	ug/kg	2.0					
1,1-Dichloroethene	ND	ug/kg	1.0					

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0405367

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 02-06 (WG171399-2)							
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 16:09	RY
trans-1,2-Dichloroethene	ND	ug/kg	1.5				
Trichloroethene	ND	ug/kg	1.0				
1,2-Dichlorobenzene	ND	ug/kg	5.0				
1,3-Dichlorobenzene	ND	ug/kg	5.0				
1,4-Dichlorobenzene	ND	ug/kg	5.0				
Methyl tert butyl ether	ND	ug/kg	2.0				
p/m-Xylene	ND	ug/kg	1.0				
o-Xylene	ND	ug/kg	1.0				
cis-1,2-Dichloroethene	ND	ug/kg	1.0				
Dibromomethane	ND	ug/kg	10.				
1,2,3-Trichloropropane	ND	ug/kg	10.				
Styrene	ND	ug/kg	1.0				
Dichlorodifluoromethane	ND	ug/kg	10.				
Acetone	ND	ug/kg	10.				
Carbon disulfide	ND	ug/kg	10.				
2-Butanone	ND	ug/kg	10.				
4-Methyl-2-pentanone	ND	ug/kg	10.				
2-Hexanone	ND	ug/kg	10.				
Bromochloromethane	ND	ug/kg	5.0				
Tetrahydrofuran	ND	ug/kg	20.				
2,2-Dichloropropane	ND	ug/kg	5.0				
1,2-Dibromoethane	ND	ug/kg	4.0				
1,3-Dichloropropane	ND	ug/kg	5.0				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.0				
Bromobenzene	ND	ug/kg	5.0				
n-Butylbenzene	ND	ug/kg	1.0				
sec-Butylbenzene	ND	ug/kg	1.0				
tert-Butylbenzene	ND	ug/kg	5.0				
o-Chlorotoluene	ND	ug/kg	5.0				
p-Chlorotoluene	ND	ug/kg	5.0				
1,2-Dibromo-3-chloropropane	ND	ug/kg	5.0				
Hexachlorobutadiene	ND	ug/kg	5.0				
Isopropylbenzene	ND	ug/kg	1.0				
p-Isopropyltoluene	ND	ug/kg	1.0				
Naphthalene	ND	ug/kg	5.0				
n-Propylbenzene	ND	ug/kg	1.0				
1,2,3-Trichlorobenzene	ND	ug/kg	5.0				
1,2,4-Trichlorobenzene	ND	ug/kg	5.0				
1,3,5-Trimethylbenzene	ND	ug/kg	5.0				
1,2,4-Trimethylbenzene	ND	ug/kg	5.0				
Ethyl ether	ND	ug/kg	5.0				
Isopropyl Ether	ND	ug/kg	4.0				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	4.0				
Tertiary-Amyl Methyl Ether	ND	ug/kg	4.0				
1,4-Dioxane	ND	ug/kg	500				

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0405367

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 02-06 (WG171399-2)							
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0521 16:09	RY
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	107.	%	70-130				
Toluene-d8	105.	%	70-130				
4-Bromofluorobenzene	106.	%	70-130				
Dibromofluoromethane	104.	%	70-130				
Blank Analysis for sample(s) 01-03 (WG171399-4)							
Volatile Organics by MCP 8260B/5035-Low				54 8260B		0524 10:08	RY
Methylene chloride	ND	ug/kg	10.				
1,1-Dichloroethane	ND	ug/kg	1.5				
Chloroform	ND	ug/kg	1.5				
Carbon tetrachloride	ND	ug/kg	1.0				
1,2-Dichloropropane	ND	ug/kg	3.5				
Dibromochloromethane	ND	ug/kg	1.0				
1,1,2-Trichloroethane	ND	ug/kg	1.5				
Tetrachloroethene	ND	ug/kg	1.0				
Chlorobenzene	ND	ug/kg	1.0				
Trichlorofluoromethane	ND	ug/kg	5.0				
1,2-Dichloroethane	ND	ug/kg	1.0				
1,1,1-Trichloroethane	ND	ug/kg	1.0				
Bromodichloromethane	ND	ug/kg	1.0				
trans-1,3-Dichloropropene	ND	ug/kg	1.0				
cis-1,3-Dichloropropene	ND	ug/kg	1.0				
1,1-Dichloropropene	ND	ug/kg	5.0				
Bromoform	ND	ug/kg	4.0				
1,1,2,2-Tetrachloroethane	ND	ug/kg	1.0				
Benzene	ND	ug/kg	1.0				
Toluene	ND	ug/kg	1.5				
Ethylbenzene	ND	ug/kg	1.0				
Chloromethane	ND	ug/kg	5.0				
Bromomethane	ND	ug/kg	2.0				
Vinyl chloride	ND	ug/kg	2.0				
Chloroethane	ND	ug/kg	2.0				
1,1-Dichloroethene	ND	ug/kg	1.0				
trans-1,2-Dichloroethene	ND	ug/kg	1.5				
Trichloroethene	ND	ug/kg	1.0				
1,2-Dichlorobenzene	ND	ug/kg	5.0				
1,3-Dichlorobenzene	ND	ug/kg	5.0				
1,4-Dichlorobenzene	ND	ug/kg	5.0				
Methyl tert butyl ether	ND	ug/kg	2.0				
p/m-Xylene	ND	ug/kg	1.0				
o-Xylene	ND	ug/kg	1.0				
cis-1,2-Dichloroethene	ND	ug/kg	1.0				
Dibromomethane	ND	ug/kg	10.				
1,2,3-Trichloropropane	ND	ug/kg	10.				
Styrene	ND	ug/kg	1.0				
Dichlorodifluoromethane	ND	ug/kg	10.				

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0405367

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 01-03 (WG171399-4)							
Volatile Organics by MCP 8260B/5035-Low continued				54 8260B		0524 10:08	RY
Acetone	ND	ug/kg	10.				
Carbon disulfide	ND	ug/kg	10.				
2-Butanone	ND	ug/kg	10.				
4-Methyl-2-pentanone	ND	ug/kg	10.				
2-Hexanone	ND	ug/kg	10.				
Bromochloromethane	ND	ug/kg	5.0				
Tetrahydrofuran	ND	ug/kg	20.				
2,2-Dichloropropane	ND	ug/kg	5.0				
1,2-Dibromoethane	ND	ug/kg	4.0				
1,3-Dichloropropane	ND	ug/kg	5.0				
1,1,1,2-Tetrachloroethane	ND	ug/kg	1.0				
Bromobenzene	ND	ug/kg	5.0				
n-Butylbenzene	ND	ug/kg	1.0				
sec-Butylbenzene	ND	ug/kg	1.0				
tert-Butylbenzene	ND	ug/kg	5.0				
o-Chlorotoluene	ND	ug/kg	5.0				
p-Chlorotoluene	ND	ug/kg	5.0				
1,2-Dibromo-3-chloropropane	ND	ug/kg	5.0				
Hexachlorobutadiene	ND	ug/kg	5.0				
Isopropylbenzene	ND	ug/kg	1.0				
p-Isopropyltoluene	ND	ug/kg	1.0				
Naphthalene	ND	ug/kg	5.0				
n-Propylbenzene	ND	ug/kg	1.0				
1,2,3-Trichlorobenzene	ND	ug/kg	5.0				
1,2,4-Trichlorobenzene	ND	ug/kg	5.0				
1,3,5-Trimethylbenzene	ND	ug/kg	5.0				
1,2,4-Trimethylbenzene	ND	ug/kg	5.0				
Ethyl ether	ND	ug/kg	5.0				
Isopropyl Ether	ND	ug/kg	4.0				
Ethyl-Tert-Butyl-Ether	ND	ug/kg	4.0				
Tertiary-Amyl Methyl Ether	ND	ug/kg	4.0				
1,4-Dioxane	ND	ug/kg	500				
Surrogate(s)	Recovery		QC Criteria				
1,2-Dichloroethane-d4	102.	%	70-130				
Toluene-d8	102.	%	70-130				
4-Bromofluorobenzene	102.	%	70-130				
Dibromofluoromethane	94.0	%	70-130				
Blank Analysis for sample(s) 01-03 (WG171407-3)							
Volatile Petroleum Hydrocarbons				47 98-1		0521 09:13	MM
C5-C8 Aliphatics, Unadjusted	ND	mg/kg	2.00				
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	2.00				
C9-C10 Aromatics	ND	mg/kg	2.00				
C5-C8 Aliphatics, Adjusted	ND	mg/kg	2.00				
C9-C12 Aliphatics, Adjusted	ND	mg/kg	2.00				

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0405367

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 01-03 (WG171407-3)							
Volatile Petroleum Hydrocarbons continued				47 98-1		0521 09:13	MM
Surrogate(s)	Recovery		QC Criteria				
2,5-Dibromotoluene-PID	93.0	%	70-130				
2,5-Dibromotoluene-FID	106.	%	70-130				
Blank Analysis for sample(s) 04-06 (WG171414-3)							
Volatile Petroleum Hydrocarbons				47 98-1		0521 08:19	MM
C5-C8 Aliphatics, Unadjusted	ND	mg/kg	2.00				
C9-C12 Aliphatics, Unadjusted	ND	mg/kg	2.00				
C9-C10 Aromatics	ND	mg/kg	2.00				
C5-C8 Aliphatics, Adjusted	ND	mg/kg	2.00				
C9-C12 Aliphatics, Adjusted	ND	mg/kg	2.00				
Surrogate(s)	Recovery		QC Criteria				
2,5-Dibromotoluene-PID	110.	%	70-130				
2,5-Dibromotoluene-FID	115.	%	70-130				

REFERENCES

1. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IIIA, 1997.

30. Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WPCF. 18th Edition. 1992.

47. Method for the Determination of Volatile Petroleum Hydrocarbons (VPH), Massachusetts Department of Environmental Protection, (MADEP-VPH-98-1), January 1998.

54. Compendium of Quality Assurance and Quality Control Requirements and Performance Standards for Selected Analytical Methods. MADEP BWSC. Final Methods. May 2003.

GLOSSARY OF TERMS AND SYMBOLS

REF Reference number in which test method may be found.
METHOD Method number by which analysis was performed.
ID Initials of the analyst.
ND Not detected in comparison to the reported detection limit.

Please note that all solid samples are reported on dry weight basis unless noted otherwise.

LIMITATION OF LIABILITIES

Alpha Analytical, Inc. performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical, Inc., shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical, Inc. be held liable for any incidental consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical, Inc.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding times and splitting of samples in the field.

ALPHA ANALYTICAL LABORATORIES
LOGIN SPECIFIC INFORMATION

Laboratory Job Number: L0405367

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	pH	Temp	Pres	Seal	Analysis
L0405367-01A	Vial MeOH preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G, VPH
L0405367-01B	Vial NaHSO4 preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G
L0405367-01C	Vial NaHSO4 preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G
L0405367-01D	Plastic 2oz unpreserved for TS	A	N/A	4 C	Y	Absent	TS
L0405367-01E	Amber 250ml unpreserved	A	N/A	4 C	Y	Absent	AG-TI, AS-TI, BE-TI, CD-TI, CR-TI, CU-TI, HG-T, NI-TI, PB-TI, PREPT, SB-TI, SE-TI, TL-TI, ZN-TI
L0405367-02A	Vial MeOH preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G, VPH
L0405367-02B	Vial NaHSO4 preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G
L0405367-02C	Vial NaHSO4 preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G
L0405367-02D	Plastic 2oz unpreserved for TS	A	N/A	4 C	Y	Absent	TS
L0405367-02E	Amber 250ml unpreserved	A	N/A	4 C	Y	Absent	AG-TI, AS-TI, BE-TI, CD-TI, CR-TI, CU-TI, HG-T, NI-TI, PB-TI, PREPT, SB-TI, SE-TI, TL-TI, ZN-TI
L0405367-03A	Vial MeOH preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G, VPH
L0405367-03B	Vial NaHSO4 preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G
L0405367-03C	Vial NaHSO4 preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G
L0405367-03D	Plastic 2oz unpreserved for TS	A	N/A	4 C	Y	Absent	TS
L0405367-03E	Amber 250ml unpreserved	A	N/A	4 C	Y	Absent	AG-TI, AS-TI, BE-TI, CD-TI, CR-TI, CU-TI, HG-T, NI-TI, PB-TI, PREPT, SB-TI, SE-TI, TL-TI, ZN-TI
L0405367-04A	Vial MeOH preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G, VPH
L0405367-04B	Vial NaHSO4 preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G
L0405367-04C	Vial NaHSO4 preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G
L0405367-04D	Plastic 2oz unpreserved for TS	A	N/A	4 C	Y	Absent	TS
L0405367-04E	Amber 250ml unpreserved	A	N/A	4 C	Y	Absent	AG-TI, AS-TI, BE-TI, CD-TI, CR-TI, CU-TI, HG-T, NI-TI, PB-TI, PREPT, SB-TI, SE-TI, TL-TI, ZN-TI
L0405367-05A	Vial MeOH preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G, VPH
L0405367-05B	Vial NaHSO4 preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G
L0405367-05C	Vial NaHSO4 preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G
L0405367-05D	Plastic 2oz unpreserved for TS	A	N/A	4 C	Y	Absent	TS

ALPHA ANALYTICAL LABORATORIES
LOGIN SPECIFIC INFORMATION

Laboratory Job Number: L0405367

Continued

Container ID	Container Type	Cooler	pH	Temp	Pres	Seal	Analysis
L0405367-05E	Amber 250ml unpreserved	A	N/A	4 C	Y	Absent	AG-TI, AS-TI, BE-TI, CD-TI, CR-TI, CU-TI, HG-T, NI-TI, PB-TI, PREPT, SB-TI, SE-TI, TL-TI, ZN-TI
L0405367-06A	Vial MeOH preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G, VPH
L0405367-06B	Vial NaHSO4 preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G
L0405367-06C	Vial NaHSO4 preserved	A	N/A	4 C	Y	Absent	MCP-8260L-G
L0405367-06D	Plastic 2oz unpreserved for TS	A	N/A	4 C	Y	Absent	TS
L0405367-06E	Amber 250ml unpreserved	A	N/A	4 C	Y	Absent	AG-TI, AS-TI, BE-TI, CD-TI, CR-TI, CU-TI, HG-T, NI-TI, PB-TI, PREPT, SB-TI, SE-TI, TL-TI, ZN-TI

Container Comments

Container ID	Comments

TRAFFIC IMPACT AND ACCESS STUDY

PROPOSED CITYSQUARE MIXED-USE DEVELOPMENT
WORCESTER, MASSACHUSETTS

Prepared for:

BERKELEY INVESTMENTS INC.
Boston, Massachusetts

February 2005

Prepared by:

VANASSE & ASSOCIATES, INC.
10 New England Business Center Drive
Suite 314
Andover, MA 01810
(978) 474-8800

Copyright © 2005 by VAI
All Rights Reserved

CONTENTS

EXECUTIVE SUMMARY 7

Existing Conditions 7
Future Conditions 10
Traffic OperationS Analysis 17
Recommendations 17

INTRODUCTION 27

Project Description 27
Study Methodology 28

EXISTING CONDITIONS 29

Geometry 30
Existing Traffic Volumes 44
Public Transportation 45
Pedestrian And Bicycle Facilities 47
Motor Vehicle Crash Data 48

FUTURE CONDITIONS 50

Future Traffic Growth 50
Project-Generated Traffic 55
Trip Distribution And Assignment 58
Future Traffic Volumes - Build Condition 59

CONTENTS (Continued)

TRAFFIC OPERATIONS ANALYSIS 62

Methodology 62
Analysis Results 66

CONCLUSIONS AND RECOMMENDATIONS 75

Conclusions 75
Recommendations 76

FIGURES

No.	Title
1	Site Location Map
2	Roadway Jurisdiction, Railroads, and Sensitive Receptors
3	Study Area Map
4	2004 Existing Weekday Morning Peak-Hour Traffic Volumes
5	2004 Existing Weekday Evening Peak-Hour Traffic Volumes
6	2004 Existing Saturday Midday Peak-Hour Traffic Volumes
7	Public Transportation Map
8	2010 No-Build Weekday Morning Peak-Hour Traffic Volumes
9	2010 No-Build Weekday Evening Peak-Hour Traffic Volumes
10	2010 No-Build Saturday Midday Peak-Hour Traffic Volumes
11	2010 No-Build As-of-Right Reoccupancy of Site Weekday Morning Peak-Hour Traffic Volumes
12	2010 No-Build As-of-Right Reoccupancy of Site Weekday Evening Peak-Hour Traffic Volumes
13	2010 No-Build As-of-Right Reoccupancy of Site Saturday Midday Peak-Hour Traffic Volumes
14	Trip Distribution Map – Commercial and Retail Components
15	Trip Distribution Map – Residential Component

FIGURES (CONTINUED)

No.	Title
16	Project-Generated Weekday Morning Peak-Hour Traffic Volumes
17	Project-Generated Weekday Evening Peak-Hour Traffic Volumes
18	Project-Generated Saturday Midday Peak Hour Traffic Volumes
19	2010 Build Weekday Morning Peak-Hour Traffic Volumes
20	2010 Build Weekday Evening Peak-Hour Traffic Volumes
21	2010 Build Saturday Midday Peak-Hour Traffic Volumes

TABLES

No.	Title
1	Union Station Commuter Rail Service
2	Motor Vehicle Crash Data Summary
3	Existing Worcester Common Outlets – As-of-Right Full Occupancy Trip-Generation Summary: Office Component
4	Existing Worcester Common Outlets – As-of-Right Full Occupancy Trip-Generation Summary: Retail Component
5	Existing Worcester Common Outlets – As-of-Right Full Occupancy Trip-Generation Summary: Existing Site-Generated Trips
6	Travel Mode Split
7	Trip-Generation Summary – Commercial Component
8	Trip-Generation Summary – Residential Component
9	Trip-Generation Summary – Retail Component
10	CitySquare Trip-Generation Summary
11	Trip-Generation Comparison – Proposed Mixed-Use Development vs. As-of-Right Reoccupancy of Project Site
12	Trip-Distribution Summary
13	Peak-Hour Traffic-Volume Increases
14	Level-of-Service Criteria for Unsignalized Intersections
15	Level-of-Service Criteria for Signalized Intersections

TABLES (CONTINUED)

No.	Title
16	Level-of-Service Criteria for Rotaries
17	Unsignalized Intersection Level-of-Service and Vehicle Queue Summary
18	Signalized Intersection Level-of-Service and Vehicle Queue Summary
19	Rotary Traffic Operations Summary
20	Mitigated Signalized Intersection Level-of-Service and Vehicle Queue Summary

EXECUTIVE SUMMARY

Vanasse & Associates, Inc. (VAI) has conducted a Traffic Impact and Access Study (TIAS) in order to determine the traffic impacts associated with the construction of a proposed mixed-use development to be known as CitySquare and generally situated on the site of the Worcester Common Outlets, west of Worcester Center Boulevard, between Foster Street and Franklin Street, in Worcester, Massachusetts. This study reviews access requirements, potential off-site improvements, safety considerations, and identifies and analyzes existing and future traffic conditions with and without the proposed project at nineteen (19) existing intersections (including the Washington Square rotary). The study area selected and evaluated in conjunction with this assessment is consistent with that identified by the Traffic Engineering Division of the City of Worcester Department of Public Works. In conjunction with the CitySquare project, two new north-south roadways will be constructed, along with an extension of an existing east-west collector and the construction of a new connector roadway linking the new east-west/north-south grid system. Access to the proposed development will be provided by way of the existing garage access drives that serve the Worcester Common Outlets located off Commercial Street and Worcester Center Boulevard, and by way of new garage access drives to be located within the development and off the new street system.

This study was prepared in consultation with the City of Worcester and the Massachusetts Highway Department (MassHighway), and was performed in accordance with state standards for the preparation of Traffic Impact Assessments (TIAs).

EXISTING CONDITIONS

A comprehensive field inventory of traffic conditions on the study area roadways was conducted in November and December 2004. The field investigation consisted of an inventory of existing roadway geometrics, traffic volumes, and operating characteristics, as well as posted speed limits and land use information within the study area.

The study area for the TIAS is consistent with that identified by the Traffic Engineering Division of the City of Worcester Department of Public Works and was selected to contain the major roadways providing access to the project site including Main Street, Foster Street, Commercial Street, Pleasant Street, Front Street, Franklin Street, Worcester Center Boulevard, Francis J. McGrath Boulevard, and Green Street, as well as the 19 major intersections located along these roadways through which project-related traffic will travel: Main Street at Maple Street and Foster

Street; Main Street at Pearl Street and Mechanic Street; Main Street at Pleasant Street and Front Street; Main Street at Franklin Street; Commercial Street at Foster Street; Commercial Street at the Worcester Common Outlets West Garage Driveway; Commercial Street at Mechanic Street; Front Street at Commercial Street; Franklin Street at Front Street and Salem Street; Worcester Center Boulevard at the Worcester Medical Center Driveway and the Worcester Common Outlets West Garage Driveway; Worcester Center Boulevard at Foster Street; Worcester Center Boulevard Southbound at the Worcester Common Outlets East Garage Egress Driveway (North); Worcester Center Boulevard Southbound at the Worcester Common Outlets East Garage Egress Driveway (South); Worcester Center Boulevard Northbound at Bridge Street; Worcester Center Boulevard at Old Mechanic Street and the Worcester Common Outlets East Garage Entrance Driveway; Worcester Center Boulevard Northbound at Ramp C; Worcester Center Boulevard at the Worcester Common Outlets Garage Ramp A; Worcester Center Boulevard at Francis J. McGrath Boulevard, Franklin Street, and Green Street; and the Washington Square Rotary.

Existing Traffic Volumes

In order to determine existing traffic-volume demands and flow patterns within the study area, manual turning movement counts (TMCs) and vehicle classification counts were completed in November and December 2004. Weekday morning (7:00 to 9:00 AM), weekday evening (4:00 to 6:00 PM), and Saturday midday (11:00 AM to 2:00 PM) peak-period manual TMCs were performed at the 19 study area intersections. The November traffic volumes were found to be representative of slightly above average-month traffic conditions and were not adjusted downward to average-month conditions in order to provide a conservative (above-average) analysis scenario. The December traffic volumes were found to be below average-month traffic conditions and were adjusted upwards accordingly in order to represent average-month conditions within the study area in accordance with state traffic study guidelines.

A review of the peak-period traffic counts indicates that the weekday morning peak hour generally occurs between 8:00 and 9:00 AM, with the weekday evening peak hour generally occurring between 4:30 and 5:30 PM. The Saturday midday peak hour was observed to generally occur between 12:00 and 1:00 PM.

Public Transportation

The project site is ideally situated to take advantage of available public transportation resources in the area, including the Massachusetts Bay Transportation Authority (MBTA) commuter rail service and Worcester Regional Transit Authority (WRTA) bus routes. Union Station, located in the southwest quadrant of the Washington Square rotary, serves as the current terminus of the MBTA Framingham/Worcester commuter rail line.

The WRTA operates several bus lines in the vicinity of the project site, with stops located on Main Street, Franklin Street, Front Street, Foster Street, Worcester Center Boulevard, and at Union Station. All twenty-eight WRTA public bus routes serve the study area and are located at or in close proximity (within walking distance) of the project site. WRTA buses are equipped with bicycle racks accommodating two bicycles. There is no additional charge for bicycles beyond the regular fare.

In addition, interstate and regional bus service to the City of Worcester and the study area is provided by Peter Pan Bus Lines. Peter Pan Bus Lines provides daily service from its Worcester terminal located at 75 Madison Street to Albany, New York; New York City; Philadelphia, Pennsylvania; Baltimore, Maryland; and Manchester, New Hampshire; as well as to Springfield,

Northampton and Boston, Massachusetts, and a number of other cities and towns within Massachusetts, Connecticut, Rhode Island and New York. Connections to Logan International Airport in Boston, Bradley International Airport in Connecticut, Manchester Airport, and LaGuardia and JFK International Airports in New York are also available from Peter Pan Bus Line terminals in the respective cities.

Commuter rail service to the City of Worcester and the study area is provided by the MBTA from its station located at Union Station. The MBTA provides daily commuter rail service between Worcester and Boston on its Framingham/Worcester line. Commuter rail fares from Union Station are $6.00 one-way. Tickets can be purchased at any commuter rail station or participating local merchants. Monthly commuter rail passes are available for $198.00 from the MBTA which also allow pass holders to use MBTA bus and subway services.

Pedestrian and Bicycle Facilities

The project site is served by an extensive and growing network of pedestrian sidewalks. Sidewalks are provided along both sides of all roadways providing access to the planned development, as well as along the project frontage on Commercial Street, Worcester Center Boulevard, Front Street, and Franklin Street. Pedestrian crosswalks and wheelchair ramps are provided at major pedestrian crossing locations, with pedestrian traffic signal equipment provided at signalized intersections. These facilities will be expanded and improved in conjunction with the proposed project, with sidewalks provided along both sides of all new roadways constructed as a part of the planned development, and pedestrian crosswalks and wheelchair ramps provided at major crossing locations. Any new or modified traffic signal systems will provide accommodations for pedestrians and bicycles.

Bicycle access to the City of Worcester will be provided by way of the Blackstone River Bikeway being constructed parallel to the general alignment of Route 146, as well as along Granite Street, Endicott Street, Qunsigamond Avenue, Southbridge Street and Main Street to Union Station. When complete, the Blackstone River Bikeway will consist of a 48-mile bicycle facility connecting Worcester to Providence, Rhode Island. The bikeway will consist of both on and off-road segments. Portions of the bikeway in Rhode Island and the segment connecting Millbury and Worcester, Massachusetts have been completed or are under construction, with the remaining segments under design.

Motor Vehicle Crash Data

Motor vehicle crash data was obtained from the MassHighway Safety Management/Traffic Operations Unit for the most recent three-year period available (2000 through 2002) in order to examine motor vehicle crash trends occurring within the study area. A review of this information indicates that, with the exception of the Washington Square rotary, the study area intersections averaged approximately 13 or fewer reported motor vehicle crashes per year over the three-year review period. The intersections of Main Street at Maple Street and Foster Street (23 total crashes); Main Street at Pleasant Street and Front Street (31 total crashes); Worcester Center Boulevard at Francis J. McGrath Boulevard, Franklin Street, and Green Street (40 total crashes); and the Washington Square rotary (63 total crashes) were found to have experienced the largest number of reported motor vehicle collisions over the three-year review period of the 19 study intersections.

The majority of the crashes occurring at the intersection of Main Street at Maple Street and Foster Street (17 out of 23) involved property damage only, occurred on a weekday (13 out of 23), and

were classified as angle-type collisions (12 out of 23). The majority of the crashes occurring at the intersection of Main Street at Pleasant Street and Front Street (15 out of 31) involved property damage only, occurred on a weekday (22 out of 31), and were classified as angle-type collisions (12 out of 31). The majority of the crashes occurring at the intersection of Worcester Center Boulevard at Francis J. McGrath Boulevard, Franklin Street, and Green Street (21 out of 40) involved property damage only, occurred on a weekday (32 out of 40), and were classified as angle-type collisions (17 out of 40). The majority of the crashes occurring at the Washington Square rotary (31 out of 63) involved property damage only, occurred on a weekday (54 out of 63), and were classified as rear-end type collisions (31 out of 63).

These four intersections (Main Street at Maple Street and Foster Street; Main Street at Pleasant Street and Front Street; Worcester Center Boulevard at Francis J. McGrath Boulevard, Franklin Street, and Green Street; and the Washington Square rotary), along with the intersections of Main Street at Pearl Street and Mechanic Street; Main Street at Franklin Street; and Franklin Street at Front Street and Salem Street, were found to have crash rates above the MassHighway average for unsignalized or signalized intersections, as appropriate, for the MassHighway District in which the project is located (District 3). In and of itself, this does not necessarily indicate that a specific safety deficiency exists at these locations. However, the data does suggest that a more detailed assessment of the cause of the motor vehicle collisions occurring at these locations should be undertaken in order to determine if a specific safety deficiency exists that is subject to correction. The detailed motor vehicle crash records have been requested from the City of Worcester Police Department in order to complete this evaluation.

It is important to note that with regard to the Washington Square rotary, the crash data provided did not differentiate between the five separate and distinct legs of the circle. As such, the motor vehicle crashes reported at these locations could not be assigned to a specific intersection or approach from the data provided. Further, the City of Worcester is in the process of reconstructing the Washington Square rotary to form a modern roundabout configuration, which should improve both traffic flow and safety. No fatal motor vehicle crashes were reported at the study area intersections over the three-year review period.

FUTURE CONDITIONS

Traffic volumes in the study area were projected to the year 2010, which reflects a five-year planning horizon from the present year (2005), consistent with State traffic study guidelines. The future condition traffic-volume projections incorporate identified specific development by others expected to be complete by 2010, as well as general background traffic growth as a result of development external to the study area and presently unforeseen projects. Anticipated project-generated traffic volumes superimposed upon these future conditions reflect 2010 Build conditions with the project.

Specific Development by Others

MassHighway, the Executive Office of Economic Development Department of the City of Worcester, and the Traffic Engineering Division of the City of Worcester Department of Public Works were contacted in order to determine if there were any projects planned within the study area that would have an impact on future traffic volumes at the study intersections. Based on these discussions, the following projects were identified:

- ***New Worcester Courthouse Facilities, Worcester, Massachusetts.*** This project consists of the construction of a 430,000 square foot (sf) Worcester Courthouse facility to be located at 201-249 Main Street in Worcester, Massachusetts.

- ***Hilton Garden Inn, Worcester, Massachusetts.*** This project consists of the construction of a 198-room hotel and 320-seat high-turnover restaurant to be located adjacent to the Worcester DCU Center in Worcester, Massachusetts.

- ***Union Station Intermodal Transportation Center, Worcester, Massachusetts.*** This project consists of the restoration of Union Station located at Washington Square in Worcester, Massachusetts. The project is comprised of the following elements: a 5-bay transit terminal; 26,000 sf of restaurant space; 134,000 sf of office space; a 100-room hotel; 60,000 sf of retail space; and a 240-unit residential community.

- ***Wyman Gordon Redevelopment, Worcester, Massachusetts.*** This proposed project consists of the construction of 178,000 sf of commercial/retail space and a 120-unit residential development to be located off Madison Street in Worcester, Massachusetts.

- ***Princeton at Putnam Lane Residential Apartment Community, Worcester, Massachusetts.*** This project consists of the replacement of the Worcester Driving Range located at 15 Putnam Lane in Worcester, Massachusetts, with a 160-unit residential apartment community.

- ***Arbor Point Residential Apartment Community, Worcester, Massachusetts.*** This proposed project consists of the construction of a 300-unit residential apartment community to be located off Route 9, adjacent to Interstate-290, in Worcester, Massachusetts.

No other projects were identified at this time that would impact future traffic volumes within the study area beyond the general background traffic growth rate.

General Background Traffic Growth

A review of traffic-volume data compiled by MassHighway from historic traffic counts conducted in the City of Worcester was undertaken in order to determine traffic growth trends. Based on a review of this data, it was determined that traffic volumes within the City have generally increased by approximately 0.39 percent per year over the past several years. However, in order to provide a conservative (high) analysis scenario and to be consistent with the traffic growth rate used in previous studies conducted in the City, a 2.0 percent per year compounded annual background traffic growth rate was used as approved by the Traffic Engineering Division of the City of Worcester Department of Public Works.

Roadway Improvement Projects

The City of Worcester Department of Public Works and MassHighway were contacted in order to determine if there were any planned roadway improvement projects expected to be completed within the study area. Based on these discussions, the following projects were identified:

Washington Square Improvement Project

The City of Worcester, in conjunction with the Union Station Intermodal Transportation Center Project, has proposed to reconstruct Washington Square, replacing the existing rotary with a

modern roundabout. In addition, traffic signal improvements will be provided at the following intersections: Worcester Center Boulevard at Old Mechanic Street (to be known as Foster Street after the improvements) and the Worcester Common Outlets east garage entrance driveway; Worcester Center Boulevard Northbound at Ramp C (to be removed and replaced with a newly constructed roadway to be known as Front Street); and Worcester Center Boulevard at the Worcester Common Outlets garage Ramp A. The proposed Washington Square modern roundabout will provide two entering and two exiting lanes per approach, with pedestrian crossings provided. The geometry of the intersection of Worcester Center Boulevard at Foster Street will remain unchanged. The intersection of Worcester Center Boulevard at Front Street will be placed under traffic signal control and constructed to provide the following geometry: two through travel lanes and a through/right-turn lane along the Worcester Center Boulevard northbound approach; a left-turn lane and two through travel lanes along the Worcester Center Boulevard southbound approach; and two left-turn lanes and a right-turn lane along the Front Street westbound approach. The intersection of Worcester Center Boulevard at the Worcester Common Outlets garage Ramp A will be reconstructed, with the Worcester Center Boulevard southbound u-turn being replaced by a through travel lane. This maneuver will be accommodated at the intersection of Worcester Center Boulevard at Front Street. The traffic signals at these three intersections will be interconnected and coordinated.

The Union Station Intermodal Transportation Center Project is currently under construction and is expected to be complete in 2005. The Washington Square Improvement Project is currently at the 100 percent design review stage, with construction expected to begin in 2005 and be complete by September 2006.

Franklin Street

The City of Worcester, in conjunction with the Union Station Intermodal Transportation Center Project, has proposed to reconfigure Franklin Street, allowing for two-way travel between Worcester Center Boulevard and Grafton Street. This change was implemented in December 2004.

Worcester Center Boulevard

The City of Worcester is currently considering improvements along Worcester Center Boulevard which would provide better pedestrian access along this roadway. The improvements may include roadway width reductions, tree planting, and sidewalk improvements. The plans for these improvements are currently at the pre-conceptual level and, therefore, are not included as part of this traffic study.

Interstate-290 Viaduct Rehabilitation Project

This project consists of the rehabilitation of the Interstate-290 viaduct in downtown Worcester. The project improvements include substructure repair, the installation of a drainage system, the reinforcement of existing structural steel, the painting of structural steel along joint locations, bridge deck replacement, and the installation of a bridge railing system. This construction project was commenced in February 2004 and is expected to be complete in the Fall of 2006.

No-Build Traffic Volumes

The 2010 No-Build peak-hour traffic-volume networks were developed by applying the 2.0 percent per year compounded annual background traffic growth rate to the 2004 Existing peak-hour traffic volumes and then superimposing the peak-hour traffic volumes expected to be generated by the previously identified specific development by others.

As-of-Right Reoccupancy

A 2010 No-Build condition with the reoccupancy of the Worcester Common Outlets was also created (as-of-right No-Build condition). This was done in order to compare the traffic impacts of the proposed project to those of the approved land uses for the Worcester Common Outlets that could be reoccupied as-of-right. The traffic characteristics of the as-of-right reoccupancy of the site were developed using trip-generation statistics published by the Institute of Transportation Engineers (ITE)[1] for similar land uses as those that were previously approved to occupy the site, which included 486,359 sf of general office space and 565,000 sf of retail space. Existing traffic volumes associated with the portion of the Worcester Common Outlets that has continued to operate on the project site and are reflected on the 2004 Existing traffic volume networks were removed from the local roadway network since they could not be directly attributed to a specific land use on the project site. ITE Land Use Code (LUC) 710, General Office Building, with the independent variable of 1,000 sf of gross floor area equal to 486.359 (486,359 sf), and LUC 820, Shopping Center, with the independent variable of 1,000 sf of gross leasable area equal to 565.000 (565,000 sf), were used to develop the traffic characteristics of the as-of-right reoccupancy of the project site. A 10 percent internal/dual-purpose trip rate was applied to both the office and retail trips in order to account for the interaction between these uses.

In addition, a 25 percent pass-by trip rate was applied to the trip-generation for the retail portion of the reoccupied Worcester Common Outlets in order to account for motorists traveling along roadways adjacent to the project site for other purposes that may patronize the retail component of the development in conjunction with their trip and are not new trips to the area.

In order to account for the use of alternative modes of travel to the site, the trip-generation calculations obtained using the ITE methodology, which are expressed in vehicle trips, were converted to person trips using a vehicle occupancy ratio of 1.06 persons per vehicle. Due to the availability of public transportation (transit) in the area (WRTA bus service, Framingham/Worcester commuter rail, etc.), as well as the presence of pedestrian facilities providing access to the site, it is anticipated that a portion of the employees and patrons destined for the fully occupied Worcester Common Outlets would use alternative modes of transportation. In order to account for the use of alternative modes of transportation, it was assumed that 94 percent of the trips to the site would be completed by private automobile, with 2 percent consisting of transit trips and the remaining 4 percent comprised of pedestrian/bicycle trips.

The directional distribution of generated trips to and from the project site for the fully occupied Worcester Common Outlets was determined based on the methodology used to establish the directional distribution for the office and retail components of the proposed development.

The as-of-right full occupancy of the project site was shown to generate approximately 17,096 new automobile trips on an average weekday (8,548 entering and 8,548 exiting), with approximately 841 new automobile trips (704 entering and 137 exiting) during the weekday

[1] *Trip Generation,* Seventh Edition; Institute of Transportation Engineers; Washington, DC; 2003.

morning peak hour and 1,774 new automobile trips (657 entering and 1,117 exiting) during the weekday evening peak hour. On a Saturday, the as-of-right reoccupancy of the project site was shown to generate approximately 18,430 new automobile trips (9,215 entering and 9,215 exiting), with approximately 1,861 new automobile trips (988 entering and 873 exiting) during the Saturday midday peak hour.

The 2010 No-Build with as-of-right reoccupancy of the project site condition traffic-volume networks were developed by removing the existing traffic volumes associated with current uses located on the project site from the respective No-Build peak-hour traffic volumes and then adding the traffic volumes associated with the fully occupied Worcester Common Outlets.

Project-Generated Traffic

The proposed project will entail the construction of a mixed-use development encompassing 853,159 sf of general office space, 322,050 sf of medical office space, 674 residential units (125 apartment units, 299 condominium type units, and 250 units of senior adult housing), and 357,419 sf of retail space. In order to develop the traffic characteristics of the proposed project, trip-generation statistics published by the ITE for similar land uses as those proposed were used. ITE LUC 710, General Office Building, with the independent variable of 1,000 sf of gross floor area equal to 853.159 (853,159 sf); LUC 610, Hospital, with the independent variable of 1,000 sf of gross floor area equal to 322.050 (322,050 sf); LUC 220, Apartment, with the independent variable of number of dwelling units equal to 125; LUC 230, Residential Condominium/Townhouse, with the independent variable of number of dwelling units equal to 299; LUC 252, Senior Adult Housing – Attached, with the independent variable of number of occupied dwelling units equal to 250; and LUC 820, Shopping Center, with the independent variable of 1,000 sf of gross leasable area equal to 357.419 (357,419 sf); were used to develop the traffic characteristics of the planned development.

Dual-Purpose/Internal Trips

Given the mix of uses proposed as part of the planned development, it is expected that a portion of the trips generated by the proposed project will consist of dual-purpose or internally captured trips. By way of example, an employee of the office/medical buildings may also patronize the retail uses within the development. Similarly, a resident living within the development may work at the office/medical buildings and/or patronize the retail uses within the site. This characteristic of mixed-use developments is not accounted for when the trip-generation calculations are performed on an individual land use basis. Studies documented by the ITE for mixed-use developments have shown internal capture rates ranging as high as 55 percent during the peak commuter periods. However, in order to provide a conservative (high) analysis scenario, a 10 percent dual-purpose/internal capture rate was applied to the traffic volumes associated with the proposed development.

Pass-By Trips

Not all of the vehicle trips expected to be generated by the retail component of the proposed project will be new trips on the roadway network. A significant portion of these trips will consist of pass-by trips or vehicles already traveling along roadways adjacent to the project site for other purposes that will patronize the proposed development in conjunction with their trip and then continue on to their original destination. These trips are not new trips on the roadway network as

a result of the planned project. Statistics published by the ITE[2] indicate that, on average, up to 34 percent of the trips generated by shopping centers consist of pass-by trips. However, in accordance with state standards for the preparation of TIAs and in order to provide a conservative (high) assessment of project-related impacts on the transportation infrastructure, a 25 percent pass-by trip rate was applied to the trip-generation for the retail component of the project.

Travel Mode Split

In order to account for the use of alternative modes of travel to the site, the trip-generation calculations obtained using the ITE methodology, which are expressed in vehicle trips, were converted to person trips using the average Vehicle Occupancy Ratio (VOR) for the residents, employees, and patrons of the proposed development. A review of the travel mode data obtained from the 2000 U.S. Census for persons employed within the City of Worcester indicates that a VOR of approximately 1.06 persons per vehicle would be applicable for employees and patrons of the commercial and retail components of the proposed project. A review of the travel mode data obtained from the 2000 U.S. Census for persons residing in the census tract containing the project site (Census Tract 7317) indicates that a VOR of approximately 1.10 persons per vehicle would be applicable for the residents of the proposed project.

Given the availability of public transportation services in the area, it is expected that a portion of the residents and employees of the planned development will use public transportation or will walk/bicycle between the project site and adjacent commuter rail station or bus stops. In order to determine the proportion of employees and patrons of the proposed development that may use public transportation or walk/bicycle, travel mode data obtained from the 2000 U.S. Census for persons employed within the City of Worcester was reviewed. Similarly, in order to determine the proportion of residents of the proposed development that may use public transportation or walk/bicycle, travel mode data obtained from the 2000 U.S. Census for persons residing within the census tract containing the project site (Census Tract 7317) was reviewed. As approved by the Traffic Engineering Division of the City of Worcester Department of Public Works City, the travel mode split used for the project was as follows: commercial/retail components – 94 percent automobile, 2 percent transit, and 4 percent pedestrian/bicycle; residential component – 59 percent automobile, 17 percent transit, and 24 percent pedestrian/bicycle.

The proposed development is expected to generate approximately 25,436 new automobile trips (12,718 entering and 12,718 exiting), with 1,030 transit trips (515 entering and 515 exiting), and 1,724 pedestrian/bicycle trips (862 entering and 862 exiting). During the weekday morning peak hour, the proposed development is expected to generate approximately 1,602 new automobile trips (1,233 entering and 369 exiting), with 67 transit trips (32 entering and 35 exiting), and 114 pedestrian/bicycle trips (62 entering and 52 exiting). During the weekday evening peak hour, the proposed development is expected to generate approximately 2,561 new automobile trips (896 entering and 1,665 exiting), with 92 transit trips (45 entering and 47 exiting), and 158 pedestrian/bicycle trips (71 entering and 87 exiting). On a Saturday, the proposed development is expected to generate approximately 23,778 new automobile trips (11,889 entering and 11,889 exiting), with 886 transit trips (443 entering and 443 exiting), and 1,488 pedestrian/bicycle trips (744 entering and 744 exiting). During the Saturday midday peak hour, the proposed development is expected to generate 2,328 new automobile trips (1,219 entering and 1,109 exiting), with 84 transit trips (45 entering and 39 exiting), and 144 pedestrian/bicycle trips (75 entering and 69 exiting).

---

[2] *Trip Generation Handbook, Second Edition, An ITE Recommended Practice;* Institute of Transportation Engineers; Washington DC; June 2004.

In comparison to the as-of-right reoccupancy (full occupancy) of the existing Worcester Common Outlets, the proposed mixed-use development was shown to generate approximately 3,912 additional automobile trips on an average weekday, with 667 additional automobile trips during the weekday morning peak hour and 371 additional automobile trips during the weekday evening peak hour. On a Saturday, the proposed mixed-use development is expected to generate approximately 472 fewer automobile trips than the as-of-right reoccupancy of the project site, with 97 fewer automobile trips during the Saturday midday peak hour.

Trip Distribution and Assignment

Due to the varied nature of the proposed land uses within the planned development, the directional distribution for each land use was determined to have its own unique traffic pattern. Accordingly, a separate trip-distribution pattern was created for each of the primary land use components of the project. The directional distribution of generated trips to and from the commercial and retail components of the proposed project was determined based on journey-to-work data obtained from the 2000 U.S. Census for persons employed within the City of Worcester and adjusted based on existing travel patterns at the study area intersections. The directional distribution of generated trips to and from the residential components of the proposed project was determined based on journey-to-work data obtained from the 2000 U.S. Census for persons residing within the City of Worcester and adjusted based on existing travel patterns at the study area intersections.

For the commercial/retail components, 10 percent of project-related traffic was assigned to/from the north on Main Street; with 7 percent oriented to/from the south on Main Street; 2 percent to/from the north on Commercial Street; 10 percent to/from the north on Worcester Center Boulevard; 11 percent to/from the north on Summer Street; 7 percent to/from the east on Shrewsbury Street; 19 percent to/from the south on Grafton Street; 1 percent from the east on Franklin Street; 10 percent from the south on Green Street; 11 percent to the south on Green Street; 18 percent to/from the southwest on Francis J. McGrath Boulevard; 2 percent to/from the south on Salem Street; 2 percent from the west on Pleasant Street; 3 percent to the west on Pleasant Street; and 1 percent from the west on Pearl Street.

For the residential components, 9 percent of project-related traffic was assigned to/from the north on Main Street; with 6 percent oriented to/from the south on Main Street; 2 percent to/from the north on Commercial Street; 12 percent to/from the north on Worcester Center Boulevard; 16 percent to/from the north on Summer Street; 17 percent to/from the east on Shrewsbury Street; 14 percent to/from the south on Grafton Street; 8 percent to/from the south on Green Street; 11 percent to/from the southwest on Francis J. McGrath Boulevard; 1 percent to/from the south on Salem Street; and 4 percent to/from the west on Pleasant Street.

Build Condition Traffic-Volume Networks

The 2010 Build condition networks were developed by removing the existing traffic generated by the current land uses that occupy the project site from the 2010 No-Build traffic volumes and then adding the anticipated project-generated traffic. The proposed development was shown to result in peak-hour traffic-volume increases relative to 2010 No-Build conditions within the study area ranging from -41 to 340 vehicles. When compared to the as-of-right reoccupancy of the project site, the planned development was shown to result in peak-hour traffic-volume increases ranging from -75 to 268 vehicles.

TRAFFIC OPERATIONS ANALYSIS

In order to assess the impacts of the proposed project on the roadway network, traffic operations and vehicle queue analyses were performed at the study intersections under 2004 Existing, 2010 No-Build, 2010 No-Build with as-of-right reoccupancy of the project site, and 2010 Build conditions. This analysis has indicated that the proposed project would not result in a significant change in traffic operations or vehicle queuing at the study intersections over No-Build conditions. The majority of the movements at the study intersections were shown to remain operating at level-of-service (LOS) D or better during the peak periods with the addition of project-related traffic, particularly with the introduction of the new street system in conjunction with the proposed project and the pending improvements to be completed in conjunction with the Washington Square Improvement Project.

RECOMMENDATIONS

The project proponent is committed to the implementation of a comprehensive transportation mitigation program that is designed to reduce the impacts of the planned development on the adjacent transportation infrastructure and build upon the planned roadway improvements to be implemented by others. The major elements of the mitigation program can be separated into site access and off-site improvements, and include the development and implementation of a Transportation Demand Management (TDM) program that is designed to reduce single occupant vehicle (SOV) travel associated with the proposed project and encourage the use of alternatives to SOVs including car/vanpooling, pedestrian, and bicycle travel. Each of the elements of the planned transportation mitigation program are discussed in detail in the following sections.

Site Access

Access to the proposed development will be provided by way of the existing garage access drives that serve the Worcester Common Outlets located off Commercial Street and Worcester Center Boulevard, and by way of new garage access drives to be located within the development and off the new street system. The following recommendations are made relative to site access and internal circulation within the site:

- Operating conditions for vehicles exiting the west garage onto Commercial Street should be monitored upon completion of the portion of the project to be situated on the block formed by Commercial Street, Foster Street, Trumbull Street and Front Street. If conditions warrant, it is suggested that the existing traffic control signal at the intersection of Commercial Street at the west garage driveway be upgraded, reactivated and integrated into the traffic signal system at the intersection of Commercial Street at Foster Street.
- Operating conditions for vehicles exiting the west garage onto Worcester Center Boulevard should be monitored upon completion of the portion of the project to be situated on the block formed by Commercial Street, Foster Street, Trumbull Street and Front Street. If conditions warrant, it is suggested that the existing traffic control signal at the intersection be upgraded, reactivated and integrated into the traffic signal system at the intersection of Worcester Center Boulevard and Foster Street and Trumbull Street.

- The intersection of Worcester Center Boulevard southbound at the east garage egress driveway (north) should be reconstructed and designed to provide an entrance-only drive for southbound motorists. It is recommended that the entering travel lane be a minimum of 16 feet in width, with appropriate signs and pavement markings provided indicating the function of the driveway as a one-way entrance-only drive.

- The intersection of Worcester Center Boulevard southbound at the east garage egress driveway (south) should be reconstructed and designed to provide two exit lanes (separate left-and right-turn lanes). It is recommended that the exiting travel lanes be a minimum of 12 feet in width, with appropriate signs and pavement markings provided indicating the function of the driveway as a one-way exit-only drive. If left-turns are permitted to exit the east garage at this intersection, the existing raised median along Worcester Center Boulevard should be discontinued at the drive in order to allow left-turning motorists from the east garage to exit onto Worcester Center Boulevard northbound. Vehicles exiting the development should be placed under STOP-sign control.

- The intersection of Worcester Center Boulevard at Old Mechanic Street (Foster Street) and the east garage driveway will retain its existing geometry, traffic control (fully actuated traffic signal system) and function following the improvements to be completed in conjunction with the Washington Square Improvement Project.

- The existing Worcester Common Outlets Ramp A will be removed in conjunction with the proposed project. In the vicinity of the former intersection of Ramp A with Worcester Center Boulevard, a new driveway will be constructed to serve the underground parking garage to be located generally in the southeast portion of the project site. The intersection of Worcester Center Boulevard at the garage driveway will be placed under fully actuated traffic signal control. The Worcester Center Boulevard northbound approach should consist of a left-turn/through travel lane and two through travel lanes. The Worcester Center Boulevard southbound approach should consist of two through travel lanes and a through/right-turn lane. The garage driveway should accommodate a single entering travel lane and a single exiting travel lane separated by a double-yellow centerline. Further, it is recommended that the existing raised median along Worcester Center Boulevard be discontinued at the intersection in order to allow left-turns to enter and exit the garage from Worcester Center Boulevard.

- Access to the west garage will also be provided by way of two new driveways that will intersect the new connector roadway linking New Front Street to Trumbull Street (Eaton Place). The east driveway will be designed to function as a one-way entrance-only facility and the west driveway will function as a one-way exit-only facility. It is recommended that the two one-way driveways be a minimum of 16 feet in width, with appropriate signs and pavement markings provided indicating the function of the driveways as one-way entrance/exit drives. Vehicles exiting the development should be placed under STOP-sign control with illumination provided.

- Access to the underground garage will also be provided by way of a single full-access driveway that will intersect the new two-way north-south connector roadway linking New Front Street and Franklin Street (New Side Street). It is recommended that the driveway be a minimum of 24 feet in width, accommodating both entering and exiting traffic. Vehicles exiting the development should be placed under STOP-sign control with illumination provided.

- Sidewalks should be installed flush with the proposed garage driveways so as not to provide a discontinuous pedestrian facility. Appropriate warning devices (signs, audible warning, and/or flashing indications) should be provided at the garage drives in order to warn pedestrians of exiting vehicles that may be obscured.
- On-street parking should be prohibited within 20-feet adjacent to the garage drives so as to provide line of sight to and from the drives.

Proposed Street System

In conjunction with the CitySquare project, two new north-south roadways will be constructed, along with an extension of an existing east-west collector and the construction of a new connector roadway linking the new east-west/north-south grid system. Front Street will be extended (New Front Street) in an easterly direction between the current end of its linear alignment east of Commercial Street and Worcester Center Boulevard. New Front Street will serve as a three-lane, two-way local collector roadway linking Main Street to Worcester Center Boulevard, and intern, to Interstate 290 (I-290) and Route 9 by way of Shrewsbury Street and Central Street, and to Union Station. Trumbull Street is planned as a three-lane, two-way local collector roadway that will traverse a general north-south alignment between Worcester Center Boulevard and New Front Street, providing access to City Hall and Franklin Street via Front Street. A new two-way north-south connector roadway linking New Front Street and Franklin Street (New Side Street) is proposed situated between Front Street and Worcester Center Boulevard. New Side Street will primarily serve a local access function for the CitySquare project, as well as a secondary means of access to Franklin Street and Front Street (via New Front Street), thereby dispersing traffic between Front Street and the new connector. The final piece of the new street system will be a new connector roadway linking New Front Street to Trumbull Street (Eaton Place) which will parallel the curvilinear alignment of Worcester Center Boulevard along the northern CitySquare frontage. Eaton Place will be a two-lane, two-way roadway that will primarily serve a local access function for the development.

It is recommended that the proposed roadways be a minimum of 24 feet in width if on-street parking is not provided (two 12-foot wide travel lanes) and a minimum of 40 feet in width if on-street parking is permitted (two 12-foot wide travel lanes with an 8-foot wide parking lane provided parallel to the curbline. Corner radii and departure lane widths at intersections should be sufficient to accommodate the turning requirements of fire apparatus, delivery trucks and WRTA buses as defined by the City of Worcester. The roadways should be designed with appropriate geometry (horizontal and vertical) to accommodate a safe travel speed of 30 mph. If centerline pavement markings are provided, they should consist of a double-yellow line in accordance with the centerline pavement marking standards of the Manual on Uniform Traffic Control Devices (MUTCD).[3] Sidewalks should be provided along both sides of the proposed roadway network in accordance with City standards, with wheelchair ramps and crosswalks provided at pedestrian crossing locations. Illumination should be provided along the proposed roadway network and at all proposed intersections.

In addition, in order to facilitate the potential future installation of traffic control signals, if and when warranted, it is recommended that traffic signal conduit and pull boxes be installed at the intersection of Trumbull Street at New Front Street and New Front Street at Front Street and Old Front Street. Further, traffic signal conduit and pull boxes should be provided between Trumbull Street and the existing traffic signal at the intersection of Front Street at Commercial Street in

[3] *Manual on Uniform Traffic Control Devices*; Federal Highway Administration; Washington, DC; 2003.

order to allow for the interconnection and coordination of the future traffic signals, again, if and when warranted.

Off-Site

Commercial Street at the West Garage Driveway

The west garage driveway was formerly under traffic signal control as part of the traffic signal system at the intersection of Commercial Street at Foster Street. The critical movements at this unsignalized intersection (left-turns from the west garage driveway) were shown to be operating at capacity (LOS E) during the weekday evening peak hour under 2010 Build conditions, with exiting vehicle queues extending into the garage. Given that this condition was projected to occur only during the weekday evening peak period under 2010 Build conditions, it is recommended that operating conditions for the garage exit be monitored upon completion of the portion of the project to be situated on the block formed by Commercial Street, Foster Street, Trumbull Street and Front Street. If conditions warrant, it is suggested that the existing traffic control signal at the intersection of Commercial Street at the west garage driveway be upgraded, reactivated and integrated into the traffic signal system at the intersection of Commercial Street at Foster Street. If and when warranted, these improvements will be designed and implemented by the project proponent in consultation with and as directed by the City of Worcester. With implementation of the suggested improvement, overall operating conditions at the intersection under 2010 Build with Mitigation conditions were shown to improve to an overall LOS B during the weekday morning peak hour, to LOS C during the weekday evening peak hour, and to LOS B during the Saturday midday peak hour.

Front Street at Commercial Street

The addition of project-related traffic to this signalized intersection was shown to result in a degradation in overall operating conditions over No-Build with as-of-right reoccupancy of the project site conditions during the weekday evening peak hour (LOS C to LOS D). In order to improve operating conditions and reduce vehicle queues at the intersection, the project proponent will design and implement an optimal traffic signal timing and phasing plan for the intersection within one year of the issuance of a Certificate of Occupancy for the development or as directed by the City of Worcester. With implementation of the recommended improvements, overall operating conditions at the intersection under 2010 Build with Mitigation conditions were shown to improve to LOS C during the weekday evening peak hour.

Franklin Street at Front Street and Salem Street

Overall operating conditions at the signalized intersection of Franklin Street at Front Street and Salem Street were shown to be acceptable (LOS D or better) under 2004 Existing, 2010 No-Build, 2010 No-Build with as-of-right reoccupancy of the project site, and 2010 Build conditions during the weekday morning, weekday evening, and Saturday midday peak hours; however, Under 2010 No-Build with as-of-right reoccupancy of the project site and 2010 Build conditions, the Front Street southbound left-turn/through movement was shown to be operating under constrained conditions (LOS F) during the weekday evening peak hour. Recognizing the importance of this intersection in providing access to the proposed project and both existing and planned future development in the area, the project proponent will design and implement an optimal traffic signal timing and phasing plan for this intersection within one year of the issuance of a Certificate of Occupancy for the development or as directed by the City of Worcester. With implementation of the recommended improvements, the Front Street southbound left-turn/through

movement was shown to improve to LOS D during the weekday evening peak hour, with overall intersection operations shown to improve to LOS C.

Worcester Center Boulevard at the Worcester Medical Center Driveway and the West Garage Driveway

The critical movements at the intersection of Worcester Center Boulevard at the Worcester Medical Center driveway and the west garage driveway (all movements from the west garage driveway) were shown to be constrained (LOS F) during the weekday evening peak hour under 2004 Existing, 2010 No-Build, 2010 No-Build with as-of-right reoccupancy of the project site, and 2010 Build conditions. In addition, left-turns from the Worcester Medical Center driveway were shown to be constrained (LOS F) during the weekday evening peak hour under 2010 No-Build, 2010 No-Build with as-of-right reoccupancy of the project site, and 2010 Build conditions. A traffic control signal has been installed at the intersection; however, the signal is currently set in flashing operation, with flashing red indications provided for the Worcester Medical Center driveway and the Worcester Common Outlets west garage driveway approaches, and flashing yellow indications provided for the Worcester Center Boulevard approaches. Given that this condition was only shown to occur during the weekday evening peak period, it is recommended that operating conditions for the garage exit be monitored upon completion of the portion of the project to be situated on the block formed by Commercial Street, Foster Street, Trumbull Street and Front Street. If conditions warrant, it is suggested that the existing traffic control signal at the intersection be upgraded, reactivated and integrated into the traffic signal system at the intersection of Worcester Center Boulevard and Foster Street and Trumbull Street. If and when warranted, these improvements will be designed and implemented by the project proponent in consultation with and as directed by the City of Worcester. With implementation of the recommended improvements, overall operating conditions at the intersection under 2010 Build with Mitigation conditions were shown to improve to an overall LOS A during the weekday morning, weekday evening, and Saturday midday peak hours.

Worcester Center Boulevard at Foster Street and Trumbull Street

Overall operating conditions at the signalized intersection of Worcester Center Boulevard at Foster Street and Trumbull Street were shown to be acceptable (LOS C or better) under 2010 Build conditions during the peak periods with the addition of Trumbull Street forming the fourth leg of the intersection and the integration of this approach into the traffic signal system. In conjunction with the construction of Trumbull Street, the project proponent will design and install a fully actuated traffic signal system at the intersection of Worcester Center Boulevard at Foster Street and Trumbull Street that will replace the existing traffic signal system at the intersection. The new traffic control signal will be interconnected and coordinated with the existing traffic control signal at the intersection of Worcester Center Boulevard at the Worcester Medical Center driveway and west garage driveway in order to facilitate the potential future reactivation of the traffic control signal at that intersection. The planned improvements will include the installation of all traffic signal equipment, conduit, wiring and appurtenances necessary to provide a fully functioning coordinated traffic signal system. With implementation of the recommended improvements, overall operating conditions at the intersection under 2010 Build with Mitigation conditions were shown to continue to be acceptable (LOS C or better) during the weekday morning, weekday evening, and Saturday midday peak hours.

Worcester Center Boulevard at Francis J. McGrath Boulevard, Franklin Street, and Green Street

Overall operating conditions at the signalized intersection of Worcester Center Boulevard at Francis J. McGrath Boulevard, Franklin Street, and Green Street were shown to be constrained (LOS F) under 2004 Existing conditions during the weekday evening peak hour, and during both the weekday morning and evening peak hours under 2010 No-Build, 2010 No-Build with as-of-right reoccupancy of the project site, and 2010 Build conditions. Recognizing the importance of this intersection in providing access to the project and both existing and planned future development in the area, the project proponent will design and implement an optimal traffic signal timing and phasing plan for this intersection within one year of the issuance of a Certificate of Occupancy for the development or as directed by the City of Worcester. With implementation of the recommended improvements, overall operating conditions at the intersection under 2010 Build with Mitigation conditions were shown to remain at LOS F during both the weekday morning and weekday evening peak hours, with a general reduction in motorist delays and vehicle queuing.

Transportation Demand Management Program

The proposed project is ideally situated in relation to the regional roadway network and the public transportation system to facilitate opportunities to reduce vehicle trips and encourage alternative modes of travel. Overall, the project's impact relative to traffic, public transportation, and pedestrians are expected to be minor. However, the following pedestrian and bicycle improvements/accommodations, Transportation Demand Management (TDM), and trip reduction strategies are proposed with the goal of further minimizing the project's overall impact.

Pedestrian Improvements

As part of the proposed development, the project proponent will define and enhance pedestrian facilities as follows:

- Sidewalks and pedestrian promenade areas will be provided within the development and along all new roadways to be constructed in conjunction with the proposed project.
- Street lighting will be provided along all new roadways and around building perimeters.
- Full handicapped access will be provided on-site and along the proposed roadway network including elevators and ramps for barrier-free access throughout the development; wheelchair ramps at all intersections; pedestrian pushbuttons and phasing at all signalized intersections constructed or modified in conjunction with the proposed project; and the installation of crosswalks and associated pedestrian crossing warning signs at and in advance of pedestrian crossing locations designed and installed in accordance with the MUTCD.
- Sidewalks will be constructed so as to be flush with all garage entrances.
- Pedestrian warning devices (signs, voice and light devices, mirrors, etc.) will be provided at all garage driveways where they intersect a sidewalk for pedestrian safety.

In addition, the project proponent has been and will continue to coordinate with the City of Worcester with regard to the design and location of the pedestrian gateway between Union Station and City Hall. This important link in the pedestrian network will be integrated into the planned development, creating a functional and vibrant enhancement to the project and the

downtown area, as well as facilitating access to the intermodal transportation center at Union Station.

Bicycle Accommodations

The proposed project will include provision of safe, secure, weather protected bicycle racks and/or storage lockers throughout the development. Signs will be provided along the proposed roadway network and at appropriate locations within the site directing bicyclists to the bicycle storage facilities. Secure bicycle parking will be provided free of charge in all garages. Outside, short-term bicycle parking will be provided by way of bicycle racks located throughout the development in visible and functional locations.

In addition, the project proponent will coordinate with the City of Worcester and MassHighway with regard to potential connections between the proposed project and the planned future Blackstone River Bikeway, which is currently planned to terminate at Union Station. All proposed and modified traffic signals to be constructed in conjunction with the planned development will include bicycle detection and associated signs and pavement markings.

Traffic Reduction Strategies

In order to reduce single occupant vehicle (SOV) travel to the project site and encourage the use of alternative modes of transportation to reach the planned development, the project proponent will implement several traffic reduction strategies as an integral part of the proposed development. The core of successful traffic reduction strategies are ridesharing, alternative work schedules, bicycling, and pedestrian travel, and are discussed below.

Ridesharing Programs - Ridesharing refers to encouraging commuters to ride in vehicles with other commuters rather than drive alone to work. Given the number of persons expected to be employed and to reside within the development, a coordinated rideshare program could be successful at reducing SOV travel associated with the planned development. The most common forms of ridesharing are carpools and vanpools. The benefits of such programs include less congestion, reduced fuel consumption, and better air quality. Keys to the success of such programs include:

- Carpool/vanpool matching programs through the local Transportation Management Association (TMA);
- Joint programs with area commercial tenants;
- Dissemination of promotional materials to residents and employees;
- Newsletters about the program;
- Coordination with MassRIDES which leases commuter vans and provides administrative and organizational assistance;
- Preferential parking for carpoolers; and
- Guaranteed ride home program.

The project proponent is committed to ridesharing and will encourage its development and use. Toward this end, the project proponent will implement the following traffic reduction strategies in conjunction with the proposed project:

- Assign an on-site, full-time transportation coordinator that will coordinate and implement the traffic reduction program for the development.
- Work with the City of Worcester, MassHighway, MassRIDES, the WRTA, and the regional planning agency to develop an effective traffic reduction program for the project.
- Designated parking spaces will be provided in all garages for car/vanpools, with reduced or free parking provided to car/vanpools registered with the transportation coordinator.
- A guaranteed ride home program will be implemented for car/vanpool participants registered with the transportation coordinator.
- Tenants will be encouraged to subsidize public transportation passes to the maximum extent allowed under Internal Revenue Service (IRS) guidelines and will be encouraged to implemented the Commuter Check program for eligible full-time employees.
- Information regarding available public transportation resources, schedules, fare information, and stop/terminal locations will be provided to all commercial tenants and posted in lobby areas of the residential buildings.
- Work with the City and the WRTA to establish bus service to the project site. It is envisioned that the existing bus routes serving the area could be modified to include stops within the planned development and along the proposed roadway network.
- Provide bus stops within the development and along the proposed roadway network in consultation with the City and the WRTA. The location of bus stops will be integrated into the design of the planned street system.

In addition, an annual employee survey and traffic monitoring program will be implemented in conjunction with the planned development (discussed later) that will be used to document the effectiveness of the traffic reduction program and to refine and expand the program as necessary to meet the needs of the residents, employees and patrons of the development.

Alternative Work Schedules - Flexible working hours allow employees to choose their own starting and finishing times by establishing a required core time such as 9:00 AM to 4:00 PM; this allows employees to vary work schedules and reduces peak-hour demand. Tenants of the planned development will be encouraged to evaluate the feasibility of implementing a flextime policy and/or telecommuting for employees in order to reduce peak-hour demand.

Traffic Monitoring Program

The project proponent will implement an annual traffic monitoring and employee survey program in order to evaluate the success of the TDM program and to expand and refine the elements of the program as necessary. The monitoring program will include performing 72-hour automatic traffic recorder counts on the garage driveways serving the development on two consecutive weekdays and a Saturday, and completing an employee and resident survey of commuting modes. The results of the annual monitoring program will be provided to MassHighway, MassRIDES, the City of Worcester and the regional planning commission. The monitoring program will commence one year after full occupancy and will continue for a period of 5-years thereafter or as directed by the City of Worcester and/or MassHighway.

Construction Management

The project proponent and the general contractor will use the following measures to minimize construction impacts on pedestrian and vehicular travel and to enhance safety during the project's construction phase:

- Coordinate construction activities with the City of Worcester Department of Public Works and the Washington Square Improvement Project;
- Provide police details as required by the City of Worcester;
- Coordinate with the City of Worcester Department of Public Works regarding all transportation-related construction impacts;
- Develop and enforce the use of designated truck routes approved by the City; and
- Secure fencing and sidewalk staging protection will be provided in areas affected by each phase of construction in order to protect nearby pedestrian and vehicular traffic. Gated entrances into construction areas will be determined jointly with the City of Worcester Department of Public Works.
- Full or partial street closures will be avoided to the extent possible. Should a partial street closure be necessary in order to off-load construction materials and/or complete construction-related activities, the closure will be limited to off-peak periods so as to minimize the impact on vehicular and pedestrian flow. Police details will be used as required by the City. Prior to the implementation of any planned construction activities within the public right-of-way, the contractor will submit to the City of Worcester Department of Public Works for review and approval a traffic and pedestrian management plan.
- Secure on-site storage will be provided for tools and equipment in an effort to minimize construction-related vehicle trips to the site.

Loading and Deliveries

The proposed project will be designed to accommodate all loading, delivery, and moving functions on-site in a safe and efficient manner. Designated loading areas will be provided on-site to accommodate deliveries and tenant moves. Refuse/recycling will be accommodated in centralized areas with roll-out-type containers provided. In an effort to further minimize the impacts of loading and delivery activities associated with the planned development, the project proponent and/or the property management team will implement the following measures:

- Truck routes and hours of deliveries will be coordinated to ensure that truck activity impacts are minimized during the commuter peak hours and that truck routes are consistent with existing City and State regulations.
- Every attempt will be made to use service vendors currently delivering in the vicinity of the project site in an effort to reduce the overall number of new trucks in the area.
- The property management team will provide direction to new tenants and those moving as to the proper routes for moving vehicles to gain access to the site, as well as the location of designated loading areas.

With implementation of the above recommendations, safe and efficient access will be provided to the planned development and the proposed project can be constructed with minimal impact on the roadway system.

Table 20
MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

Signalized Intersection/ Peak Hour/Movement	2010 No-Build				2010 No-Build with As of Right Reoccupancy				2010 Build				2010 Build with Mitigation			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg./95th	V/C	Delay	LOS	Queue Avg./95th	V/C	Delay	LOS	Queue Avg./95th	V/C	Delay	LOS	Queue Avg./95th
Commercial Street at Foster Street																
Weekday Morning:																
Foster Street EB LT/TH/RT	0.20	11.2	B	1/2	0.20	11.6	B	1/2	0.26	11.7	B	1/3	0.35	16.3	B	2/3
Foster Street WB LT	0.38	5.0	A	1/4	0.38	5.3	A	2/4	0.28	5.1	A	1/3	0.39	10.0	B	2/4
Foster Street WB TH/RT	0.32	4.7	A	2/4	0.33	5.1	A	2/4	0.33	5.2	A	2/4	0.43	10.5	B	4/6
Commercial Street NB LT/TH	0.64	20.3	C	2/4	0.68	21.5	C	2/4	0.69	23.4	C	2/5	0.39	3.8	A	1/1
Commercial Street NB RT	0.09	13.7	B	0/1	0.11	13.6	B	0/1	0.06	14.3	B	0/1	0.06	0.1	A	0/0
Commercial Street SB LT/TH/RT	0.48	15.9	B	2/4	0.46	15.6	B	2/4	0.36	15.9	B	1/3	0.08	19.3	B	2/4
Overall	**0.45**	**9.7**	**A**	--	**0.46**	**10.2**	**B**	--	**0.43**	**10.7**	**B**	--	**0.41**	**11.1**	**B**	--
Weekday Evening:																
Foster Street EB LT/TH/RT	0.60	21.7	C	3/5	0.64	24.1	C	3/5	0.60	19.8	B	3/5	0.86	43.8	D	4/8
Foster Street WB LT	0.29	11.0	B	1/2	0.45	11.5	B	2/3	0.28	9.6	A	1/2	0.48	20.6	C	2/3
Foster Street WB TH/RT	0.38	11.6	B	3/4	0.35	10.9	B	3/4	0.41	10.5	B	3/5	0.60	22.3	C	6/8
Commercial Street NB LT/TH	0.62	15.3	B	4/7	0.93	44.7	D	7/12	0.71	20.5	C	4/8	0.43	5.6	A	2/3
Commercial Street NB RT	0.19	10.8	B	0/1	0.25	13.3	B	0/1	0.14	11.6	B	0/1	0.14	0.1	A	0/0
Commercial Street SB LT/TH/RT	0.60	15.1	B	4/10	0.83	31.1	C	7/12	0.65	17.4	B	4/10	0.92	54.8	D	6/11
Overall	**0.59**	**14.7**	**B**	--	**0.75**	**23.3**	**C**	--	**0.64**	**15.3**	**B**	--	**0.74**	**27.6**	**C**	--
Saturday Midday:																
Foster Street EB LT/TH/RT	0.12	7.3	A	1/1	0.26	14.0	B	1/2	0.22	11.3	B	1/2	0.54	21.0	C	2/3
Foster Street WB LT	0.11	2.9	A	1/1	0.41	7.0	A	1/3	0.22	4.5	A	1/2	0.42	12.8	B	2/4
Foster Street WB TH/RT	0.13	2.8	A	1/1	0.17	6.0	A	1/2	0.17	4.3	A	1/2	0.30	12.1	B	2/4
Commercial Street NB LT/TH	0.40	20.7	C	1/2	0.56	15.0	B	2/4	0.48	19.4	B	1/3	0.20	3.9	A	1/1
Commercial Street NB RT	0.10	18.8	B	0/1	0.20	11.9	B	0/1	0.15	17.1	B	0/1	0.15	0.1	A	0/0
Commercial Street SB LT/TH/RT	0.27	19.6	B	1/1	0.20	11.9	B	1/2	0.26	17.7	B	1/2	0.28	17.8	B	2/3
Overall	**0.18**	**10.1**	**B**	--	**0.46**	**10.8**	**B**	--	**0.29**	**11.0**	**B**	--	**0.32**	**11.6**	**B**	--
Front Street at Commercial Street																
Weekday Morning:																
Front Street EB LT/TH	0.44	3.7	A	2/8	0.45	4.1	A	2/8	0.53	6.5	A	3/11	0.51	5.7	A	3/9
Front Street WB TH/RT	0.28	3.0	A	1/3	0.28	3.3	A	1/3	0.50	6.1	A	2/5	0.47	5.4	A	2/4
Commercial Street SB LT/RT	0.27	26.0	C	1/1	0.32	24.9	C	1/1	0.51	18.3	B	2/3	0.56	20.0	B	2/3
Overall	**0.41**	**6.5**	**A**	--	**0.43**	**7.0**	**A**	--	**0.52**	**8.5**	**A**	--	**0.52**	**8.3**	**A**	--
Weekday Evening:																
Front Street EB LT/TH	0.59	7.8	A	4/10	0.92	31.3	C	8/10	0.83	20.1	C	8/11	0.90	31.4	C	6/13
Front Street WB TH/RT	0.38	5.9	A	2/4	0.55	8.8	A	3/5	0.74	13.0	B	4/7	0.77	17.2	B	6/9
Commercial Street SB LT/RT	0.58	18.3	B	2/4	0.76	21.8	C	4/8	1.08	78.6	E	8/13	0.95	42.8	D	8/14
Overall	**0.58**	**9.8**	**A**	--	**0.86**	**20.7**	**C**	--	**0.93**	**37.6**	**D**	--	**0.92**	**30.1**	**C**	--
Saturday Midday:																
Front Street EB LT/TH	0.44	5.7	A	2/5	0.73	13.7	B	5/11	0.57	8.7	A	4/9	0.58	8.5	A	3/6
Front Street WB TH/RT	0.20	4.6	A	1/2	0.38	7.5	A	1/3	0.42	7.3	A	2/4	0.42	6.8	A	1/3
Commercial Street SB LT/RT	0.38	13.9	B	1/2	0.97	47.4	D	6/8	0.70	19.6	B	4/5	0.71	18.7	B	3/5
Overall	**0.43**	**7.5**	**A**	--	**0.82**	**25.1**	**C**	--	**0.61**	**11.5**	**B**	--	**0.63**	**11.0**	**B**	--

See notes at end of table.

Table 20 (Continued)
MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

Signalized Intersection/ Peak Hour/Movement	2010 No-Build				2010 No-Build with As of Right Reoccupancy				2010 Build				2010 Build with Mitigation			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg./95th	V/C	Delay	LOS	Queue Avg./95th	V/C	Delay	LOS	Queue Avg./95th	V/C	Delay	LOS	Queue Avg./95th
Franklin Street at Front Street and Salem Street																
Weekday Morning:																
Franklin Street EB LT/TH/RT	0.22	11.2	B	2/3	0.22	11.2	B	2/3	0.27	11.2	B	2/3	0.27	10.8	B	2/3
Franklin Street WB LT	0.18	11.1	B	1/2	0.18	11.1	B	1/2	0.18	10.8	B	1/3	0.18	10.5	B	1/2
Franklin Street WB TH	0.60	14.8	B	5/11	0.60	14.9	B	5/11	0.60	14.4	B	5/11	0.59	14.0	B	5/10
Franklin Street WB RT	0.18	11.0	B	0/2	0.18	11.1	B	0/2	0.08	10.2	B	0/2	0.08	9.9	A	0/2
Salem Street NB LT/TH/RT	0.58	25.0	C	3/4	0.58	25.2	C	3/4	0.59	23.5	C	3/5	0.63	24.8	C	3/5
Front Street SB LT/TH	0.72	28.7	C	4/6	0.73	29.7	C	4/6	0.59	23.7	C	3/5	0.59	23.1	C	3/4
Front Street SB RT	0.07	18.7	B	1/1	0.09	18.7	B	1/1	0.09	18.7	B	1/1	0.08	18.3	B	1/1
Overall	**0.62**	**17.0**	**B**	--	**0.63**	**17.3**	**B**	--	**0.60**	**16.1**	**B**	--	**0.60**	**16.0**	**B**	--
Weekday Evening:																
Franklin Street EB LT/TH/RT	0.41	15.0	B	3/5	0.43	15.4	B	4/5	0.85	17.3	B	4/6	0.91	22.0	C	5/7
Franklin Street WB LT	0.61	20.2	C	3/6	0.64	21.6	C	3/6	0.59	19.6	B	3/5	0.66	26.6	C	3/6
Franklin Street WB TH	0.60	17.9	B	6/8	0.61	18.2	B	6/8	0.64	18.9	B	7/9	0.69	23.6	C	8/9
Franklin Street WB RT	0.15	13.1	B	0/1	0.23	13.9	B	0/1	0.11	13.1	B	0/1	0.11	15.8	B	0/1
Salem Street NB LT/TH/RT	0.47	31.7	C	2/3	0.52	32.1	C	2/4	0.52	32.3	C	2/4	0.56	36.7	D	2/4
Front Street SB LT/TH	0.91	47.7	D	8/15	1.13	>80.0	F	12/20	1.11	>80.0	F	12/19	0.94	49.3	D	11/18
Front Street SB RT	0.08	19.3	B	1/2	0.13	19.8	B	1/2	0.18	20.2	C	1/3	0.15	18.7	B	1/3
Overall	**0.70**	**24.5**	**C**	--	**0.78**	**40.4**	**D**	--	**0.78**	**40.7**	**D**	--	**0.77**	**30.2**	**C**	--
Saturday Midday:																
Franklin Street EB LT/TH/RT	0.30	15.4	B	1/3	0.31	17.5	B	2/3	0.31	14.2	B	2/3	0.34	13.0	B	1/3
Franklin Street WB LT	0.11	14.6	B	1/1	0.11	16.5	B	1/1	0.10	13.2	B	1/1	0.11	12.0	B	1/1
Franklin Street WB TH	0.63	19.8	B	3/7	0.59	21.0	C	4/7	0.56	16.6	B	4/7	0.60	16.1	B	3/8
Franklin Street WB RT	0.07	14.3	B	0/1	0.18	16.8	B	0/2	0.06	12.9	B	0/1	0.06	11.8	B	0/1
Salem Street NB LT/TH/RT	0.40	20.2	C	2/4	0.50	24.8	C	2/4	0.47	21.5	C	2/4	0.44	17.7	B	2/5
Front Street SB LT/TH	0.51	13.9	B	3/8	0.79	24.0	C	7/18	0.55	17.0	B	3/8	0.61	17.2	B	3/8
Front Street SB RT	0.08	11.2	B	1/2	0.13	12.7	B	1/3	0.14	13.9	B	1/2	0.15	13.0	B	1/2
Overall	**0.53**	**16.3**	**B**	--	**0.67**	**20.5**	**C**	--	**0.54**	**16.3**	**B**	--	**0.57**	**15.2**	**B**	--

See notes at end of table.

Table 20 (Continued)
MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

Signalized Intersection/ Peak Hour/Movement	2010 No-Build				2010 No-Build with As of Right Reoccupancy				2010 Build				2010 Build with Mitigation			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg./95th	V/C	Delay	LOS	Queue Avg./95th	V/C	Delay	LOS	Queue Avg./95th	V/C	Delay	LOS	Queue Avg./95th
Worcester Center Boulevard at Foster Street (and Trumbull Street)																
Weekday Morning:																
Foster Street EB LT	0.47	36.5	D	2/3	0.47	36.7	D	2/3	0.25	27.8	C	0/1	0.29	46.0	D	1/1
Foster Street EB TH	0.10	6.4	A	1/2	0.11	6.6	A	1/2	--	--	--	--	--	--	--	--
Foster Street TH/RT	--	--	--	--	--	--	--	--	0.20	10.1	B	2/3	0.25	21.9	C	3/3
Worcester Center Boulevard WB UT/LT/TH	0.45	14.9	B	5/7	0.45	15.1	B	5/9	0.62	17.1	B	4/8	0.74	46.1	D	8/9
Worcester Center Boulevard WB RT	0.46	3.8	A	1/2	0.46	3.8	A	1/2	0.39	6.6	A	0/2	0.42	22.8	C	2/4
Trumbull Street NB LT	--	--	--	--	--	--	--	--	0.09	22.8	C	0/1	0.07	34.0	C	1/1
Trumbull Street NB TH/RT	--	--	--	--	--	--	--	--	0.41	24.8	C	1/3	0.27	35.4	D	2/3
Worcester Center Boulevard SB LT	0.68	28.7	C	6/7	0.69	29.0	C	6/8	0.52	18.2	B	3/7	0.28	9.6	A	2/5
Worcester Center Boulevard SB TH/RT	--	--	--	--	--	--	--	--	0.21	9.7	A	1/2	0.18	7.9	A	1/2
Worcester Center Boulevard SB RT	0.11	20.9	C	0/1	0.11	20.8	C	0/1	--	--	--	--	--	--	--	--
Overall	**0.54**	**13.9**	**B**	--	0.55	14.0	**B**	--	**0.54**	**12.5**	**B**	--	**0.47**	**27.0**	**C**	--
Weekday Evening:																
Foster Street EB LT	0.72	43.5	D	5/6	0.72	43.5	D	5/6	0.87	69.5	E	4/7	0.81	57.7	E	4/7
Foster Street EB TH	0.26	9.7	A	3/4	0.30	10.0	B	4/4	--	--	--	--	--	--	--	--
Foster Street TH/RT	--	--	--	--	--	--	--	--	0.41	21.2	C	5/6	0.39	20.7	C	5/5
Worcester Center Boulevard WB UT/LT/TH	0.52	24.1	C	6/9	0.59	25.2	C	7/10	0.93	52.5	D	8/12	0.90	48.2	D	5/11
Worcester Center Boulevard WB RT	0.54	7.2	A	3/8	0.55	7.3	A	4/8	0.63	13.2	B	6/11	0.62	9.8	A	5/8
Trumbull Street NB LT	--	--	--	--	--	--	--	--	0.80	68.8	E	2/6	0.62	42.6	D	2/5[e]
Trumbull Street NB TH/RT	--	--	--	--	--	--	--	--	0.50	38.0	D	3/5	0.38	34.5	C	2/6[e]
Worcester Center Boulevard SB LT	1.46	>80.0	F	27/36	1.46	>80.0	F	27/36	0.91	42.3	D	13/21	0.79	19.7	B	5/8
Worcester Center Boulevard SB TH/RT	--	--	--	--	--	--	--	--	0.44	12.3	B	5/8	0.45	11.1	B	4/6
Worcester Center Boulevard SB RT	0.14	21.1	C	1/3	0.14	21.1	C	1/3	--	--	--	--	--	--	--	--
Overall	**0.94**	**78.8**	**E**	--	**0.95**	**78.8**	**E**	--	**0.89**	**32.5**	**C**	--	**0.81**	**25.2**	**C**	--
Saturday Midday:																
Foster Street EB LT	0.45	42.6	D	1/3	0.45	40.8	D	1/3	0.49	31.2	C	1/2	0.34	42.9	D	1/2
Foster Street EB TH	0.07	8.6	A	1/2	0.12	7.4	A	1/3	--	--	--	--	--	--	--	--
Foster Street TH/RT	--	--	--	--	--	--	--	--	0.21	13.2	B	2/3	0.25	25.0	C	2/3
Worcester Center Boulevard WB UT/LT/TH	0.21	14.4	B	2/4	0.27	12.9	B	3/6	0.50	19.2	B	2/6	0.62	27.6	C	3/3
Worcester Center Boulevard WB RT	0.18	2.1	A	0/1	0.19	2.1	A	0/1	0.18	5.8	A	0/2	0.19	2.8	A	0/1
Trumbull Street NB LT	--	--	--	--	--	--	--	--	0.40	25.4	C	1/3	0.32	34.8	C	1/3
Trumbull Street NB TH/RT	--	--	--	--	--	--	--	--	0.41	24.9	C	1/3	0.28	34.2	C	2/3
Worcester Center Boulevard SB LT	0.74	30.5	C	9/13	0.83	37.7	D	9/13	0.68	18.6	B	4/12	0.43	8.5	A	4/6
Worcester Center Boulevard SB TH/RT	--	--	--	--	--	--	--	--	0.19	7.3	A	1/3	0.16	6.4	A	1/3
Worcester Center Boulevard SB RT	0.04	19.3	B	0/1	0.04	20.4	C	0/1	--	--	--	--	--	--	--	--
Overall	**0.44**	**17.6**	**B**	--	**0.48**	**18.0**	**B**	--	**0.57**	**15.0**	**B**	--	**0.46**	**16.7**	**B**	--

See notes at end of table.

Table 20 (Continued)
MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

Signalized Intersection/ Peak Hour/Movement	2010 No-Build				2010 No-Build with As of Right Reoccupancy				2010 Build				2010 Build with Mitigation			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg./95th	V/C	Delay	LOS	Queue Avg./95th	V/C	Delay	LOS	Queue Avg./95th	V/C	Delay	LOS	Queue Avg./95th
Worcester Center Boulevard at Francis J. McGrath Boulevard, Franklin Street, and Green Street																
Weekday Morning:																
Franklin Street EB LT	0.88	67.3	E	10/16	0.88	67.3	E	10/16	0.65	51.3	D	5/8	0.69	55.5	E	5/8
Franklin Street EB TH/RT	0.29	41.0	D	3/5	0.29	41.0	D	3/5	0.44	44.6	D	4/5	0.46	46.9	D	4/5
Green Street NWB LT/TH/RT	0.84	51.8	D	11/13	0.84	51.8	D	11/13	0.88	50.5	D	11/16	1.00	79.2	E	13/18
Francis J. McGrath Boulevard NB LT	1.06	>80.0	F	5/11	1.06	>80.0	F	5/11	1.24	>80.0	F	7/14	0.80	67.3	E	6/11
Francis J. McGrath Boulevard NB TH/RT	1.39	>80.0	F	36/42	1.39	>80.0	F	36/42	1.32	>80.0	F	33/43	1.29	>80.0	F	35/42
Worcester Center Boulevard SB LT	1.06	>80.0	F	6/11	1.11	>80.0	F	6/12	1.09	>80.0	F	6/12	0.74	62.6	E	5/9
Worcester Center Boulevard SB TH	0.64	36.0	D	11/14	0.66	36.4	D	11/14	0.60	31.1	C	10/14	0.60	32.2	C	10/13
Worcester Center Boulevard SB RT	0.15	0.2	A	0/0	0.15	0.2	A	0/0	0.06	0.1	A	0/0	0.06	0.1	A	0/0
Overall	**1.08**	**>80.0**	**F**	--	**1.08**	**>80.0**	**F**	--	**1.05**	**>80.0**	**F**	--	**1.01**	**>80.0**	**F**	--
Weekday Evening:																
Franklin Street EB LT	0.85	58.4	E	14/20	0.97	>80.0	F	17/24	0.59	44.0	D	8/11	0.71	56.1	E	9/12
Franklin Street EB TH/RT	0.46	39.8	D	7/9	0.50	40.3	D	8/10	0.77	48.6	D	11/13	0.94	72.0	E	12/16
Green Street NWB LT/TH/RT	0.93	>80.0	F	9/13	1.03	>80.0	F	10/15	0.97	>80.0	F	9/15	0.93	76.4	E	9/14
Francis J. McGrath Boulevard NB LT	0.43	64.1	E	2/3	0.57	66.7	E	3/5	0.58	59.3	E	4/6	0.60	63.1	E	4/6
Francis J. McGrath Boulevard NB TH/RT	1.10	>80.0	F	25/31	1.17	>80.0	F	28/34	1.09	>80.0	F	25/33	1.02	75.6	E	24/30
Worcester Center Boulevard SB LT	1.98	>80.0	F	26/32	2.17	>80.0	F	29/36	2.10	>80.0	F	28/37	1.81	>80.0	F	28/35
Worcester Center Boulevard SB TH	1.24	>80.0	F	40/44	1.33	>80.0	F	44/48	1.17	>80.0	F	32/40	1.04	74.0	E	31/36
Worcester Center Boulevard SB RT	0.17	0.2	A	0/0	0.20	0.3	A	0/0	0.10	0.1	A	0/0	0.10	0.1	A	0/0
Overall	**1.16**	**>80.0**	**F**	--	**1.28**	**>80.0**	**F**	--	**1.16**	**>80.0**	**F**	--	**1.13**	**>80.0**	**F**	--
Saturday Midday:																
Franklin Street EB LT	0.67	38.3	D	5/10	0.83	53.8	D	10/18	0.46	36.7	D	3/6	0.49	42.7	D	3/6
Franklin Street EB TH/RT	0.32	31.2	C	2/5	0.29	35.0	D	3/5	0.53	36.8	D	3/6	0.56	43.0	D	4/6
Green Street NWB LT/TH/RT	0.65	35.9	D	4/8	0.73	46.1	D	7/9	0.69	35.7	D	6/9	0.73	42.2	D	7/9
Francis J. McGrath Boulevard NB LT	0.47	48.9	D	1/2	0.60	58.7	E	2/4	0.60	47.7	D	2/5	0.56	50.4	D	2/5
Francis J. McGrath Boulevard NB TH/RT	0.68	27.8	C	8/13	0.76	36.1	D	12/17	0.72	28.3	C	9/15	0.75	33.5	C	11/16
Worcester Center Boulevard SB LT	1.03	>80.0	F	5/16	1.78	>80.0	F	13/22	1.36	>80.0	F	9/20	0.93	76.1	E	8/17
Worcester Center Boulevard SB TH	0.57	20.6	C	7/15	0.74	33.3	C	13/18	0.67	24.7	C	10/16	0.61	24.4	C	11/16
Worcester Center Boulevard SB RT	0.11	0.1	A	0/0	0.16	0.2	A	0/0	0.88	0.1	A	0/0	0.08	0.1	A	0/0
Overall	**0.72**	**32.8**	**C**	--	**0.84**	**67.5**	**E**	--	**0.78**	**46.1**	**D**	--	**0.75**	**36.4**	**D**	--
Commercial Street at the West Garage Driveway																
Weekday Morning:																
West Garage Driveway WB LT													0.46	23.7	C	1/3
West Garage Driveway WB RT													0.04	21.0	C	0/1
Commercial Street NB TH													0.63	23.2	C	3/4
Commercial Street NB RT													0.17	0.8	A	0/0
Commercial Street SB LT													0.44	14.5	B	1/4
Commercial Street SB TH													0.39	28.0	C	2/4
Overall													**0.37**	**15.9**	**B**	--
Weekday Evening:																
West Garage Driveway WB LT	See Unsignalized Intersection Analysis (Table 17)				See Unsignalized Intersection Analysis (Table 17)				See Unsignalized Intersection Analysis (Table 17)				0.86	43.0	D	7/12
West Garage Driveway WB RT													0.12	22.1	C	0/2
Commercial Street NB TH													0.55	25.8	C	4/7
Commercial Street NB RT													0.15	0.5	A	0/0
Commercial Street SB LT													0.30	14.8	B	1/2[e]
Commercial Street SB TH													0.42	28.7	C	3/4[e]
Overall													**0.48**	**25.2**	**C**	--
Saturday Midday:																
West Garage Driveway WB LT													0.57	20.9	C	3/6
West Garage Driveway WB RT													0.11	16.9	B	0/2
Commercial Street NB TH													0.43	18.1	B	2/4
Commercial Street NB RT													0.19	0.8	A	0/0
Commercial Street SB LT													0.38	12.7	B	1/3
Commercial Street SB TH													0.33	25.5	C	2/4
Overall													**0.37**	**13.7**	**B**	--

See notes at end of table.

Table 20 (Continued)
MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

Signalized Intersection/ Peak Hour/Movement	2010 No-Build				2010 No-Build with As of Right Reoccupancy				2010 Build				2010 Build with Mitigation			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg./95th	V/C	Delay	LOS	Queue Avg./95th	V/C	Delay	LOS	Queue Avg./95th	V/C	Delay	LOS	Queue Avg./95th
Worcester Center Boulevard at the Worcester Medical Center Driveway and the West Garage Driveway																
Weekday Morning:																
West Garage Driveway EB LT/TH/RT													0.25	43.0	D	1/2
Worcester Medical Center Driveway WB LT													0.06	41.3	D	0/1
Worcester Medical Center Driveway WB RT													0.00	40.9	D	0/1
Worcester Center Boulevard NB LT/TH/RT													0.30	0.8	A	0/1
Worcester Center Boulevard SB LT													0.02	1.0	A	0/0
Worcester Center Boulevard SB TH/RT													0.19	1.1	A	0/1
Overall													**0.30**	**2.1**	**A**	--
Weekday Evening:	See Unsignalized Analysis (Table 17)				See Unsignalized Analysis (Table 17)				See Unsignalized Analysis (Table 17)							
West Garage Driveway EB LT/TH/RT													0.60	38.7	D	4/6
Worcester Medical Center Driveway WB LT													0.05	32.1	C	1/1
Worcester Medical Center Driveway WB RT													0.01	31.7	C	0/1
Worcester Center Boulevard NB LT/TH/RT													0.47	8.2	A	4/10
Worcester Center Boulevard SB LT													0.06	3.8	A	0/1
Worcester Center Boulevard SB TH/RT													0.39	4.4	A	4/6
Overall													**0.50**	**9.6**	**A**	--
Saturday Midday:																
West Garage Driveway EB LT/TH/RT													0.34	37.8	D	2/3
Worcester Medical Center Driveway WB LT													0.06	35.8	D	0/1
Worcester Medical Center Driveway WB RT													0.01	35.4	D	0/1
Worcester Center Boulevard NB LT/TH/RT													0.18	7.1	A	2/4
Worcester Center Boulevard SB LT													0.01	1.9	A	0/0
Worcester Center Boulevard SB TH/RT													0.23	2.5	A	2/2
Overall													**0.24**	**7.9**	**A**	--

[a]Volume-to-capacity ratio.
[b]Control (signal) delay per vehicle in seconds.
[c]Level-of-Service.
[d]Queue length in vehicles.
[e]95th percentile queue is metered by upstream signal.
EB = eastbound; WB = westbound; NB = northbound; SB = southbound; NWB = northwestbound; SEB = southeastbound; LT = left-turning movements; TH = through movements; RT = right-turning movements; UT = u-turning movements.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The proposed CitySquare mixed-use development is expected to generate approximately 25,436 new automobile trips (12,718 entering and 12,718 exiting) on an average weekday, with 1,030 transit trips (515 entering and 515 exiting), and 1,724 pedestrian/bicycle trips (862 entering and 862 exiting). During the weekday morning peak hour, the proposed development is expected to generate approximately 1,602 new automobile trips (1,233 entering and 369 exiting), with 67 transit trips (32 entering and 35 exiting), and 114 pedestrian/bicycle trips (62 entering and 52 exiting). During the weekday evening peak hour, the proposed development is expected to generate approximately 2,561 new automobile trips (896 entering and 1,665 exiting), with 92 transit trips (45 entering and 47 exiting), and 158 pedestrian/bicycle trips (71 entering and 87 exiting).

On a Saturday, the proposed development is expected to generate approximately 23,778 new automobile trips (11,889 entering and 11,889 exiting), with 886 transit trips (443 entering and 443 exiting), and 1,488 pedestrian/bicycle trips (744 entering and 744 exiting). During the Saturday midday peak hour, the proposed development is expected to generate 2,328 new automobile trips (1,219 entering and 1,109 exiting), with 84 transit trips (45 entering and 39 exiting), and 144 pedestrian/bicycle trips (75 entering and 69 exiting).

When compared to the traffic characteristics of the existing Worcester Common Outlets (at full occupancy) which occupy the project site and will be removed/redeveloped in conjunction with the planned development, the proposed mixed-use development is expected to generate approximately 3,912 additional automobile trips on an average weekday over the as-of-right reoccupancy of the project site, with 667 additional automobile trips during the weekday morning peak hour and 371 additional automobile trips during the weekday evening peak hour. This represents an increase in average weekday daily vehicle trips of approximately 18 percent over the as-of-right reoccupancy of the project site, with an increase in peak hour traffic volumes of between 17 and 71 percent.

On a Saturday, the proposed mixed-use development is expected to generate approximately 472 fewer automobile trips than the as-of-right reoccupancy of the project site, with 97 fewer automobile trips during the Saturday midday peak hour. This represents a reduction in Saturday daily vehicle trips of approximately 2 percent over the as-of-right reoccupancy of the project site, with a reduction in Saturday midday peak hour traffic volumes of approximately 4 percent.

An analysis of traffic operations at the study area intersections indicates that, in general, the proposed project will not result in a significant change in motorist delays or vehicle queuing at the study area intersections over the As-of-Right No-Build condition. The majority of the movements at the study intersections were shown to remain operating at LOS D or better during the peak periods with the addition of project-related traffic, particularly with the introduction of the new street system in conjunction with the proposed project and the pending improvements to be completed in conjunction with the Washington Square Improvement Project.

RECOMMENDATIONS

The project proponent is committed to the implementation of a comprehensive transportation mitigation program that is designed to reduce the impacts of the planned development on the adjacent transportation infrastructure and build upon the planned roadway improvements to be implemented by others. The major elements of the mitigation program can be separated into site access and off-site improvements, and include the development and implementation of a Transportation Demand Management (TDM) program that is designed to reduce single occupant vehicle (SOV) travel associated with the proposed project and encourage the use of alternatives to SOVs including car/vanpooling, pedestrian, and bicycle travel. Each of the elements of the planned transportation mitigation program are discussed in detail in the following sections. Table 20 presents the improved operating conditions (level-of-service and vehicle queues) with the planned improvements.

Site Access

Access to the proposed development will be provided by way of the existing garage access drives that serve the Worcester Common Outlets located off Commercial Street and Worcester Center Boulevard, and by way of new garage access drives to be located within the development and off the new street system. The following recommendations are made relative to site access and internal circulation within the site:

- Operating conditions for vehicles exiting the west garage onto Commercial Street should be monitored upon completion of the portion of the project to be situated on the block formed by Commercial Street, Foster Street, Trumbull Street and Front Street. If conditions warrant, it is suggested that the existing traffic control signal at the intersection of Commercial Street at the west garage driveway be upgraded, reactivated and integrated into the traffic signal system at the intersection of Commercial Street at Foster Street.
- Operating conditions for vehicles exiting the west garage onto Worcester Center Boulevard should be monitored upon completion of the portion of the project to be situated on the block formed by Commercial Street, Foster Street, Trumbull Street and Front Street. If conditions warrant, it is suggested that the existing traffic control signal at the intersection be upgraded, reactivated and integrated into the traffic signal system at the intersection of Worcester Center Boulevard and Foster Street and Trumbull Street.

- The intersection of Worcester Center Boulevard southbound at the east garage egress driveway (north) should be reconstructed and designed to provide an entrance-only drive for southbound motorists. It is recommended that the entering travel lane be a minimum of 16 feet in width, with appropriate signs and pavement markings provided indicating the function of the driveway as a one-way entrance-only drive.
- The intersection of Worcester Center Boulevard southbound at the east garage egress driveway (south) should be reconstructed and designed to provide two exit lanes (separate left-and right-turn lanes). It is recommended that the exiting travel lanes be a minimum of 12 feet in width, with appropriate signs and pavement markings provided indicating the function of the driveway as a one-way exit-only drive. If left-turns are permitted to exit the east garage at this intersection, the existing raised median along Worcester Center Boulevard should be discontinued at the drive in order to allow left-turning motorists from the east garage to exit onto Worcester Center Boulevard northbound. Vehicles exiting the development should be placed under STOP-sign control.
- The intersection of Worcester Center Boulevard at Old Mechanic Street (Foster Street) and the east garage driveway will retain its existing geometry, traffic control (fully actuated traffic signal system) and function following the improvements to be completed in conjunction with the Washington Square Improvement Project.
- The existing Worcester Common Outlets Ramp A will be removed in conjunction with the proposed project. In the vicinity of the former intersection of Ramp A with Worcester Center Boulevard, a new driveway will be constructed to serve the underground parking garage to be located generally in the southeast portion of the project site. The intersection of Worcester Center Boulevard at the garage driveway will be placed under fully actuated traffic signal control. The Worcester Center Boulevard northbound approach should consist of a left-turn/through travel lane and two through travel lanes. The Worcester Center Boulevard southbound approach should consist of two through travel lanes and a through/right-turn lane. The garage driveway should accommodate a single entering travel lane and a single exiting travel lane separated by a double-yellow centerline. Further, it is recommended that the existing raised median along Worcester Center Boulevard be discontinued at the intersection in order to allow left-turns to enter and exit the garage from Worcester Center Boulevard.
- Access to the west garage will also be provided by way of two new driveways that will intersect the new connector roadway linking New Front Street to Trumbull Street (Eaton Place). The east driveway will be designed to function as a one-way entrance-only facility and the west driveway will function as a one-way exit-only facility. It is recommended that the two one-way driveways be a minimum of 16 feet in width, with appropriate signs and pavement markings provided indicating the function of the driveways as one-way entrance/exit drives. Vehicles exiting the development should be placed under STOP-sign control with illumination provided.
- Access to the underground garage will also be provided by way of a single full-access driveway that will intersect the new two-way north-south connector roadway linking New Front Street and Franklin Street (New Side Street). It is recommended that the driveway be a minimum of 24 feet in width, accommodating both entering and exiting traffic. Vehicles exiting the development should be placed under STOP-sign control with illumination provided.

- Sidewalks should be installed flush with the proposed garage driveways so as not to provide a discontinuous pedestrian facility. Appropriate warning devices (signs, audible warning, and/or flashing indications) should be provided at the garage drives in order to warn pedestrians of exiting vehicles that may be obscured.
- On-street parking should be prohibited within 20-feet adjacent to the garage drives so as to provide line of sight to and from the drives.

Proposed Street System

In conjunction with the CitySquare project, two new north-south roadways will be constructed, along with an extension of an existing east-west collector and the construction of a new connector roadway linking the new east-west/north-south grid system. Front Street will be extended (New Front Street) in an easterly direction between the current end of its linear alignment east of Commercial Street and Worcester Center Boulevard. New Front Street will serve as a three-lane, two-way local collector roadway linking Main Street to Worcester Center Boulevard, and intern, to Interstate 290 (I-290) and Route 9 by way of Shrewsbury Street and Central Street, and to Union Station. Trumbull Street is planned as a three-lane, two-way local collector roadway that will traverse a general north-south alignment between Worcester Center Boulevard and New Front Street, providing access to City Hall and Franklin Street via Front Street. A new two-way north-south connector roadway linking New Front Street and Franklin Street (New Side Street) is proposed situated between Front Street and Worcester Center Boulevard. New Side Street will primarily serve a local access function for the CitySquare project, as well as a secondary means of access to Franklin Street and Front Street (via New Front Street), thereby dispersing traffic between Front Street and the new connector. The final piece of the new street system will be a new connector roadway linking New Front Street to Trumbull Street (Eaton Place) which will parallel the curvilinear alignment of Worcester Center Boulevard along the northern CitySquare frontage. Eaton Place will be a two-lane, two-way roadway that will primarily serve a local access function for the development.

It is recommended that the proposed roadways be a minimum of 24 feet in width if on-street parking is not provided (two 12-foot wide travel lanes) and a minimum of 40 feet in width if on-street parking is permitted (two 12-foot wide travel lanes with an 8-foot wide parking lane provided parallel to the curbline. Corner radii and departure lane widths at intersections should be sufficient to accommodate the turning requirements of fire apparatus, delivery trucks and WRTA buses as defined by the City of Worcester. The roadways should be designed with appropriate geometry (horizontal and vertical) to accommodate a safe travel speed of 30 mph. If centerline pavement markings are provided, they should consist of a double-yellow line in accordance with the centerline pavement marking standards of the Manual on Uniform Traffic Control Devices (MUTCD).[13] Sidewalks should be provided along both sides of the proposed roadway network in accordance with City standards, with wheelchair ramps and crosswalks provided at pedestrian crossing locations. Illumination should be provided along the proposed roadway network and at all proposed intersections.

In addition, in order to facilitate the potential future installation of traffic control signals, if and when warranted, it is recommended that traffic signal conduit and pull boxes be installed at the intersection of Trumbull Street at New Front Street and New Front Street at Front Street and Old Front Street. Further, traffic signal conduit and pull boxes should be provided between Trumbull Street and the existing traffic signal at the intersection of Front Street at Commercial Street in

[13] Ibid 3.

order to allow for the interconnection and coordination of the future traffic signals, again, if and when warranted.

Off-Site

Commercial Street at the West Garage Driveway

The west garage driveway was formerly under traffic signal control as part of the traffic signal system at the intersection of Commercial Street at Foster Street. The critical movements at this unsignalized intersection (left-turns from the west garage driveway) were shown to be operating at capacity (LOS E) during the weekday evening peak hour under 2010 Build conditions, with exiting vehicle queues extending into the garage. Given that this condition was projected to occur only during the weekday evening peak period under 2010 Build conditions, it is recommended that operating conditions for the garage exit be monitored upon completion of the portion of the project to be situated on the block formed by Commercial Street, Foster Street, Trumbull Street and Front Street. If conditions warrant, it is suggested that the existing traffic control signal at the intersection of Commercial Street at the west garage driveway be upgraded, reactivated and integrated into the traffic signal system at the intersection of Commercial Street at Foster Street. If and when warranted, these improvements will be designed and implemented by the project proponent in consultation with and as directed by the City of Worcester. With implementation of the suggested improvement, overall operating conditions at the intersection under 2010 Build with Mitigation conditions were shown to improve to an overall LOS B during the weekday morning peak hour, to LOS C during the weekday evening peak hour, and to LOS B during the Saturday midday peak hour.

Front Street at Commercial Street

The addition of project-related traffic to this signalized intersection was shown to result in a degradation in overall operating conditions over No-Build with as-of-right reoccupancy of the project site conditions during the weekday evening peak hour (LOS C to LOS D). In order to improve operating conditions and reduce vehicle queues at the intersection, the project proponent will design and implement an optimal traffic signal timing and phasing plan for the intersection within one year of the issuance of a Certificate of Occupancy for the development or as directed by the City of Worcester. With implementation of the recommended improvements, overall operating conditions at the intersection under 2010 Build with Mitigation conditions were shown to improve to LOS C during the weekday evening peak hour.

Franklin Street at Front Street and Salem Street

Overall operating conditions at the signalized intersection of Franklin Street at Front Street and Salem Street were shown to be acceptable (LOS D or better) under 2004 Existing, 2010 No-Build, 2010 No-Build with as-of-right reoccupancy of the project site, and 2010 Build conditions during the weekday morning, weekday evening, and Saturday midday peak hours; however, Under 2010 No-Build with as-of-right reoccupancy of the project site and 2010 Build conditions, the Front Street southbound left-turn/through movement was shown to be operating under constrained conditions (LOS F) during the weekday evening peak hour. Recognizing the importance of this intersection in providing access to the proposed project and both existing and planned future development in the area, the project proponent will design and implement an optimal traffic signal timing and phasing plan for this intersection within one year of the issuance of a Certificate of Occupancy for the development or as directed by the City of Worcester. With implementation of the recommended improvements, the Front Street southbound left-turn/through

movement was shown to improve to LOS D during the weekday evening peak hour, with overall intersection operations shown to improve to LOS C.

Worcester Center Boulevard at the Worcester Medical Center Driveway and the West Garage Driveway

The critical movements at the intersection of Worcester Center Boulevard at the Worcester Medical Center driveway and the west garage driveway (all movements from the west garage driveway) were shown to be constrained (LOS F) during the weekday evening peak hour under 2004 Existing, 2010 No-Build, 2010 No-Build with as-of-right reoccupancy of the project site, and 2010 Build conditions. In addition, left-turns from the Worcester Medical Center driveway were shown to be constrained (LOS F) during the weekday evening peak hour under 2010 No-Build, 2010 No-Build with as-of-right reoccupancy of the project site, and 2010 Build conditions. A traffic control signal has been installed at the intersection; however, the signal is currently set in flashing operation, with flashing red indications provided for the Worcester Medical Center driveway and the Worcester Common Outlets west garage driveway approaches, and flashing yellow indications provided for the Worcester Center Boulevard approaches. Given that this condition was only shown to occur during the weekday evening peak period, it is recommended that operating conditions for the garage exit be monitored upon completion of the portion of the project to be situated on the block formed by Commercial Street, Foster Street, Trumbull Street and Front Street. If conditions warrant, it is suggested that the existing traffic control signal at the intersection be upgraded, reactivated and integrated into the traffic signal system at the intersection of Worcester Center Boulevard and Foster Street and Trumbull Street. If and when warranted, these improvements will be designed and implemented by the project proponent in consultation with and as directed by the City of Worcester. With implementation of the recommended improvements, overall operating conditions at the intersection under 2010 Build with Mitigation conditions were shown to improve to an overall LOS A during the weekday morning, weekday evening, and Saturday midday peak hours.

Worcester Center Boulevard at Foster Street and Trumbull Street

Overall operating conditions at the signalized intersection of Worcester Center Boulevard at Foster Street and Trumbull Street were shown to be acceptable (LOS C or better) under 2010 Build conditions during the peak periods with the addition of Trumbull Street forming the fourth leg of the intersection and the integration of this approach into the traffic signal system. In conjunction with the construction of Trumbull Street, the project proponent will design and install a fully actuated traffic signal system at the intersection of Worcester Center Boulevard at Foster Street and Trumbull Street that will replace the existing traffic signal system at the intersection. The new traffic control signal will be interconnected and coordinated with the existing traffic control signal at the intersection of Worcester Center Boulevard at the Worcester Medical Center driveway and west garage driveway in order to facilitate the potential future reactivation of the traffic control signal at that intersection. The planned improvements will include the installation of all traffic signal equipment, conduit, wiring and appurtenances necessary to provide a fully functioning coordinated traffic signal system. With implementation of the recommended improvements, overall operating conditions at the intersection under 2010 Build with Mitigation conditions were shown to continue to be acceptable (LOS C or better) during the weekday morning, weekday evening, and Saturday midday peak hours.

Worcester Center Boulevard at Francis J. McGrath Boulevard, Franklin Street, and Green Street

Overall operating conditions at the signalized intersection of Worcester Center Boulevard at Francis J. McGrath Boulevard, Franklin Street, and Green Street were shown to be constrained (LOS F) under 2004 Existing conditions during the weekday evening peak hour, and during both the weekday morning and evening peak hours under 2010 No-Build, 2010 No-Build with as-of-right reoccupancy of the project site, and 2010 Build conditions. Recognizing the importance of this intersection in providing access to the project and both existing and planned future development in the area, the project proponent will design and implement an optimal traffic signal timing and phasing plan for this intersection within one year of the issuance of a Certificate of Occupancy for the development or as directed by the City of Worcester. With implementation of the recommended improvements, overall operating conditions at the intersection under 2010 Build with Mitigation conditions were shown to remain at LOS F during both the weekday morning and weekday evening peak hours, with a general reduction in motorist delays and vehicle queuing.

Transportation Demand Management Program

The proposed project is ideally situated in relation to the regional roadway network and the public transportation system to facilitate opportunities to reduce vehicle trips and encourage alternative modes of travel. Overall, the project's impact relative to traffic, public transportation, and pedestrians are expected to be minor. However, the following pedestrian and bicycle improvements/accommodations, Transportation Demand Management (TDM), and trip reduction strategies are proposed with the goal of further minimizing the project's overall impact.

Pedestrian Improvements

As part of the proposed development, the project proponent will define and enhance pedestrian facilities as follows:

- Sidewalks and pedestrian promenade areas will be provided within the development and along all new roadways to be constructed in conjunction with the proposed project.
- Street lighting will be provided along all new roadways and around building perimeters.
- Full handicapped access will be provided on-site and along the proposed roadway network including elevators and ramps for barrier-free access throughout the development; wheelchair ramps at all intersections; pedestrian pushbuttons and phasing at all signalized intersections constructed or modified in conjunction with the proposed project; and the installation of crosswalks and associated pedestrian crossing warning signs at and in advance of pedestrian crossing locations designed and installed in accordance with the MUTCD.
- Sidewalks will be constructed so as to be flush with all garage entrances.
- Pedestrian warning devices (signs, voice and light devices, mirrors, etc.) will be provided at all garage driveways where they intersect a sidewalk for pedestrian safety.

In addition, the project proponent has been and will continue to coordinate with the City of Worcester with regard to the design and location of the pedestrian gateway between Union Station and City Hall. This important link in the pedestrian network will be integrated into the planned development, creating a functional and vibrant enhancement to the project and the

downtown area, as well as facilitating access to the intermodal transportation center at Union Station.

Bicycle Accommodations

The proposed project will include provision of safe, secure, weather protected bicycle racks and/or storage lockers throughout the development. Signs will be provided along the proposed roadway network and at appropriate locations within the site directing bicyclists to the bicycle storage facilities. Secure bicycle parking will be provided free of charge in all garages. Outside, short-term bicycle parking will be provided by way of bicycle racks located throughout the development in visible and functional locations.

In addition, the project proponent will coordinate with the City of Worcester and MassHighway with regard to potential connections between the proposed project and the planned future Blackstone River Bikeway, which is currently planned to terminate at Union Station. All proposed and modified traffic signals to be constructed in conjunction with the planned development will include bicycle detection and associated signs and pavement markings.

Traffic Reduction Strategies

In order to reduce single occupant vehicle (SOV) travel to the project site and encourage the use of alternative modes of transportation to reach the planned development, the project proponent will implement several traffic reduction strategies as an integral part of the proposed development. The core of successful traffic reduction strategies are ridesharing, alternative work schedules, bicycling, and pedestrian travel, and are discussed below.

Ridesharing Programs - Ridesharing refers to encouraging commuters to ride in vehicles with other commuters rather than drive alone to work. Given the number of persons expected to be employed and to reside within the development, a coordinated rideshare program could be successful at reducing SOV travel associated with the planned development. The most common forms of ridesharing are carpools and vanpools. The benefits of such programs include less congestion, reduced fuel consumption, and better air quality. Keys to the success of such programs include:

- Carpool/vanpool matching programs through the local Transportation Management Association (TMA);
- Joint programs with area commercial tenants;
- Dissemination of promotional materials to residents and employees;
- Newsletters about the program;
- Coordination with MassRIDES which leases commuter vans and provides administrative and organizational assistance;
- Preferential parking for carpoolers; and
- Guaranteed ride home program.

The project proponent is committed to ridesharing and will encourage its development and use. Toward this end, the project proponent will implement the following traffic reduction strategies in conjunction with the proposed project:

- Assign an on-site, full-time transportation coordinator that will coordinate and implement the traffic reduction program for the development.
- Work with the City of Worcester, MassHighway, MassRIDES, the WRTA, and the regional planning agency to develop an effective traffic reduction program for the project.
- Designated parking spaces will be provided in all garages for car/vanpools, with reduced or free parking provided to car/vanpools registered with the transportation coordinator.
- A guaranteed ride home program will be implemented for car/vanpool participants registered with the transportation coordinator.
- Tenants will be encouraged to subsidize public transportation passes to the maximum extent allowed under Internal Revenue Service (IRS) guidelines and will be encouraged to implemented the Commuter Check program for eligible full-time employees.
- Information regarding available public transportation resources, schedules, fare information, and stop/terminal locations will be provided to all commercial tenants and posted in lobby areas of the residential buildings.
- Work with the City and the WRTA to establish bus service to the project site. It is envisioned that the existing bus routes serving the area could be modified to include stops within the planned development and along the proposed roadway network.
- Provide bus stops within the development and along the proposed roadway network in consultation with the City and the WRTA. The location of bus stops will be integrated into the design of the planned street system.

In addition, an annual employee survey and traffic monitoring program will be implemented in conjunction with the planned development (discussed later) that will be used to document the effectiveness of the traffic reduction program and to refine and expand the program as necessary to meet the needs of the residents, employees and patrons of the development.

Alternative Work Schedules - Flexible working hours allow employees to choose their own starting and finishing times by establishing a required core time such as 9:00 AM to 4:00 PM; this allows employees to vary work schedules and reduces peak-hour demand. Tenants of the planned development will be encouraged to evaluate the feasibility of implementing a flextime policy and/or telecommuting for employees in order to reduce peak-hour demand.

Traffic Monitoring Program

The project proponent will implement an annual traffic monitoring and employee survey program in order to evaluate the success of the TDM program and to expand and refine the elements of the program as necessary. The monitoring program will include performing 72-hour automatic traffic recorder counts on the garage driveways serving the development on two consecutive weekdays and a Saturday, and completing an employee and resident survey of commuting modes. The results of the annual monitoring program will be provided to MassHighway, MassRIDES, the City of Worcester and the regional planning commission. The monitoring program will commence one year after full occupancy and will continue for a period of 5-years thereafter or as directed by the City of Worcester and/or MassHighway.

Construction Management

The project proponent and the general contractor will use the following measures to minimize construction impacts on pedestrian and vehicular travel and to enhance safety during the project's construction phase:

- Coordinate construction activities with the City of Worcester Department of Public Works and the Washington Square Improvement Project;
- Provide police details as required by the City of Worcester;
- Coordinate with the City of Worcester Department of Public Works regarding all transportation-related construction impacts;
- Develop and enforce the use of designated truck routes approved by the City; and
- Secure fencing and sidewalk staging protection will be provided in areas affected by each phase of construction in order to protect nearby pedestrian and vehicular traffic. Gated entrances into construction areas will be determined jointly with the City of Worcester Department of Public Works.
- Full or partial street closures will be avoided to the extent possible. Should a partial street closure be necessary in order to off-load construction materials and/or complete construction-related activities, the closure will be limited to off-peak periods so as to minimize the impact on vehicular and pedestrian flow. Police details will be used as required by the City. Prior to the implementation of any planned construction activities within the public right-of-way, the contractor will submit to the City of Worcester Department of Public Works for review and approval a traffic and pedestrian management plan.
- Secure on-site storage will be provided for tools and equipment in an effort to minimize construction-related vehicle trips to the site.

Loading and Deliveries

The proposed project will be designed to accommodate all loading, delivery, and moving functions on-site in a safe and efficient manner. Designated loading areas will be provided on-site to accommodate deliveries and tenant moves. Refuse/recycling will be accommodated in centralized areas with roll-out-type containers provided. In an effort to further minimize the impacts of loading and delivery activities associated with the planned development, the project proponent and/or the property management team will implement the following measures:

- Truck routes and hours of deliveries will be coordinated to ensure that truck activity impacts are minimized during the commuter peak hours and that truck routes are consistent with existing City and State regulations.
- Every attempt will be made to use service vendors currently delivering in the vicinity of the project site in an effort to reduce the overall number of new trucks in the area.
- The property management team will provide direction to new tenants and those moving as to the proper routes for moving vehicles to gain access to the site, as well as the location of designated loading areas.

With implementation of the above recommendations, safe and efficient access will be provided to the planned development and the proposed project can be constructed with minimal impact on the roadway system.

WORCESTER ECONOMIC DEVELOPMENT ACTION AGENDA

prepared for

The City of Worcester, Massachusetts

prepared by

Sasaki Associates

ZHA

AUGUST 2004

TABLE OF CONTENTS

INTRODUCTION 1

ACTION AGENDA 9

CONNECTIONS 35

IMPLEMENTATION 41

Belmont St
Main St
Chestnut St
Worcester Ctr Blvd
Front St
Franklin St
Myrtle St
Francis McGrath Blvd
Green St
I-290
Madison St
Harding St
Grafton St

INTRODUCTION

Worcester's Economic Advantages

The City's economy is in transition, shifting from a dependence on manufacturing to an economy centered on health care, services, and biotechnology. The City has spent millions of dollars on a convention center, expanded airport, infrastructure improvements, and the renovation of the train station (Union Station) to support this transition. Worcester now is a regional center for employment, health care, social services, culture and education.

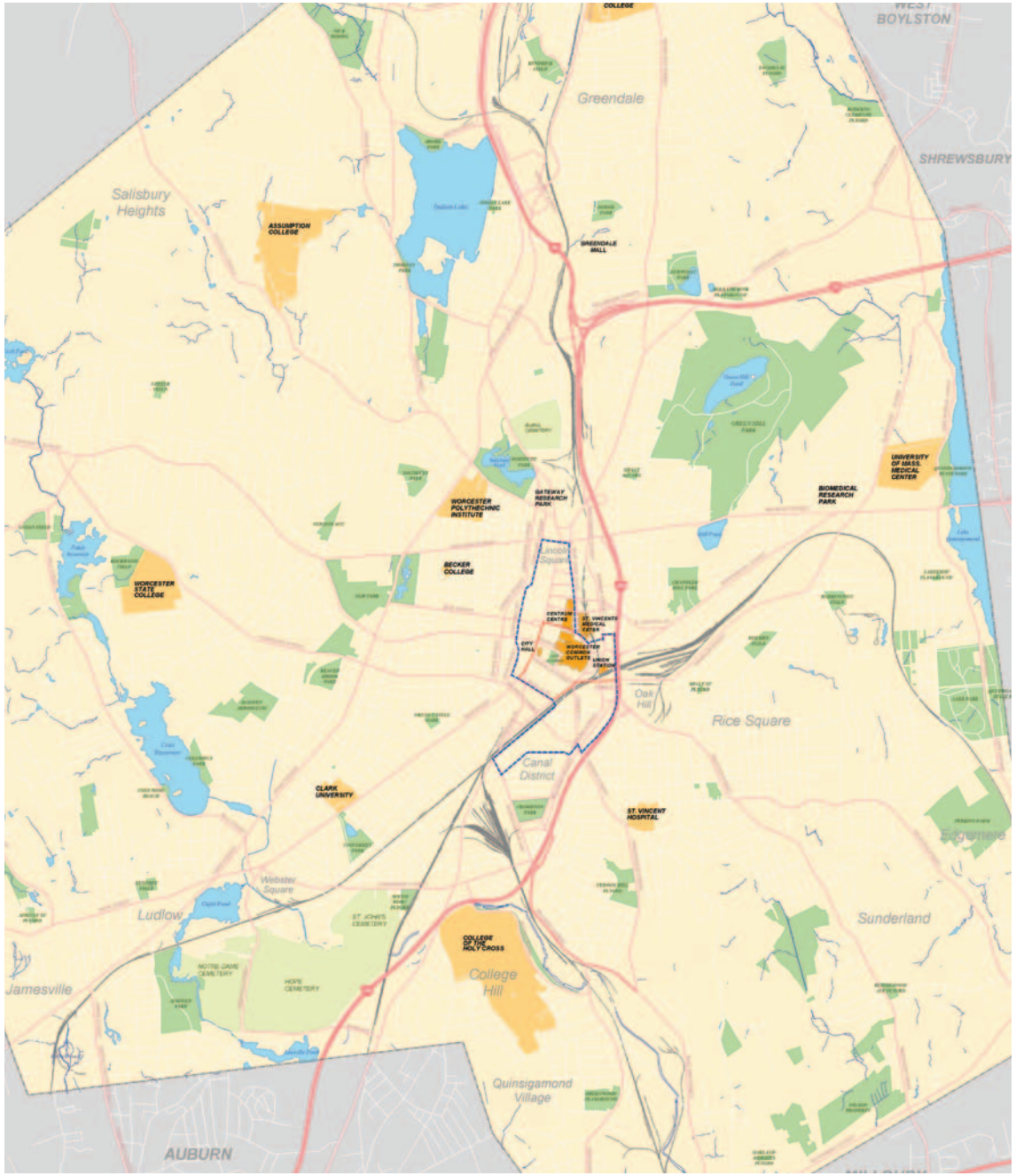
In terms of culture, the City of Worcester contains venues such as the Centrum Centre Arena and Convention Complex, Mechanics Hall, the Performing Arts School of Worcester, and Foothills Theatre, and has a designated Arts District that works in tandem with 43 cultural organizations throughout the region. Museums include the Worcester Art Museum, Worcester Historical Museum and Higgins Armory Museum.

The Centrum Centre and Convention Complex is in the heart of Worcester's downtown. Worcester's Centrum Centre is one of the nation's most successful arenas, hosting musical acts of national and international fame, innovative trade shows, concert theater productions, and family and sporting events. In addition, the Centrum is home to the Worcester IceCats of the American Hockey League.

The Centrum Centre has a new, state-of-the-art convention center with 100,000 square feet of exhibit space, 24,000 square feet in 11 meeting rooms, and a 12,100-square-foot ballroom – the largest in central Massachusetts. Combined with the 14,800-seat arena, the Centrum Centre can accommodate almost any mid-sized meeting, convention or trade show.

According to the 2003 Comprehensive Economic Development Strategy by the Worcester Regional Chamber of Commerce and others, the Worcester region contains 37,000 students at 16 colleges. The Worcester region also possesses a highly skilled workforce and a well-regarded public school system.

Worcester has excellent road, rail, air, and fiber access and is positioned at the crossroads of the Massachusetts Turnpike, Route 290 and improved Route 146. There is commuter rail service between Worcester and Boston. Union Station has recently been renovated as the hub of the commuter rail as well as national rail service through AMTRAK. Worcester is wired with over 15,000 miles of optical wire. Almost every major office park and building in the City can access this fiber optic network.



Worcester features 16 institutions of higher learning as well as numerous parks.

Worcester has the infrastructure to support growth; however, the City's available space is near build-out. To provide the land necessary to accommodate economic growth and capitalize on existing infrastructure, redevelopment must occur in the City through the reuse of Brownfield sites, which has been aggressively pursued.

The City of Worcester has taken tremendous strides, reclaiming historic landmarks, infilling new urban development, attracting institutions downtown, and creating unique destinations within the region. In the heart of all this investment, the private sector is expressing interest in key downtown properties, such as the Worcester Common Outlets. Building on the attributes of great cities and its own distinctive characteristics, the City has a broad base upon which to build future opportunities.

In order to realize the full potential in the City, each step forward must be taken deliberately with an eye toward building a great city over time. Each project must contribute to the whole. The Action Agenda for the City of Worcester captures aspirations for downtown and balances these with an understanding of the priorities of the public and the private sectors. The plan provides a long-term framework and identifies the priority projects that are most immediate.

WORCESTER: ATTRIBUTES OF A GREAT CITY

Building on the themes by Richard Florida in *The Rise of the Creative Class* and our experience, Worcester offers the following key features:

Connectivity

Worcester is well connected to the surrounding region and to Boston through the infrastructure of regional highways, commuter rail at Union Station, and telecommunications. Worcester is a center for biotechnology in the region and is at the edge of a thriving metropolitan market, and can position itself as a desirable alternative to more expensive urban areas or to relatively isolated suburban areas.

Dramatic setting and story

The development of Worcester as one of the great market and industrial centers of the region was based on the quality of the agricultural land; topography, waterways, hydropower, innovation, and transportation systems. The traces of this geography and history are still in place, with the City's beautiful rolling hills, dramatic views, street patterns, industrial architecture, and the legacy of great institutions.

Higher education

The 16 institutions of higher education in the Worcester region serve as a backbone to the economy and generate knowledge and culture that enrich the City. Students and faculty bring vitality to the streets, especially if they can be encouraged to live in downtown areas.

Art and culture

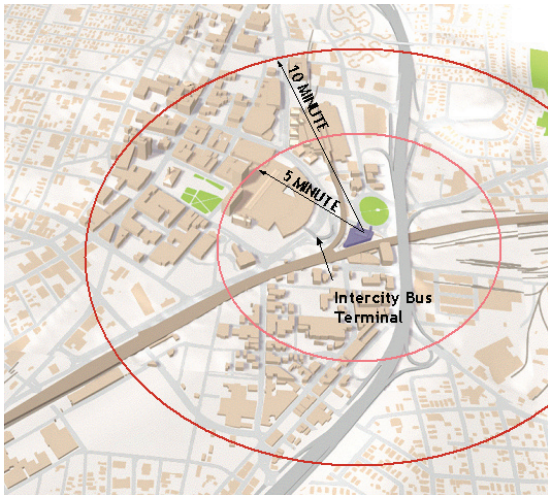
Worcester is unrivaled in the region for its art and culture. With its national renown, the Worcester Art Museum will continue to draw residents and visitors downtown. Similarly, venues such as the Centrum, Convention Center, Mechanics Hall and theaters are vital for generating opportunities for economic spin-off in retail and restaurants.

Historic Building stock

The historic building stock in Worcester is a key ingredient for regeneration. The flexibility and character of loft space is highly desirable for residences, life/work units, incubator industries, and professional offices, and the lower development costs are an incentive for initial regeneration when the economics of new construction are prohibitive.

Diversity of population

Worcester's diverse population creates a vibrant urban setting, enriched by a variety of music, art, festivals, restaurants, and shops. Successful cities are able to welcome new residents from a range of cultures and economic backgrounds, and thrive on the energy that they bring to the labor force and to new enterprises.



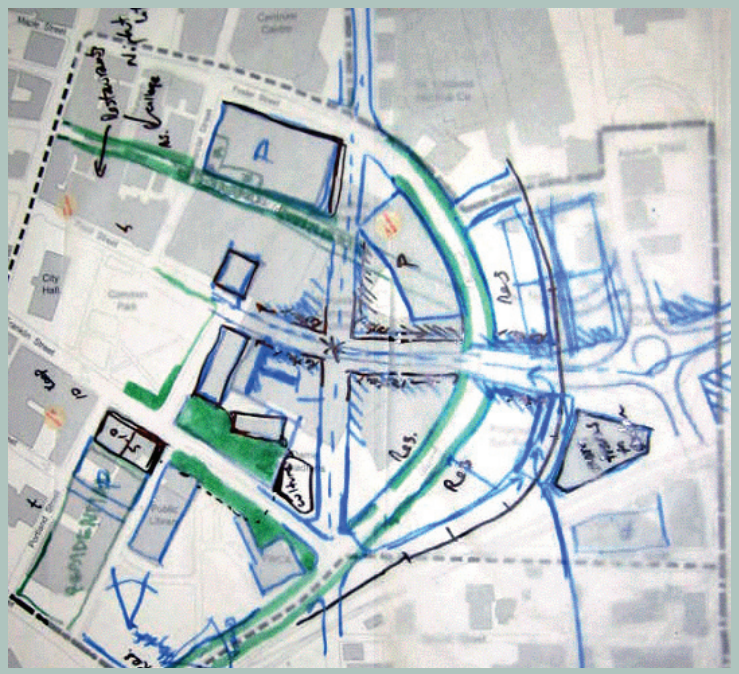
The restored Union Station is a catalyst for transit-oriented development

Background

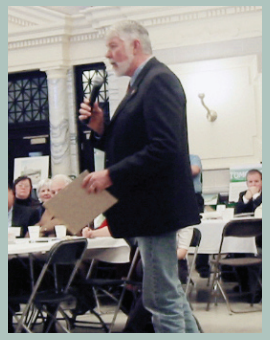
Over the last ten years, the City of Worcester has accomplished a number of significant projects and is currently working on several new initiatives. Many of these projects were first envisioned during a public charrette that the City sponsored in the early 1990s. In the last decade, the City restored Union Station, built the Convention Center and the adjacent parking deck, installed a new Korean War Memorial, and completed many downtown streetscape and gateway improvements, based on previous studies, such as the 1993 Worcester Downtown Gateways Program by Arrowstreet. The City worked with the Massachusetts College of Pharmacy and Health Sciences to locate their Worcester School of Pharmacy in the heart of downtown. The development of the Worcester Medical Center and adjacent parking structure, which are also in the heart of downtown, was made possible through partnership with the City.

The City, with state and federal support, is currently engaged in a number of public development projects that are moving from design into implementation. In the downtown area, these include the Regional Justice Center, the inter-city bus port, restoration of the Common as the central civic space in the City, reconstruction of Shrewsbury Street, the continued build-out of Union Station for private tenant occupancy, a new garage to serve Union Station patrons, and Washington Square improvements. Recently, the City has sponsored studies for the Canal District and Arts District, which have set the agenda for these areas. A downtown parking study is underway to determine parking demand and use. In other areas, the City is constructing a new state-of-the-art vocational high school, a new fire station, and is in the planning stages for the redevelopment of an industrial park in South Worcester, a new Visitor's Center along the reconstructed Route 146 Gateway, and a major capital improvements program for the Quinsigamond Village section of the City.

Through partnerships, the City has been able to accomplish a number of other initiatives. The City recently transferred the Central Street Fire Station site to allow for the construction of a Hilton Garden Inn downtown. The historic GAR Hall was transferred from public ownership to private to allow for its redevelopment. The former Public Schools maintenance facility on Shrewsbury Street is being redeveloped by the private sector into restaurant and commercial office space. The Worcester Business Development



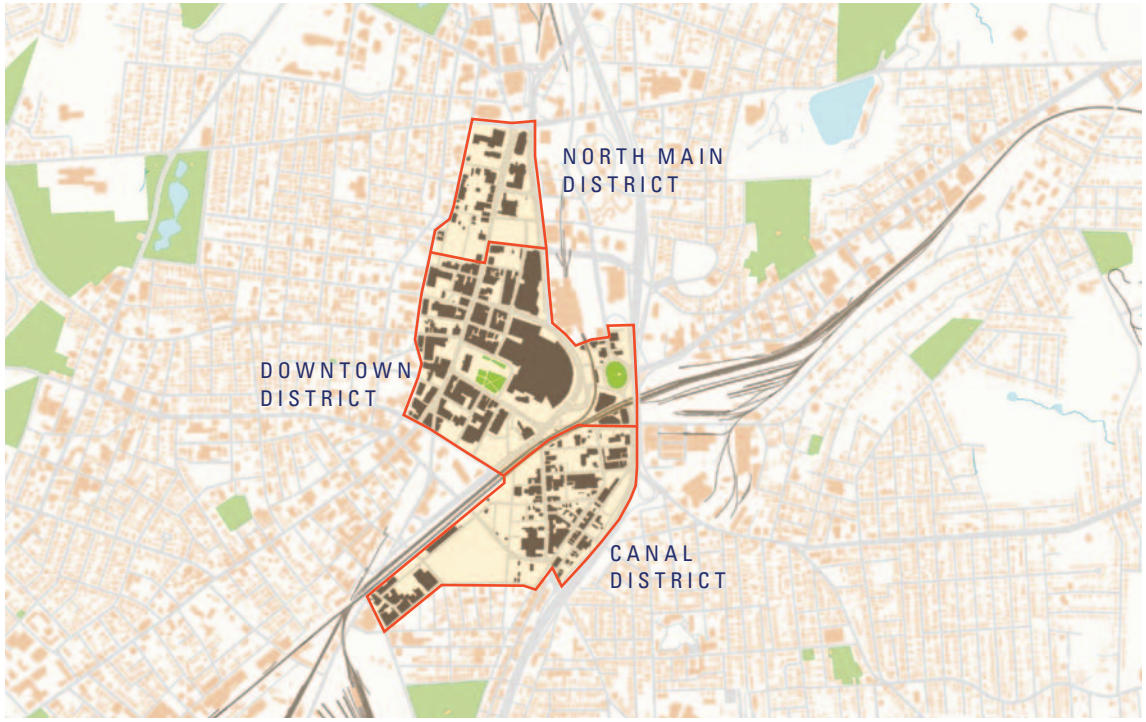
LEARNING FROM THE CHARRETTE



On a Friday and Saturday in early February the City sponsored a charrette to re-engage the citizens and other stakeholders. For this event, the project team prepared a series of mini-lectures on topics related to Worcester and then encouraged the participants to break into small groups to discuss these issues and generate ideas. The second day began with a presentation by Dr. Peiser, Professor of Real Estate Development at Harvard University's Graduate School of Design, and author of "Turning Grayfields to Goldfields," concerning the redevelopment of urban malls. This was followed by a discussion focused on ideas related specifically to the redevelopment of the Worcester Common Outlet Mall. Over 200 people participated in the charrette on the first day and approximately 125 participated in the second half-day session, offering a tremendous opportunity for dialogue, engagement, debate, and sharing of ideas, which influenced the approach and recommendations of this agenda.

Corporation, in partnership with Worcester Polytechnic Institute and the City, is working to develop a 55-acre Gateway Park just north of Lincoln Square. The Worcester Regional Transit Authority is conducting a study to determine strategies for improving bus ridership and service in the City and region.

Major state and federal investments in transportation projects will greatly enhance Worcester's position as the transportation hub of Central New England. These projects include the Mass Turnpike/Route 146 Interchange project, the Route 146/Route 290 Connector, and the extension of the MBTA's commuter rail service to the revitalized Union Station. The entire City has been included in the John H. Chaffee Blackstone River Valley National Heritage Corridor, which has focused national attention on the role that Worcester played in the innovation and enterprise that characterized the American Industrial Revolution.



The study area encompasses three districts.

Need for the Economic Development Action Agenda

Over the past few years, an increasing number of out-of-town investors and developers have discovered the Worcester real estate and its potential investment opportunities. The commuter rail service and investment in roadway projects have enhanced these opportunities. Members of the City Council, local business leaders, area residents, and the local media have expressed awareness and interest in economic development issues in response to these various real estate development proposals. This renewed interest has also led to increased concerns, not only about the status of these various economic development projects, but also about the need to create an integrated "vision" of how these various projects and opportunities can best be connected for the overall benefit of the community. The recent sale of the Worcester Common Outlets and its office towers and parking structures has created a sense of immediacy regarding the future of downtown. With these issues and concerns in mind, the Office of Economic Development engaged Sasaki Associates and their real estate advisors, ZHA, in early 2004 to develop the Action Agenda.

Project Area

The Economic Development Action Agenda area includes the area from the Wyman-Gordon site north to Union Station and the area from Federal Square to Belmont Street (see map on previous page). This area was selected because it provides an opportunity to integrate several existing or proposed projects in areas adjacent to the city center with those planned or underway in the downtown area. Within the larger area, key development parcels or opportunities are identified and prioritized for attention.

Process and Participation

Many people have shaped the recommendations put forth in the Action Agenda. The Office of Economic Development has directed the overall work effort and worked closely with the consultant team during the process. Initial meetings with key stakeholders were held in January to gain an understanding of key issues and goals affecting downtown. These meetings reached out to a number of constituencies who came together in small groups, including:

- City Administration
- City Councilors
- Canal District representatives
- Arts District representatives
- Neighborhood representatives
- College and universities
- Health care and biotechnology industries
- Chamber of Commerce and their member businesses
- Worcester Regional Transit Authority and regional agencies
- Historic Society and other non-profit organizations

DEVELOPMENT OPPORTUNITIES

Residential Market

- Downtown Worcester can support approximately 550 to 650 housing units over the next five years
- Approximately one half of the residential demand is rental, the other half, ownership
- A variety of market-rate housing types should be offered to appeal to a variety of household types and lifestyles

  Mid-Rise Multi-Family 50 to 70 dwelling units per acre; for-sale or rent; one parking space per unit; for sale units, dedicated parking with secure access; for rental units, public or private parking.

  Lofts 40 to 50 dwelling units per acre; high ceilings; varying levels of finish; flexible space.

  Townhouse/Rowhouse 20 dwelling units per acre; attached single family; attractive to empty nesters, non-traditional families, young singles and couples, families.

Typical downtown housing

Retail Market

- Worcester Common Outlet Mall redevelopment: Phase I retail will initially rely on the daytime employee population, visitors to the Centrum and other destinations, and local residents. Retail needs to be clustered and within easy walking distance to offices and destinations. Retail store types to target include a drug store, a microbrewery, cafes, and a bookstore. New retail totaling 100,000 to 150,000 square feet is a realistic program in the short term. This square footage does not include a cinema, nor does it include existing retail elsewhere in the downtown.
- Wyman Gordon site: In light of an overall downtown strategy, a mixed use development at the Wyman Gordon site could be supported and should be neighborhood-oriented. A mix of a grocery store, hardware store, sit-down restaurant, a small pharmacy, and personal and business services is a target tenant mix, with a total retail program of approximately 150,000 square feet.

Typical main street retail use

Office development in Worcester

Office Market

- Between now and 2010, downtown Worcester can likely support 60,000 square feet to 127,000 of office space. Assuming an anchor tenant of 20,000 square feet, there may be an opportunity to develop a multi-tenant building of approximately 60,000 square feet downtown.

- The remaining office demand will likely manifest itself in build-to-suit office buildings. From a programming perspective, an additional office pad capable of accommodating an office building of at least 60,000 square feet should be identified and available for development on an as-needed basis.

On a Friday and Saturday in early February, the City sponsored a charrette to re-engage the citizens and other stakeholders (see sidebar). Based on input from the charrette, the project team devised a development framework and tested these concepts in more detail on the Worcester Common Outlets and Wyman Gordon site. The draft recommendations were presented to stakeholders and to the public early May 2004. From the input in these discussions, the recommendations have been refined into an Action Agenda and are embodied in this report.

Goals

The following goals establish the underpinning for the recommendations in the Action Agenda.

Build on Existing Assets

To be successful, Worcester must recognize its strengths and invest in efforts that further define and enhance these as assets. The goal should be to distinguish Worcester from its peers by celebrating unique and authentic characteristics, not by disguising them or replicating features in other cities. Unique assets include topography, rail connections, historic building stock, colleges and universities, and an engaged citizenry, among others.

Invest in Public Projects that Leverage Private Development

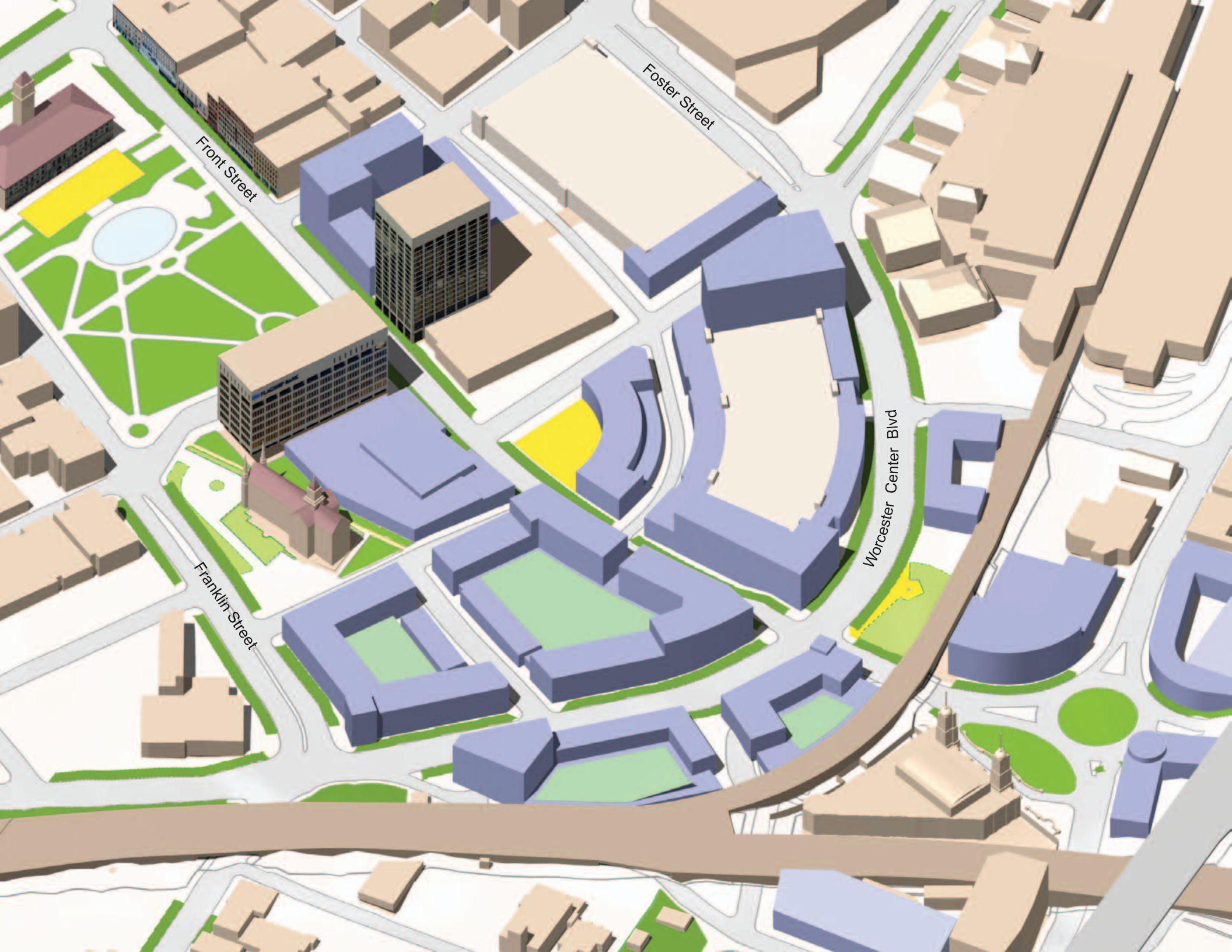
Public investment in infrastructure and amenities can act as a catalyst for subsequent private investment, and should be focused to leverage such investment. The City should be strategic in the scale of investment and prioritize projects to maximize opportunities for private investment. Neither the public nor the private sector should get too far ahead of the other, but rather the two should work in concert in an interactive partnership.

Balance Big Moves with Small

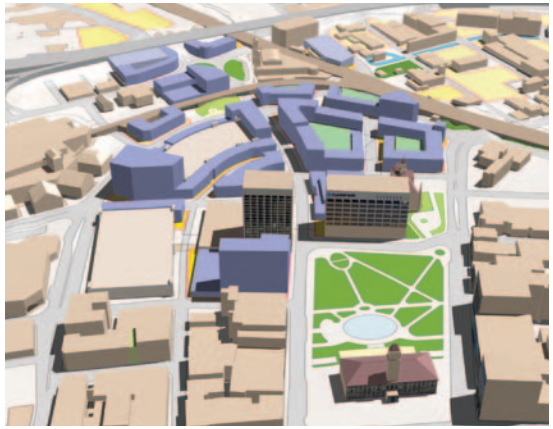
Large projects should be complemented by smaller-scale projects that reinforce relationships with the surrounding urban context. Over the last ten years, Worcester has accomplished a number of very large projects and should focus now on integrating these into the City fabric. Incremental investment allows for course correction over time to respond to market conditions and private sector interests. This approach recognizes that there is no "silver bullet" that will be the single solution to downtown revitalization, but rather this is an ongoing strategy of investment to maintain and improve assets.

Lead in Transit Oriented Development (TOD) and Smart Growth

Worcester is perfectly positioned to lead the state in transit-oriented development that is the hallmark of smart growth. Transit-oriented development creates pedestrian-friendly mixed-use districts within walking distance of train stations. Urban neighborhoods support small shops and restaurants and create an 18-hour active street life. From downtown Worcester, people will be able to easily commute to Boston or walk or bike to work or school within the downtown area. Amenities such as cultural institutions, parks and linear trails, loft buildings, and an exciting mix of restaurants and stores are key attractions for the demographic segment interested in downtown living.


Foster Street
Front Street
Worcester Center Blvd
Franklin Street

DOWNTOWN DISTRICT



Proposed development will restore the historic Front Street connection.

Strategy

- Emphasize downtown as an urban residential neighborhood in close proximity to commuter rail service and encourage transit-oriented development
- Continue to promote downtown as a mixed-use city center, with entertainment, office, and government destinations
- Concentrate any retail activity in the heart of downtown and, in particular, on key streets such as Front Street and on prominent corners

Program

- Multi-family and loft development, both rental and condo: 50 to 70 dwelling units per acre (four- to six-story buildings), potentially above retail in places
- Community Retail Center: 100,000 to 150,000 square feet new; emphasis on eating and drinking, convenience, and specialty stores
- Multi-tenant office: 60,000 square feet
- Build-to-suit office: building pad to support at least 60,000 square feet

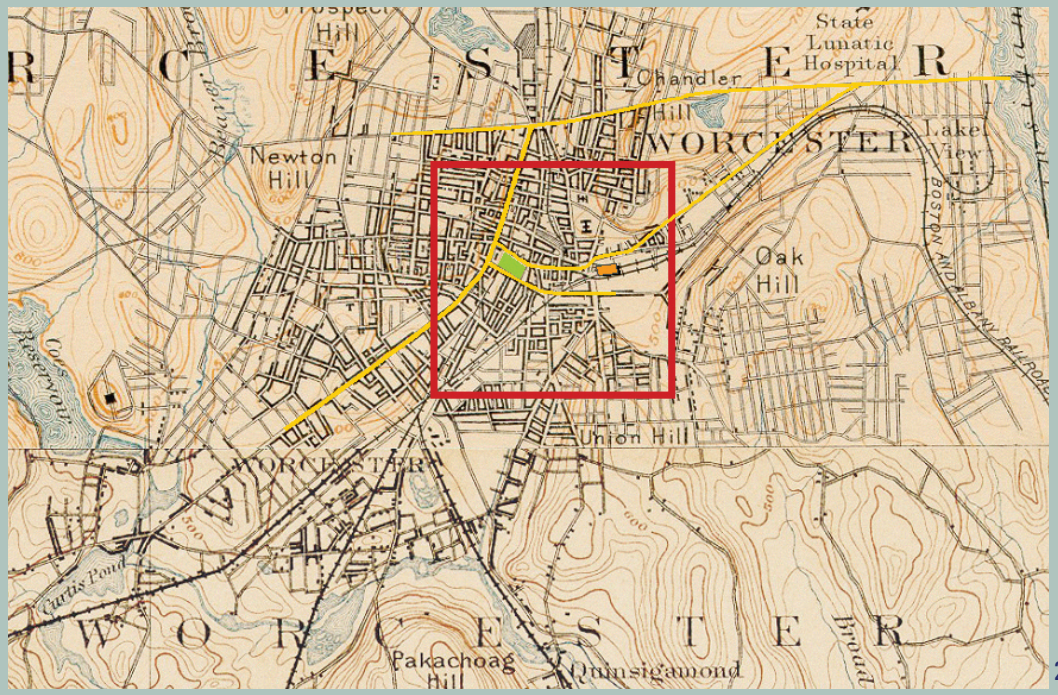
Setting

The downtown district today serves as the primary visitor destination with government uses, medical, banking, and financial services, retail, and entertainment venues. The downtown district juxtaposes the fine grain street and block pattern of 19th-century development with the larger superblock developments of the 20th century.

Pedestrian-scaled streets and historic building facades characterize many of the blocks in the Main Street area. Historic landmarks add character and dimension to the downtown, including Union Station, City Hall, Mechanics Hall, Notre Dame des Canadiens, and GAR Hall, among others. The addition to the Library has become a new prominent landmark. Restoration and redevelopment of Union Station has prompted a rise in civic events, train ridership, and new dining and entertainment establishments.

HEART OF THE HISTORIC CITY

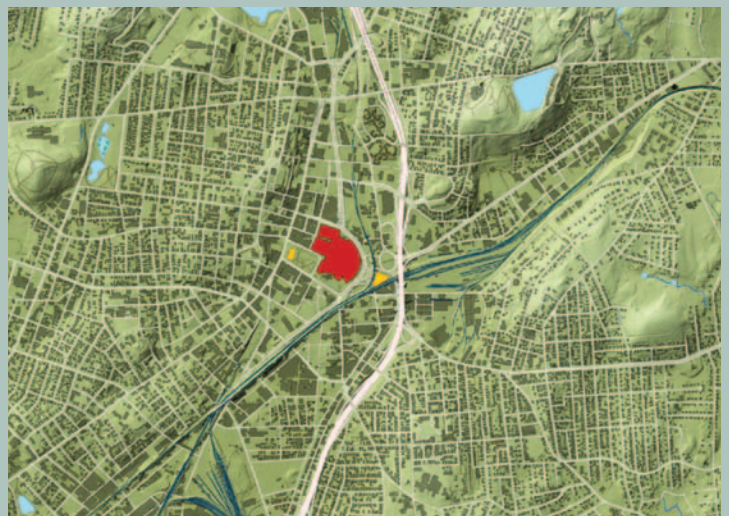
1



2

3

4



5

The historic street pattern was disrupted by redevelopment in the early 1970s.

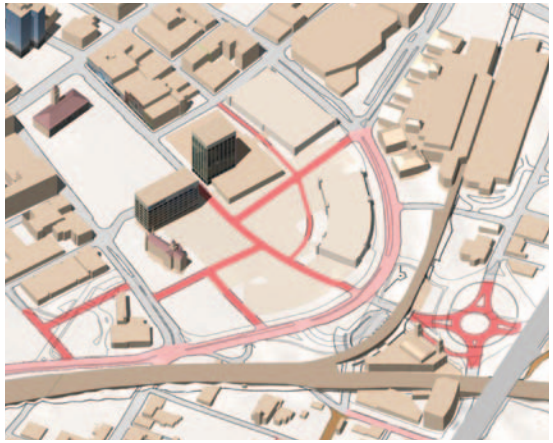
1. Birdseye view c. 1878 highlighting Union Station, the Common and the Blackstone Canal.
2. Map of Downtown Worcester c. 1917. The fine grain of streets and blocks were well defined by building edges.
3. Downtown Worcester is located at the confluence of two valleys. The geography influenced the major road and railway routes including the primary north-south spine of Main Street and Shrewsbury Street, the gateway to the east.
4. By the early 1970's, the link between the two valleys was disrupted by a series of barriers including I-290, the Worcester Center Boulevard, and the newly developed Worcester Center Shopping Mall.
5. Ultimately the infrastructure barriers led to the erosion of the downtown building fabric, especially along the barriers. Contrast this with the map from 1917

The heart of the historic City is strategically located in a valley surrounded by hills. Main Street skirts the edge of the hills that rise up 100 feet or more on the west. Southbridge Street branches off to follow the line of the valley to the southwest. The historic Blackstone Canal followed the eastern side of the same valley. To the northeast, Shrewsbury Street follows a side valley defined by steep hillsides and connects to the historic road to Boston, Route 9. As a market center, roads radiated out of Worcester to connect to the surrounding towns, creating a pattern of angled intersections and squares.

Like the canals and roadways, the railroads also sought low-lying, level routes. Union Station commands the intersection of the two valleys, with one rail line extending north, parallel to Main Street; one line following Shrewsbury Street to the northeast; and one line extending southwest, parallel to Southbridge Street. When the interstate highway was built through downtown, the engineers selected an alignment that followed the canal route along the eastern side of the valley. Worcester Center Boulevard was introduced down the center of the valley as a six-lane bypass to Main Street.

The Centrum and Convention Center draw people into the downtown, as do other entertainment venues, such as Mechanics Hall, the Foothills Theater, and nightclubs. New amenities are planned, such as the Showcase Cinema, which is proposed to be converted back to a live theater venue. The Worcester Medical Center is another significant downtown destination that has the potential to draw medical-related development to the area. The Massachusetts College of Pharmacy and Allied Health Sciences recently located just blocks away from the Medical Center. Since the 1960s, the 20-acre retail mall development has come to dominate much of the downtown core, severing the historic connection along Front Street between downtown, Union Station, and Shrewsbury Street.

In the heart of downtown, the restoration of the historic Common will improve the setting for casual relaxation and civic events, while enhancing surrounding real estate values. The new Korean War Memorial introduces another area of open space on the Front Street alignment. Washington Square is slated to become a more pedestrian-friendly connection between Front Street and Shrewsbury Street, while Federal Square, with its gracious civic park, joins together the newly designated Arts District on South Main and the Downtown district.



Proposed street patterns

Open space framework

Development along Front Street

Catalyst Project: Worcester Common Outlets Redevelopment

The redevelopment of the Worcester Common Outlets will be a major catalyst in transforming perceptions of downtown. The project will remove physical barriers and demonstrate the potential for transit-oriented, urban mixed-use development, with a focus on downtown housing. Current plans by Berkeley Investments, Inc. involve the demolition of the under-performing retail areas and retain the two existing office towers, some of the parking facilities, and the underground level with its infrastructure. A more traditional street and block pattern will be reintroduced and Front Street will once again connect Main Street to Union Station.

A program for redevelopment is shown in Table 1 and reflects adjustments made by the Action Agenda's market and urban design studies to Berkeley's initial program.

Build-out of Worcester Common Outlets site

New development connects to Washington Square

The average floor area ratio (FAR) on the 20.2-acre site is 2.4, with a maximum FAR of 3.6 on the block with the existing tower. Approximately 2.4 acres of the site will be set aside for street right-of-ways. Parking for 4,180 cars is accommodated through reuse of existing structures, renovation of the basement level for parking, and on-street parking. Development is expected to occur in phases over a five-year period.

HISTORIC FRONT STREET

1

2

Washington Square is the historic front door to Union Station and lies in the valley that connects Shrewsbury Street to the downtown core. Prior to the development of the Worcester Common Outlet Mall, Front Street connected Washington Square to the Common and was lined with shops and businesses that drew strength from proximity to the station and the heart of downtown.

3

4

1-4. A walk down historic Front Street from the Common to Washington Square

The tallest building is the existing office tower at 19 stories. The other existing office tower is nine stories. Recommended heights for new development on the site range from one story for high-bay entertainment uses to 12 story towers in key locations. The overall urban design concept is to allow height at specific locations taking into consideration the following:

- ***Building Context*** 12-story maximum height for corner towers around the Common
- ***Major Streets*** 7 to 8 stories along Front Street
- ***Prominent Corners*** 10-story tower at the corner of Worcester Center Boulevard and Foster Street
- ***Consistent street wall*** 4 to 5 stories along Worcester Center Boulevard to create a gracious residential street with higher buildings at prominent corners

Use	Floor Area (sf)
Existing Office	486,000
Proposed Office	223,000
Residential	982,000
Retail	257,000
Entertainment	66,000
Community College	30,000
Health Club	22,000
Day Care	8,000
Total	*2,074,000*

Table 1
Proposed Worcester Common Outlets Redevelopment Program

Downtown District Action Agenda

- Catalyst projects
- Priority redevelopment parcels
- Longer term redevelopment parcels
- Existing streetscape improvements
- Proposed streetscape improvements

Ongoing Projects (0 to 1 year)

1 Worcester Common
2 Bus Port
3 GAR Memorial Hall Adaptive Reuse
4 Washington Square Reconfiguration
5 Union Station Parking Structure

Near-Term Projects (1 to 5 years)

6 Worcester Common Outlets Redevelopment
7 Front Street Extension and Other Streets
8 Main Street from Central Street to Federal Square
9 Worcester Center Boulevard Reconstruction from Foster to Franklin
10 Adaptive Reuse (as appropriate)
11 Washington Square Redevelopment Parcels

Long-Term Projects (5 to 10 years)

12 Downtown Parking (to be sited)
13 Francis McGrath Traffic Calming
14 Renovation and Redevelopment around the Common
15 Greenway Triangle Redevelopment Parcels
16 Worcester Center Boulevard Development Parcels
17 Federal Square
18 Streetscapes

Action Agenda Projects

Ongoing Projects (0 to 1 year)

Worcester Common Construction began in May 2004 with a completion date set for 2005. This landscape improvement project, together with the redevelopment of the Worcester Common Outlets project, will help to change the image of downtown and demonstrates the City's commitment to downtown revitalization.

Bus Port / Ramp Demolition The City is currently building an inter-city bus terminal in the area between the railroad tracks and Worcester Center Boulevard at Front Street, which is expected to be complete in early 2005. The Federal Transit Authority and the City are providing funding. This location will help reinforce the role of Union Station as an intermodal center. Over time, as this land becomes more valuable, air rights could be granted for development above the terminal.

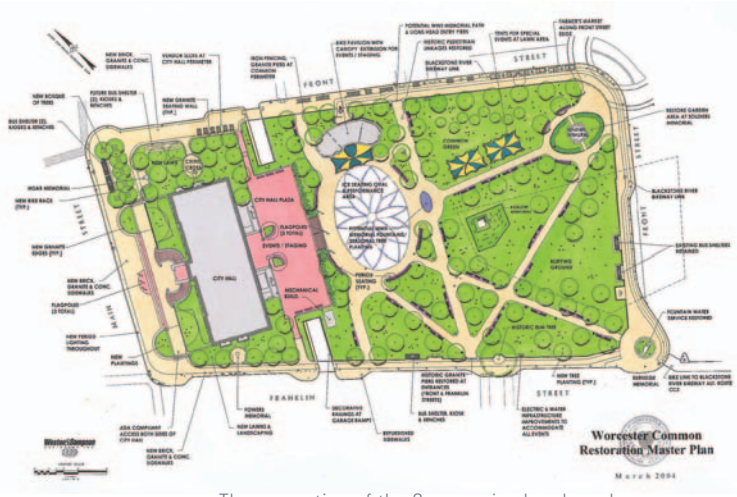
GAR Memorial Hall Adaptive Reuse Through a developer's request for proposal, the City recently sold the historic GAR Memorial Hall, which was built in 1876. The developer is proposing a renovation that will include a grand meeting room for function business downtown.

Washington Square Reconfiguration The reconstruction of Washington Square is at 75% design with construction slated to begin in 2005 with funding from the Federal Highway Administration. This project will improve pedestrian connections between downtown and Shrewsbury Street and complement the extension of Front Street. Washington Square serves as the gateway to downtown from the east, serving commuter rail travelers and for research and business at the UMass Medical Center and Biotechnology Park near Route 9.

Union Station Parking Structure The Union Station parking structure is a critical project that is needed to support plans for a multi-modal transit facility at Union Station, and for the commercial success of existing and future businesses in the station. It will also provide needed parking for new businesses in the adjacent Canal District. The City is in the process of acquiring property and is in discussions with the state regarding funding.

Near Term Projects (1 to 5 years)

Worcester Common Outlets Redevelopment The redevelopment of the Worcester Common Outlets will require a public/private partnership, where the City participates in infrastructure and the developer providing equity, risk, and development expertise. As a first step, the City demolished one of the overhead ramps that connected to the parking garage. Currently in the preliminary planning stages, the redevelopment of the Worcester Common Outlets project will be phased over a five-year period.



The renovation of the Common is already underway.

Front Street Extension and Other Streets Front Street will be extended to Worcester Center Boulevard as part of the redevelopment of the Common Outlets. This project will reintroduce a key connection between downtown, Washington Square, Union Station, and Shrewsbury Street and will encourage pedestrian and vehicular flows and support business activity in both areas. Other new mid-block connectors will create blocks and development parcels that are consistent with the historic pattern of development downtown.

Main Street Streetscape from Central Street to Federal Square The City has initiated a streetscape improvement program for downtown, a portion of which has been implemented. The completion of these improvements on Main Street is a high priority since it will create a consistent streetscape that reinforces the revitalization goals for Main Street revitalization and helps to change the image of downtown. Since one side is complete, the program will require sidewalk improvement from curb to building face.

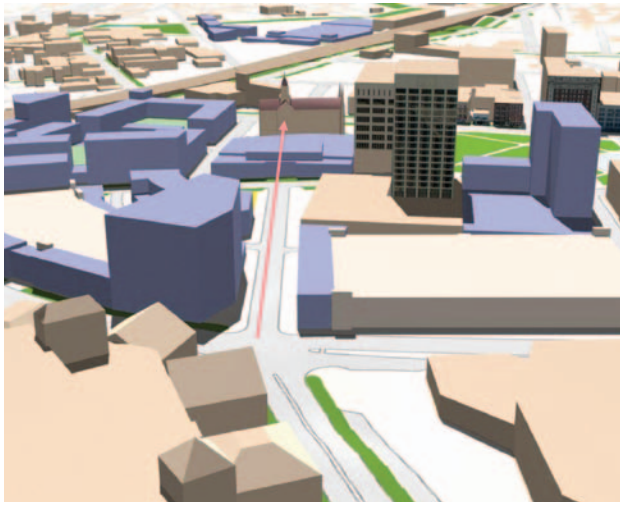
Worcester Center Boulevard Reconstruction from Foster to Franklin Narrowing Worcester Center Boulevard will minimize the barrier effect of the boulevard and calm traffic. Pedestrian connections will be reinforced between downtown, Union Station and Shrewsbury Street. By reducing the right-of-way, land could be transferred to adjacent redevelopment parcels, making it possible to wrap the existing parking structure with new housing. The narrowed Worcester Center Boulevard will be similar in scale to Main Street, balancing traffic distribution while offering a friendlier pedestrian environment and a better address for real estate development. A traffic analysis will be necessary to define the exact parameters of this newly defined street corridor.

Adaptive Reuse The application of historic tax credits and newer building rehabilitation codes will be necessary to encourage the adaptive reuse of underutilized Class "C" office space downtown. Because of their age and footprint size, these historic buildings may be best suited for residential, live/work units, or small professional offices. Many buildings may require a complete rehabilitation with new building systems.

Washington Square Redevelopment Parcels Reducing the size of the rotary will create development parcels around the periphery of the square. New buildings are projected to be not more than three to five stories to respond to the height of Union Station.

Long Term Projects (5 to 10 years)

Parking Structure The need for an additional parking structure in the downtown district is likely and could be located on an internal parcel such as the Telegram & Gazette site on Portland Street or could involve the expansion of the Federal Square Garage. Additional parking will encourage adaptive reuse of existing buildings and new infill development, and could be accomplished in partnership with the private sector.



With redevelopment, a new street connects the Centrum and Worcester Medical Center to Front Street.

Francis McGrath Traffic Calming As a continuation of the narrowing of Worcester Center Boulevard, Frances McGrath Highway should be reconfigured into a city street rather than an arterial highway. This corridor, which parallels the rail viaduct, offers a perfect opportunity for introducing a greenway with continuous bicycle lanes that could connect to the regional systems.

Renovation and Redevelopment around the Common The investment in the Common will make this address more valuable. As one of the most historic and significant places in the City, heights should not exceed the typical cornice line of 125 feet, especially where shadow effects will impact the Common. Preservation of historic facades should be encouraged with additional height allowed in the center of the blocks. Density should not exceed that of the proposed Worcester Common Outlets redevelopment with a maximum FAR in the range of 2.0 to 3.0. Private developers have already expressed interest in the block between Portland and Salem Street.

Greenway Triangle Redevelopment Parcels A number of redevelopment opportunities exist within the district south of Franklin Street along Frances McGrath Boulevard and Southbridge Street. Key projects in this area include the Library parking lot; the YMCA property, which could support the current YMCA program with other uses at higher density; and properties on either side of Madison Street, including the Seven Hills Plaza. Redevelopment of this area would not be a first priority, but rather should follow the Worcester Common Outlets redevelopment and the Arts District redevelopment efforts. Development guidelines need to be established for this area, including preservation goals and the desired height and density in relation to surrounding buildings. Rationalizing the street and block pattern between the YMCA and the Library parking lot parcels will improve their redevelopment potential and pedestrian circulation.

Washington Square will be transformed from an auto-dominated rotary into a vibrant pedestrian-friendly gateway to downtown.

The greenway triangle includes a bicycle link along Francis McGrath Boulevard to the Common.

Worcester Center Boulevard Development Parcels Improvements to Worcester Center Boulevard and the redevelopment of the Worcester Common Outlet will spur development along the railroad viaduct. The appropriate height for development in this area is projected to be four to five stories in order to complement development of the same scale on the Worcester Common Outlets redevelopment site.

Federal Square Unlike the other squares, Federal Square retains its historic charm and scale and features a pedestrian-scaled civic park. To improve Federal Square, the focus should be directed on the regeneration of active uses in the surrounding blocks. The proposed renovation of the historic Poli Theater (Showcase Cinema) would draw people to this part of downtown and add life to the streets. Importantly, the theater would also thematically connect the Arts District to Federal Square.

Streetscapes Intersection and street improvements will be an ongoing investment that enhances visitor orientation and the quality of the experience for people downtown, and will increase property values on adjacent real estate parcels. These improvements should be phased to coincide with private sector investment.

Development around the Common should respect the height of the existing cornice lines.

240’
125’
60’
FLAGSHIP BANK

Redevelopment opportunities in the Canal District

The Canal District features historic buildings and vibrant neighborhood businesses.

CANAL DISTRICT

Strategy

- Position the Canal District as a unique urban neighborhood to attract urban dwellers who desire renovated warehouse space as residential and office lofts, art studio uses, artists housing or live/work units, with the potential for headquarter office space in renovated warehouse space
- Promote new infill development to strengthen the sense of neighborhood with new loft space, townhouses, or low-rise apartments, and neighborhood retail

Program

- Adaptive reuse of underutilized and vacant warehouses for mixed use
- New loft development and rowhouse development on vacant/under-utilized parcels
- Potential for neighborhood-oriented retail up to 150,000 square feet of floor area

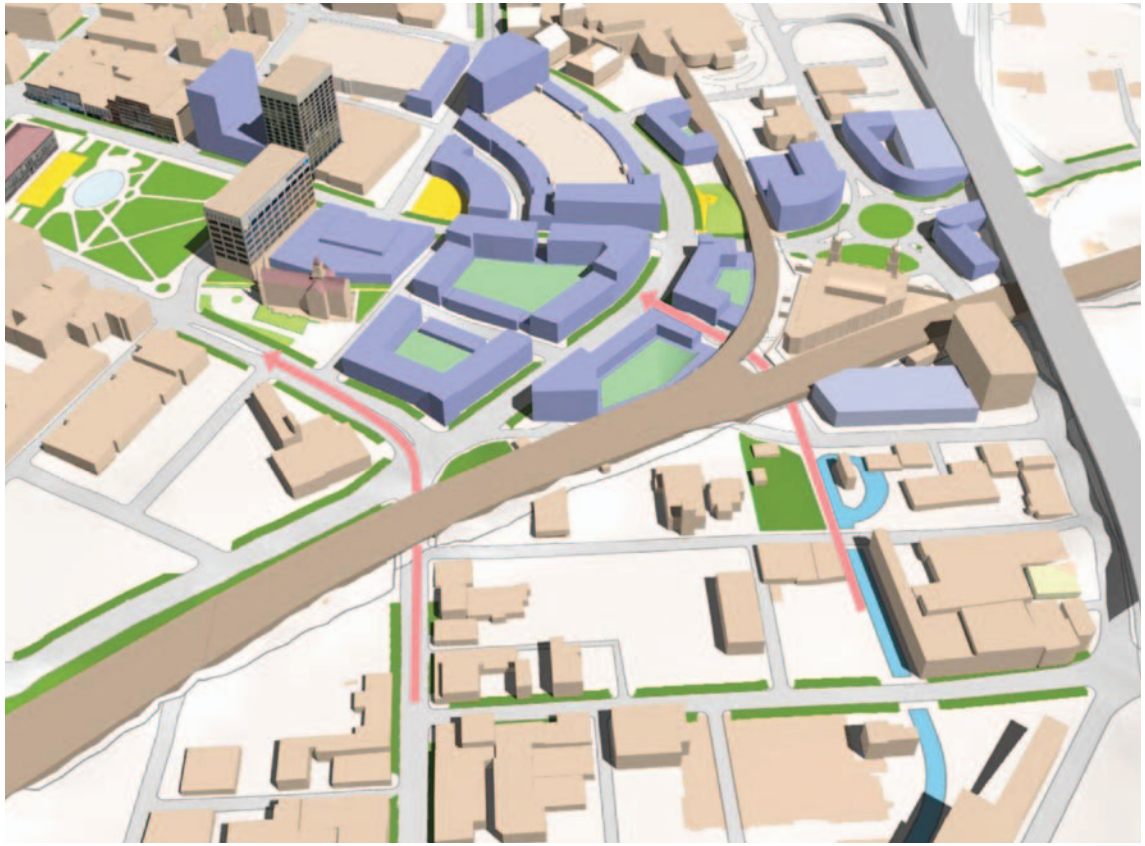
Setting

Historic brick warehouses and industrial buildings characterize the northern section of the Canal District, which occupies a triangle between the railroad viaduct, Interstate 290, and the Green Island neighborhood. The historic alignment of the Blackstone Canal ran along Harding Street, but the canal was soon replaced by the railroad. The many unique food stores, shops, and restaurants along Water Street today echo the district's historic development and offers an authentic destination within the downtown. The nearby Green Island neighborhood is known for its strong immigrant history.

The Canal District is in transition. The industries in the northern district provide employment, with businesses that range from food wholesaling to manufacturing of machine parts. Retail has traditionally been concentrated on Water Street and Green Street. Some of the land and brick warehouse buildings are underutilized or vacant. Adaptive reuse is beginning to occur, however, and historic structures are being transformed into residences, lofts, galleries, restaurants, and nightlife venues. The 17-acre Wyman Gordon site, which has been cleared of most of its structures, is a key redevelopment parcel along Madison Street. To the south, Green Island is a more traditional residential neighborhood that is closely bound to the Canal District and its future.

Kelley Square is the historic junction between the northern Canal District and the Green Island neighborhood. The square also serves as a key gateway where Routes 122 and 146 converge to enter downtown from the southeast. Today, the unsignalized intersection of Madison Street/Vernon Street, Harding Street, Green Street, and the offset of nearby Water Street and the I-290 ramps is a challenging entry point for the uninitiated. The unorganized traffic patterns make it equally difficult for pedestrians to cross the square, a situation that breaks the retail continuity of Water Street. The gas stations and fast food venues around Kelley Square are oriented to automobiles and further break down the character of this historic square.

The Canal District Master Plan, prepared by Icon in 2003, recommended that the historic canal be replicated along the alignment of Harding Street. A canal turning basin and other park space would become the central features of the new Kelley Square. Vernon Street would be aligned directly with Madison Street to clarify movement through Kelley Square and Green Street would enter at a right angle to Madison Street. The Canal Plan is slated for further study to determine the feasibility, phasing, and implementation of various recommendations.



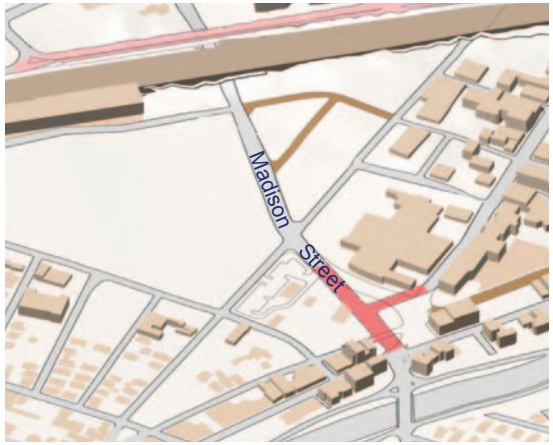
Green Street and the future canal along Harding Street will become the primary links to downtown.

Catalyst Project: Wyman Gordon Redevelopment

At the current time, the redevelopment of the Wyman Gordon site is a high priority based on the owner's desire to dispose of the property within the year. A number of real estate developers have expressed interest with uses ranging from residential and neighborhood retail to grocery stores and big box retail. The City has articulated their goals for the site, which include:

- Mixed-use development that serves as a positive catalyst for private investment in the adjacent Canal District and Green Island neighborhood. Preferred uses include residential and neighborhood retail, including a grocery store. Regional destination retail is undesirable since it will increase traffic and is at a scale that does not complement the adjacent Green Island neighborhood. The scale of development should be three to six stories.
- Active building facades along Washington Street between Lamartine and Madison Street, preferably residential townhouse or loft units with the potential for ground-floor retail on the Madison Street corner. These uses will define and activate the street and complement the neighborhood and proposed improvements to Kelley Square.
- "Main Street" retail along Madison Street, recognizing that this is a key gateway into the City and that active ground-floor retail will contribute to a walkable pedestrian environment that serves the Canal District, Green Island, and the South Main/Arts District residents. Residential units above the retail would be desirable to provide additional height and more residents in the area, with a typical scale of three to six stories.
- Open-space corridor along Lamartine Street to accommodate the Mill Brook Fenway and to buffer new development, especially commercial development and parking, from the residential neighborhood.
- Parking areas should be screened by development on the street edges and by the open space corridor.

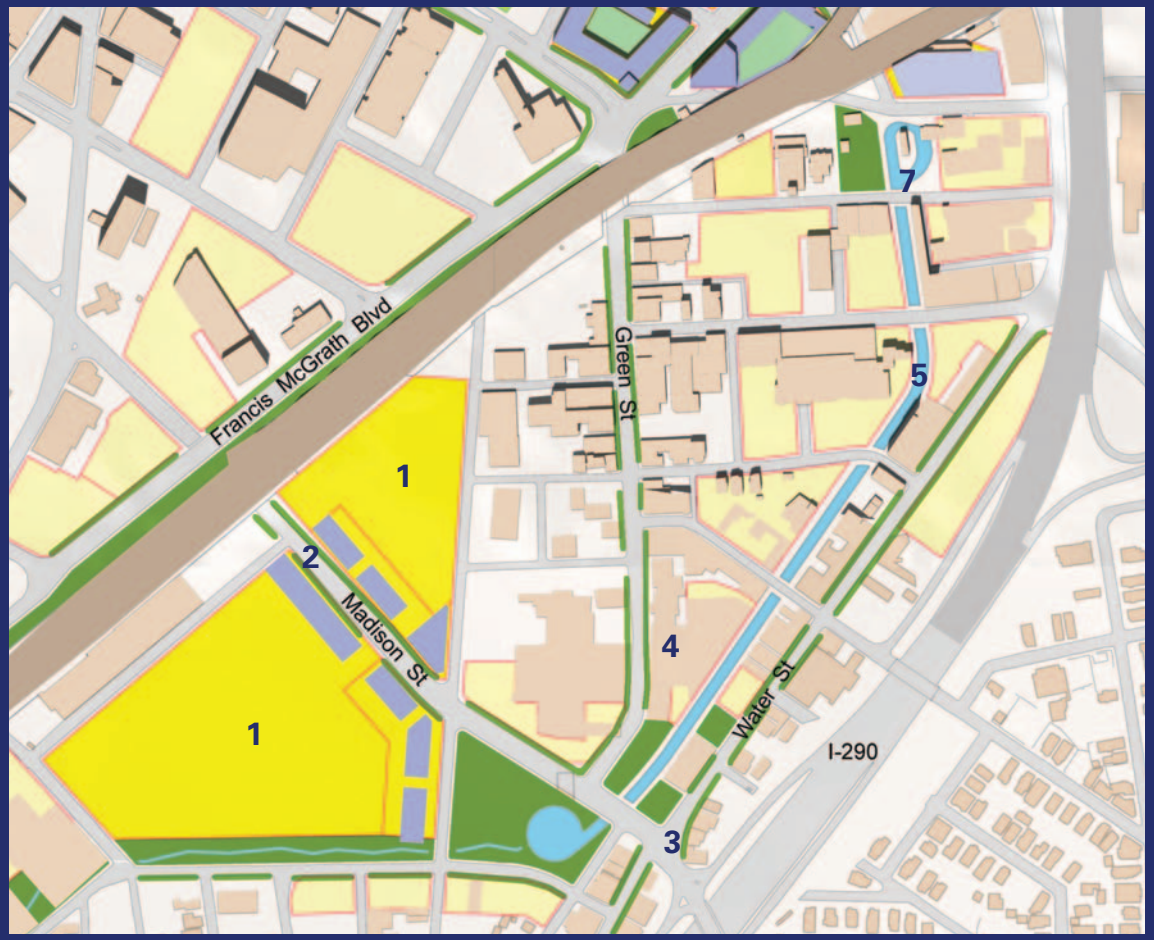
Existing conditions



Proposed street improvements

Open space framework

New development defining Madison Street and Kelley Square Park



Catalyst projects
Priority redevelopment parcels
Longer term redevelopment parcels
Existing streetscape improvements
Proposed streetscape improvements

Canal District Action Agenda

Near-Term Projects (1 to 5 years)

1 Wyman Gordon Redevelopment
2 Madison Street Improvements at Wyman Gordon
3 Kelley Square Reconfiguration
4 Adaptive Reuse and Infill (as appropriate)
5 Canal Environmental Impact Study

Long-Term Projects (5 to 10 years)

6 Parking Structure (to be sited)
7 Canal, Bridges, and Turning Basin
8 Public Market (to be sited)
9 Streetscapes

Action Agenda Projects

Near-term Projects (1 to 5 years)

Wyman Gordon Redevelopment Wyman Gordon is in the process of disposing of the 17-acre parcel, which would be redeveloped by the private sector. For this key catalyst project, redevelopment plans should be subject to City review and site design guidelines to ensure that new development achieves an appropriate relationship with adjacent properties, the Green Island neighborhood, the emerging Canal District and the adjacent downtown area. Wyman Gordon currently is remediating environmental conditions on the site, but efforts should be made to ensure that residential standards are met.

Madison Street Improvements at Wyman Gordon Madison Street improvements should be tied to private interest in the redevelopment of the Wyman Gordon site. The new streetscape will support private redevelopment of the site and help to integrate it with the surrounding urban fabric, including the Green Island neighborhood and the Canal District.

Kelly Square Reconfiguration This project should be separated from the larger canal concept to advance it toward implementation, especially with the proposed redevelopment of the Wyman Gordon site. A phased strategy should be pursued that accomplishes the transportation enhancements at this key gateway into the City while minimizing land takings. Open space goals may be part of a longer-term implementation approach.

The Loom Works is an important candidate for adaptive reuse

Adaptive Reuse and Infill in Canal District Incremental investment in the Canal District is happening on its own volition and should be encouraged. As adaptive reuse proceeds, the value of other vacant and underutilized property in the area will increase making infill development more likely. City initiatives should focus on the following:

- Application of building rehabilitation codes that support more creative solutions to life safety and other primary goals.
- Zoning and design guidelines that limit new buildings to 4 to 6 stories and ensure compatibility with existing warehouse structures.
- Shared parking opportunities should be pursued that do not require on-site parking solutions and that reduce the number of spaces required per unit, especially given the proximity of the commuter rail station.
- An urban renewal district should be considered, so that the tools of eminent domain could be used in public/private partnerships.
- Where appropriate, opportunities for industrial relocation should be pursued with a focus on improving the operations for existing businesses.
- Façade improvement assistance and infill development along the Green Street corridor will encourage the current pattern of retail and restaurants.

Canal Environmental Impact Study The Environmental Impact Study for the Canal will investigate alternatives and impacts from the canal development, and will also refine the design and engineering of the canal concept. A phasing strategy should be defined that includes short-term streetscape and other open-space and interpretive improvements that can enhance private investment in the Canal District in the immediate future.

Historic warehouse buildings are suitable for reuse as office, residential, or live/work lofts.

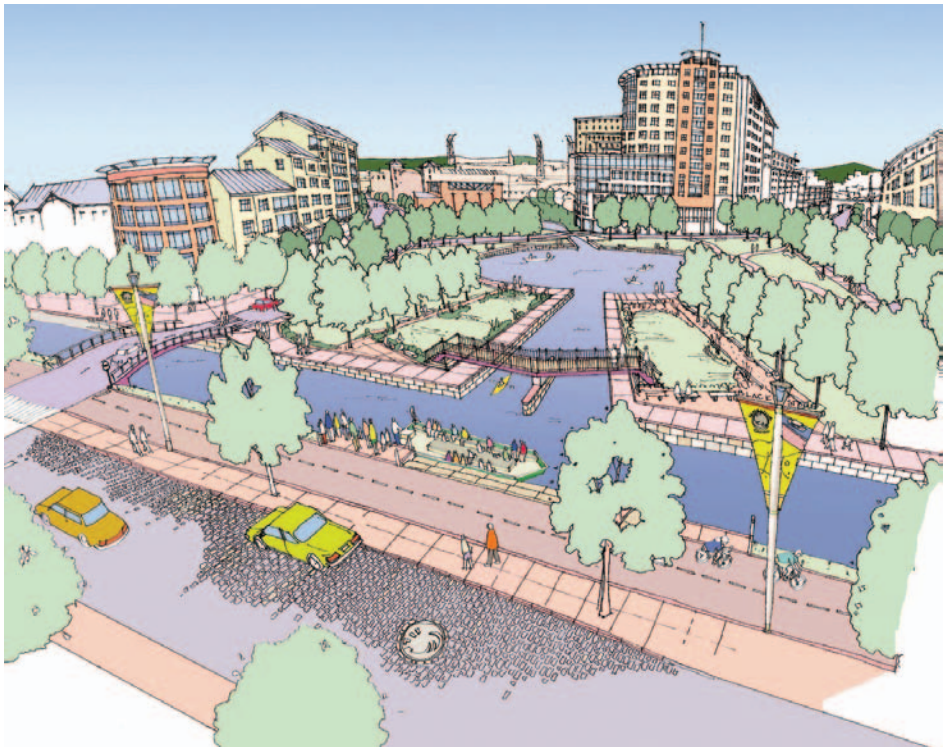
Long-term Projects (5 to 10 years)

Parking Structure The need for a parking structure in this district is likely. The structure should be centrally located in the district near Winter Street or Pond Street, at least five-to ten-minute's walking distance from the proposed Union Station parking structure (*see Downtown District*). The parking structure will encourage adaptive reuse of existing buildings and new infill development, and could be accomplished in partnership with the private sector.

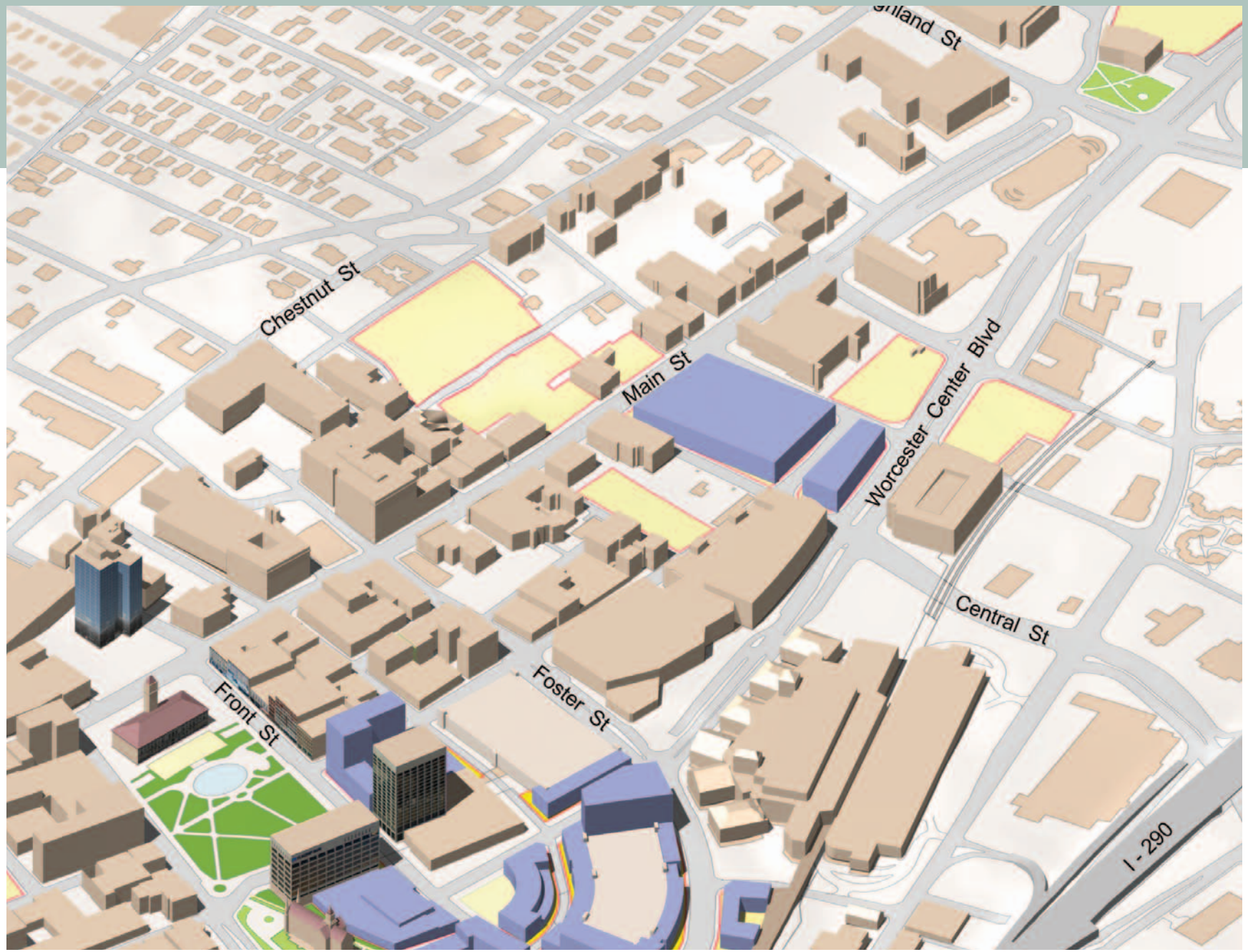
Canal, Bridges, and Turning Basin The Canal District Master Plan, prepared by Icon, presents a number of specific recommendations for the canal, bridges, turning basin, and other park areas along the corridor between Union Station and Kelley Square. This project is currently being considered as part of the State Transportation Bond Bill.

Public Market A public market in the vicinity of Franklin Street would serve as a catalyst that would draw people into the district and begin to transform the character while making a bridge to the past. The feasibility of this market should be tested in light of any grocery stores at Wyman Gordon and/or the Worcester Common Outlets redevelopment, and the program adjusted to complement private markets.

Streetscapes Intersection and street improvements will be an ongoing investment that enhances visitor orientation and the quality of the experience for people downtown and will increase property values on adjacent real estate parcels. These improvements should be phased to coincide with private-sector investment.



The Canal Master Plan, prepared by Icon Architecture, illustrates the potential of Kelley Square.



Development potential in the North Main District

Landmarks and institutions define the North Main District.

NORTH MAIN DISTRICT

Strategy

- Encourage adaptive reuse to attract businesses seeking more affordable downtown office or ground-floor restaurant or entertainment venues, or to accommodate residential lofts
- Position vacant lots for commercial or residential development
- Highlight and complement institutional character of existing landmark buildings and new Regional Justice Center

Program

- Multi-tenant office space
- Multi-family rental and/or condominiums
- Additional entertainment and restaurant uses
- Infill development will likely depend on public parking supply for 80% of parking needs

Setting

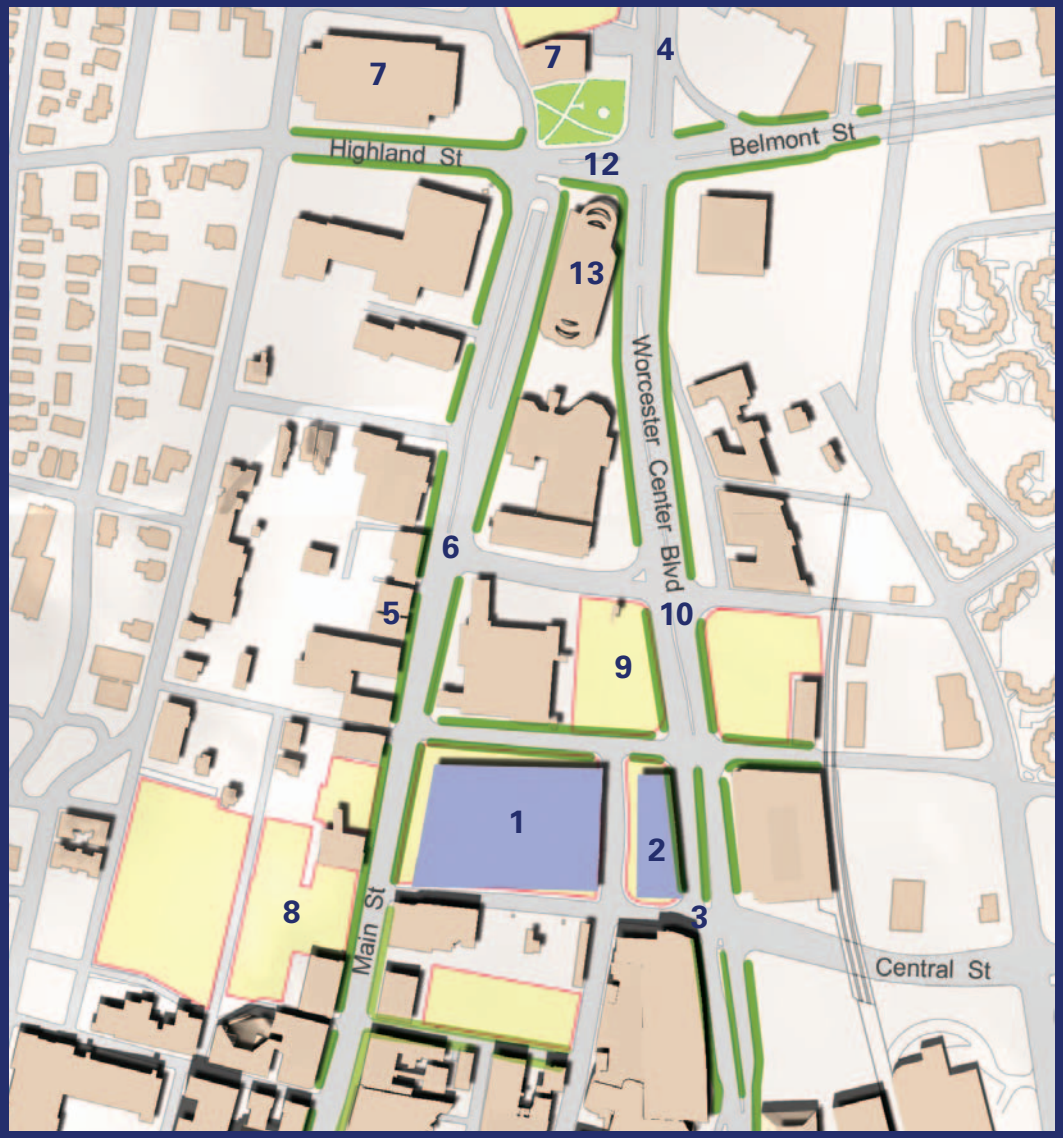
Monumental buildings, such as the old Courthouse, the Municipal Auditorium, and the former "Voke" School, anchor the North Main District at a primary gateway into the downtown from the north. The Worcester Art Museum, the Worcester Polytechnic Institute (WPI) campus, and the Gateway Park lie to the north and west of Lincoln Square. Some of the institutional buildings, such as the courthouse, the municipal auditorium, and the "Voke" School have lost their original purpose, and new uses must be found. Others such as the Art Museum and the churches continue to be vital destinations.

Lincoln Square joins together the North Main District, the Gateway Park to the north, and the nearby WPI campus. The square is complicated by traffic movements and grade separations that include a southbound tunnel, two levels to Main Street northbound and southbound, and the walled parking structure of the Crowne Plaza. While key institutional uses and buildings surround the square, the square itself has become a barrier between them. Each of these districts would be strengthened by a critical mass of activities around the square, especially the connection to the Worcester Art Museum, which is a national destination.

Catalyst Projects: Regional Justice Center and Hilton Garden Inn

The new State Courthouse, which is currently under construction, will be a catalyst project in the North Main District. This project will reinforce the institutional character and attract professional offices and restaurants that benefit from proximity to the courthouse.

A second catalyst in the area will be the development of the Hilton Garden Inn on the site of the former Central Street Fire Station. The City has agreed to narrow a portion of Commercial Street to facilitate this development, which is underway. An elevated skywalk is planned to link the Hilton Hotel, Convention Center and nearby parking structure. The new hotel, which faces Worcester Center Boulevard, will complement the nearby Convention Center, while also creating a critical mass of hotel rooms in conjunction with the Crowne Plaza. This project should also spin off demand for additional restaurants and entertainment venues.



Ongoing Projects (0 to 1 year)

1 Regional Justice Center
2 Hilton Garden Inn
3 Skywalk
4 Gateway Park Site Improvements

Near-Term Projects (1 to 5 years)

5 Main Street Adaptive Reuse (as appropriate)
6 Main Street Streetscape Completion from Belmont to Central Street
7 Lincoln Square District Adaptive Reuse

Long-Term Projects (5 to 10 years)

8 Main Street Redevelopment Parcels
9 Worcester Center Boulevard Redevelopment Parcels
10 Worcester Center Boulevard Traffic Calming
11 Parking Structure (to be sited)
12 Lincoln Square Reconfiguration
13 Crowne Plaza Parking Structure Redevelopment
14 Streetscapes

Catalyst projects
Priority redevelopment parcels
Longer term redevelopment parcels
Existing streetscape improvements
Proposed streetscape improvements

North Main District Action Agenda

Action Agenda Projects

Ongoing Projects (0 to 1 year)

Regional Justice Center Groundbreaking for the new Regional Justice Center on North Main Street began in July 2004. The Justice Center will extend the Main Street building fabric north of Central Street and will bring new employees into the downtown area.

Hilton Garden Inn The Hilton Garden Inn project is an eight-story, 200-room hotel, which will be developed adjacent to the Centrum and Convention Center. The project is currently in the advanced planning stages and is anticipated to open in fall 2005. The new hotel will reinforce the Centrum and Convention Center as major destinations in downtown Worcester.

Skywalk The City is responsible for the design and construction of a skywalk that will link the Hilton Garden Inn to parking and the Convention Center.

Gateway Park Site Improvements As a part of the Gateway Park project, some street improvements are being made to Concord, Grove, and Prescott Streets and their intersections. Other site improvements in this area include land acquisition and environmental remediation.

Lincoln Square District Reuse Strategy The reuse of the Municipal Auditorium, Vocational School, and the old courthouse represent a challenge and an opportunity for the City. A reuse strategy should explore the highest and best uses within the context of other improvements on North Main and the Gateway Park. A developers RFP will be more likely to generate private sector response if the City can articulate clearly the municipal objectives and the likely incentives based on a understanding of the development costs, market potential, and financial feasibility.

The state Trial Courthouse, designed by Shepley Bulfinch Richardson and Abbott, will be a catalyst in the district.

Near-term Projects (1 to 5 years)

Main Street Adaptive Reuse Technical assistance and incentives for adaptive reuse of the historic buildings on Main Street are recommended to preserve the building stock that gives this area such distinctive character. Because of their age and footprint size, many buildings may be best suited for either residential or small professional offices, either one of which will complement the Courthouse by adding life and activity on the street. Many buildings may require a complete rehabilitation with new building systems. The application of historic tax credits and newer building rehabilitation codes may be necessary to make this feasible (see Canal District recommendations).

Main Street Streetscape Completion from Belmont to Central Street The City has initiated a streetscape improvement program for downtown, a portion of which has been implemented. The completion of these improvements on Main Street is a high priority since it will create a consistent streetscape that reinforces the revitalization goals for Main Street revitalization and helps to change the image of downtown.

Lincoln Square District Adaptive Reuse Through a private/public partnership, the adaptive reuse of the Municipal Auditorium, Vocational School, the old courthouse and other historic buildings will transform the Lincoln Square area, which is a key gateway into the City. The potential for reuse can build on the energy from the WPI campus, the Gateway Park, and the Regional Justice Center and other planned improvements in the North Main District.

Lincoln Square is the northern gateway to the downtown.

Surface parking lots on Main Street are prime redevelopment sites.

Long-Term Projects (5 to 10 years)

The City plans to build a skywalk to connect the new hotel, parking and convention center.

Main Street Redevelopment Parcels The surface parking lots on the west side of Main Street are prime sites for residential or mixed-use infill. Since there is little open space in this district, a pocket park at the end of Central Street could become an organizing feature for new development. Development should match the scale of other buildings along Main Street, with parking built into the hill and active lobbies or ground floor retail along Main Street.

Worcester Center Boulevard Redevelopment Parcels Other surface parking lots along Worcester Center Boulevard could be redeveloped for mixed-use that would complement the nearby hotels and add vitality to the district.

Worcester Center Boulevard Traffic Calming Based on the findings of a traffic analysis, consideration should be give to narrowing Worcester Center Boulevard to the scale of a city street with on-street parking in order to improve the value of the properties facing onto this roadway.

The Hilton Garden Inn will be a catalyst in the North Main District. (renderings provided by Fargo Management)

Parking Structures The need for parking structures in this district is likely, and they could be incorporated into mixed-use developments and at the back of the existing State Courthouse site at Lincoln Square. This parking will encourage adaptive reuse of existing buildings and new infill development, and could be accomplished in partnership with the private sector.

Lincoln Square Reconfiguration Lincoln Square is another key gateway into the City and requires further study given the complicated traffic movements, grade separations, and physical alignments. The proposed traffic study and the reuse of the Vocational School and the Municipal Auditorium and other redevelopment opportunities should be integrated into future recommendations for the square, which should balance vehicular movements with improvements to the pedestrian environment.

Crowne Plaza Parking Structure With improvements to Lincoln Square, the parking structure at the Crowne Plaza could become a prime redevelopment opportunity, with parking on the ground-floors, active ground floor uses, and greater density for housing, research, or office uses.

Streetscapes Intersection and street improvements will be an ongoing investment that enhance visitor orientation and the quality of the experience for people downtown and that will increase property values on adjacent real estate parcels. These improvements should be phased to coincide with private sector investment.

Belmont St
Main St
Chestnut St
Worcester Ctr Blvd
Front St
Shrewsbury St
Francis McGrath Blvd
Green St
I-290
Madison St
Grafton St

CONNECTIONS

Strategy

The City must continue to build on past efforts and the concepts proposed in the 1993 Worcester Downtown Gateways Program by Arrowstreet to develop a clear hierarchy of streets that reflects the geography of the City, the orientation and destinations for visitors, and the desire for a more walkable and beautiful downtown. This hierarchy will be established by emphasizing the two north/south spines that parallel I-290 and the series of key east/west streets that connect across the downtown.

Like the street system, open space can provide a connective tissue that links together different districts and squares in downtown Worcester. Linear trails and corridors such as the Blackstone Valley pass through and connect several districts. Downtown parks need to be distributed in such a way that they function together with the streets to create an amenity for people walking downtown. Many parks can become a unique destination. The parks need to complement surrounding uses, and typically will increase property values around them.

Setting

The downtown street network links different districts and squares together. The clarity of this system is essential to visitor orientation, gateways, and a sense of arrival. Pedestrian-friendly streets will serve as the connective tissue that encourages people to come downtown and to extend their stay as they walk to different destinations and experience the City. Ease of access and attractive streetscapes improve the value of all the properties that front along a street, creating desirable addresses for investment.

Today, finding one's way into downtown Worcester and to a destination is made difficult by the multiple ramps from I-290 and the barriers created by the elevated highway, railroad viaducts, and steep hills. At the squares, roads converge from many different directions, complicating traffic geometries and turning movements. The pattern of one-way streets makes it difficult to reach a destination directly. At six lanes, Worcester Center Boulevard is over-designed for the traffic it carries, encouraging high speeds and making pedestrian access along or across it difficult. The interstate currently operates as a local arterial because of the many on and off ramps through the downtown.

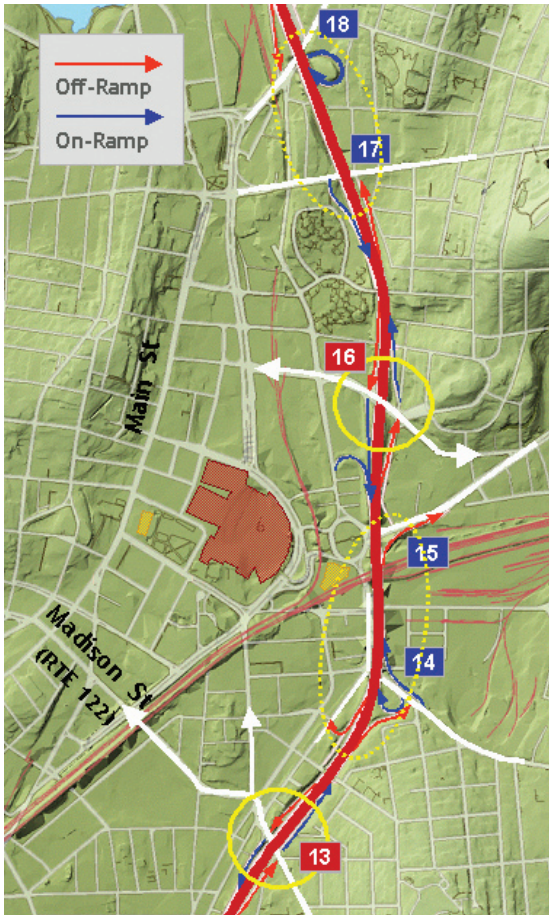
Infill development, improved squares, and walkable streets will create a cohesive downtown that links the neighborhoods and districts.

North/South Spines

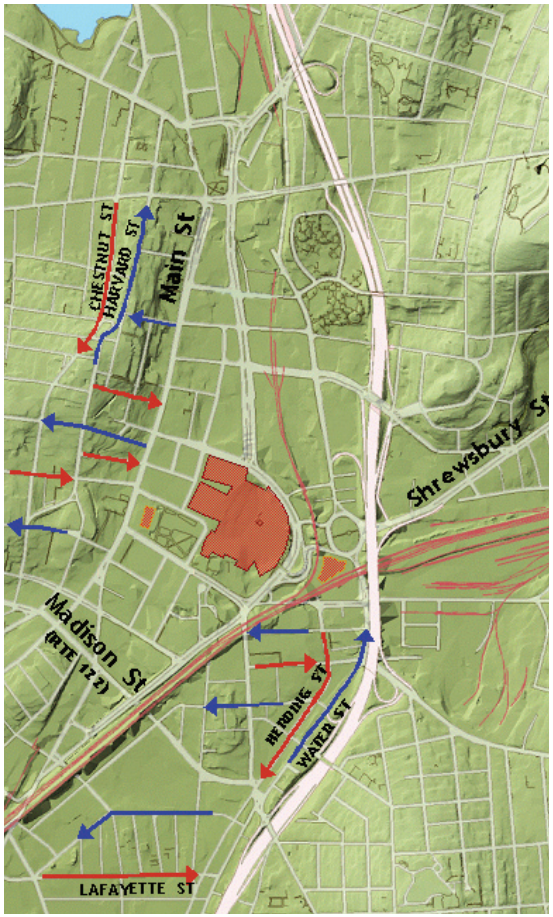
As an interstate highway, I-290 should be primarily focused on regional traffic that is traveling between Route 2 and the Massachusetts Turnpike (I-90) or is destined for downtown Worcester. The removal of some of these ramps may be possible to clarify access to and from downtown and on the streets that pass under the elevated highway.

With connections to the Gateway Park to the north and the South Main Street Arts District to the south, Main Street will continue to be a major north/south spine through the downtown. Gateway portals are at Route 9 (Belmont Street) and at Federal Square. The street typically has two travel lanes in each direction, and in some sections, has parking on one or two sides of the street. The average daily traffic is 18,000 vehicles per day (2004 data). Main Street moves significant volumes of traffic, yet is also a very walkable street. Many notable buildings have their addresses on Main Street.

The corridor of Worcester Center Boulevard/Francis McGrath Boulevard should be viewed as a parallel spine to Main Street. The current six-lane arterial has more capacity than is necessary for the volume of traffic and presents a formidable barrier for pedestrians crossing from downtown to Union Station. The street needs to have a more urban character that balances pedestrian and vehicular traffic. The current average daily traffic is similar to Main Street (15,000 to 22,000 vehicles per day, 2000 data). The entire length of the street from Belmont to Southbridge needs to be redesigned to calm traffic and reclaim part of the street right-of-way for wider sidewalks, on-street parking, bicycle lanes, and/or green space. In some segments, additional land could be freed up for development. With a more pedestrian-friendly character, this street should become a desirable address for new development.



Kelley Square (exit 13), Central Street (Exit 16), and Belmont Street (Exits 17&18) are primary gateways into the City.



The remaining one-way street patterns should be reconsidered to clarify circulation.

East-West Gateway Streets

A series of streets connect east/west between Main Street, Worcester Center Boulevard/Francis McGrath Boulevard, and I-290. The most important streets are the ones that serve as gateways to the downtown, including:

Belmont Street (Route 9) Improvements are needed at the Lincoln Square gateway, some of which will be carried out by the Gateway Park site improvements.

Central Street The first several blocks of Central Street have been improved as a gateway. As part of the Hilton and the Regional Justice Center redevelopment projects, the last blocks of Central Street should be improved as a pedestrian-friendly street that welcomes visitors to the heart of downtown.

Shrewsbury to Front Street As a part of the Worcester Center Boulevard, Front Street will be extended along its historic alignment to connect to Washington Square and Shrewsbury Street. On Shrewsbury Street, streetscape improvements are underway.

Grafton Street (Route 122) to Winter Street The feasibility of making Winter Street a two-way street is being studied.

Green Street to Franklin Street West Green Street is the major orienting spine through the Canal District leading to the new Worcester Common Outlets development and more clearly connecting to Franklin Street.

Vernon Street (Route 146) to Madison Street (Route 122) Along with new development on the Wyman Gordon site, an improved Madison Street corridor has the potential to transform this key gateway street in such a way that the Canal District and the Green Island neighborhood are more strongly joined with a pedestrian character.

These streets must become priorities for public investment and signage that is consistent with existing signage welcoming visitors to the downtown. The goal should be to end the highway character at the exit ramp and to focus on pedestrian-friendly street environments that feature gracious sidewalks, narrow travel lanes, and consistent building facades and active front doors and ground-floor uses.

Other intersection and street improvements will be an ongoing investment that enhances visitor orientation and the quality of the experience for people downtown and will increase property values on adjacent real estate parcels. These improvements should be phased to coincide with private-sector investment.

Action Agenda Projects

Ongoing Projects (0-1 year)

Bus Study The WRTA is currently finishing its study of downtown bus ridership and routes. This study will recommend new route alignments, some new equipment, and strategies for better response to demand.

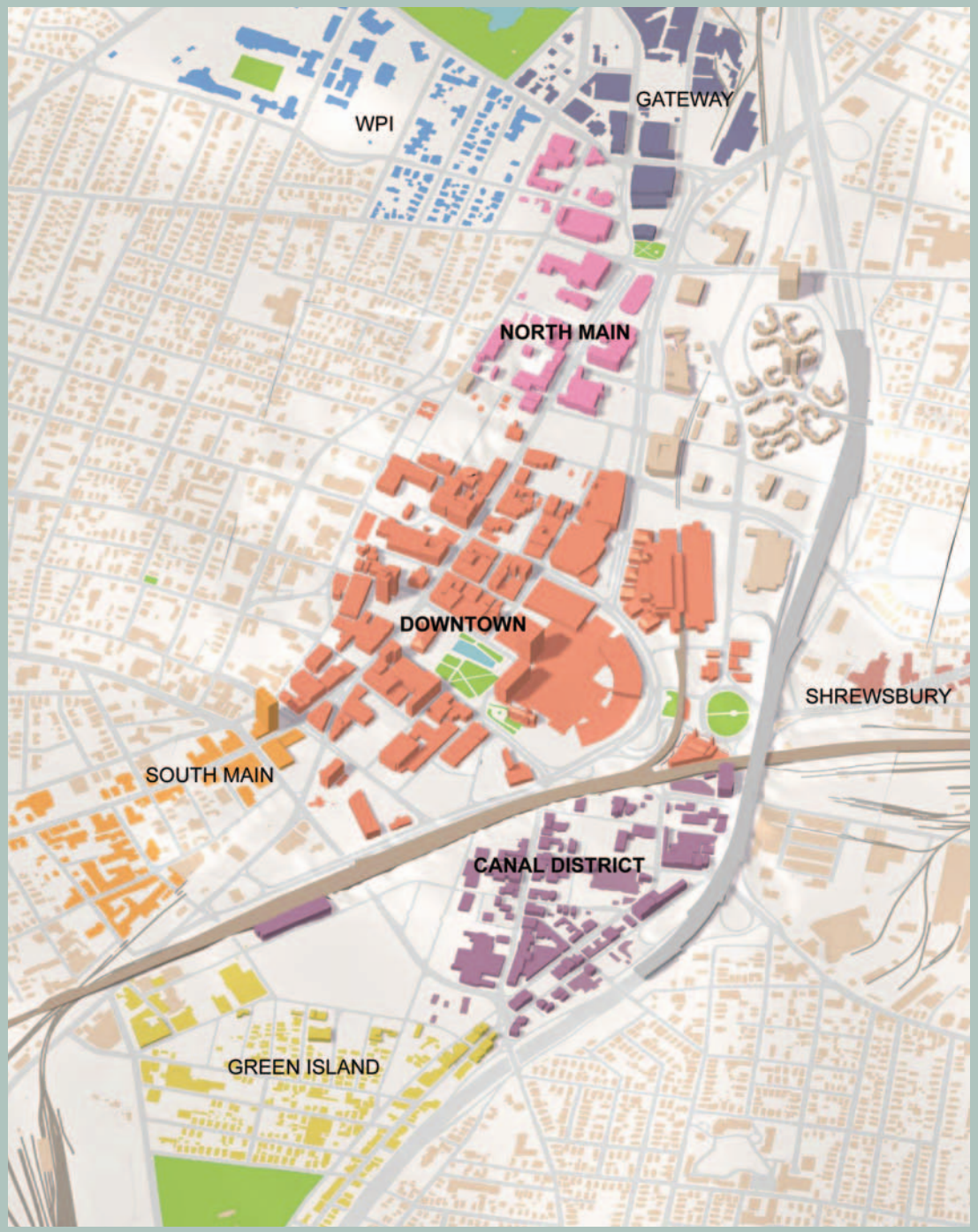
Downtown Parking Model The City has engaged VHB to conduct a downtown parking study, which should be complete by the fall 2004. This effort will document private and public parking supply and occupancy at peak hour by zone; identify parking demand by zone; explore opportunities for shared parking; integrate future development demand and parking displacement; and identify parking structures and strategic locations based on demand as well as development opportunities.

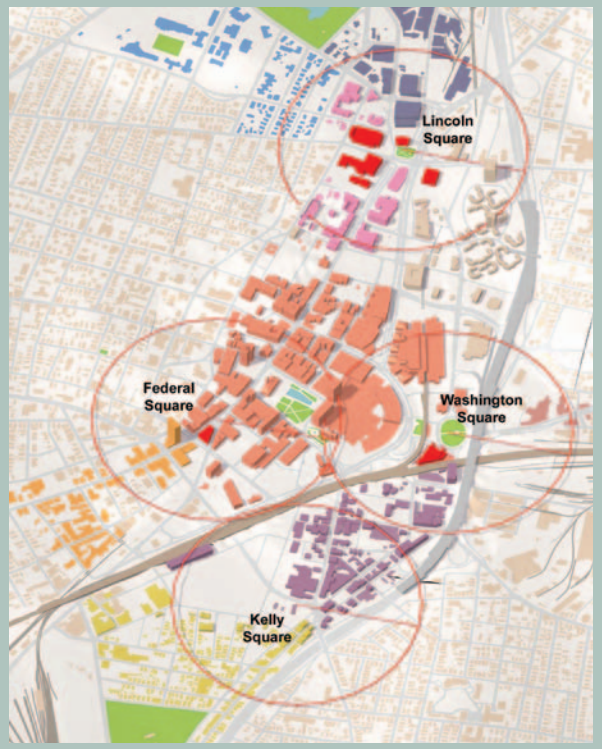
Near-term Projects (1-5 years)

Downtown Traffic Analysis A traffic analysis is the first step to key improvements to downtown streets. The City must invest in new traffic counts for key intersections throughout the downtown to establish a consistent database. Using this data, the private sector could carry out some portions of the traffic studies while in other areas the City will take the lead. The objectives are as follows:

- Define appropriate street sections and operations for the new streets in the Worcester Common Outlets redevelopment area as well as Worcester Center Boulevard and Francis McGrath Boulevard
- Develop the basis for redesign of Kelly Square and Lincoln Square, including geometry, signalization, and operations
- Continue to introduce two-way street patterns
- Define the necessary and appropriate movements on and off I-290 from downtown

DISTRICTS AND CONNECTIONS





Districts

Districts and connections establish a framework for development in Worcester that relates to the unique character of Worcester. By understanding the framework, each decision – large or small – can contributes to a coherent sense of place in the future.

Character. Each district in the downtown area contains unique cultural and physical assets that contribute to its identity and character. The combination of land uses, building types, and cultural and historic resources distinguish these areas from other parts of the City and the region. New development and public investment should reinforce the integrity of the districts.

Walkability. Within each district, every destination can be reached within a five-to ten-minute walk. The quality of the experience is enhanced by the presence of active ground-floor uses, building entries, generous sidewalks, trees, and lighting. Parking needs should be balanced within the district rather than on each site, as a way of encouraging shared parking.

Catalysts. Catalyst projects are strategically located, feature high-quality design, and complement and enhance surrounding uses with an appropriate development program. These projects, which can be large or small, inspire high-quality development around them. Every effort should be made to prioritize these projects and ensure that they are successful.

Connections

Squares as Centers. The unique pattern of squares in downtown Worcester developed out of the convergence of important transportation routes. Today the squares continue to serve as gateways and crossroads between major downtown districts, but are dominated by automobiles. Circulation improvements and strategic placement of new development can transform these squares into dynamic places that are pedestrian friendly.

Street Hierarchy. A clear street hierarchy clarifies orientation for the visitor and improves daily travel for others. Focused investment in key streets and a consistent streetscape and signage system will emphasize the street hierarchy. In all cases, emphasis should be placed on creating pedestrian-friendly streets throughout downtown.

Open Space. Open space contributes to downtown identity, improves the pedestrian experience, and creates value for adjacent real estate. Open space elements should connect with the broader City and regional open space network to enhance the overall system and to encourage recreational activity downtown.

ACTION AGENDA PRIORITIES

The intent of the Action Agenda is to establish priorities for the City and to anticipate likely private-sector interests. In all cases, opportunities driven by private-sector interests and by funding opportunities may alter the time frames presented below. Some private-sector projects, such as the Berkeley Investments redevelopment proposal for the Worcester Common Outlets mall and the adaptive reuse in the Canal District, are likely to be phased over a ten-year period.

The City is currently engaged in a number of projects, some of which are being carried out in partnership with other agencies. Projects currently underway are categorized as 0- to 1-year projects. Projects that are in the 1- to 5-year range are high-priority projects, but may require some lead time, funding, and/or approvals prior to their start. Longer-term efforts are categorized as 5- to 10-year projects, although these, too, will require some initial groundwork over the next five year to get them underway. Estimated development costs, including direct and indirect costs, are documented for the projects already underway (0- to 1-year) and estimated for the priority public projects in the 1- to 5-year range.

0 to 1 Year Projects	Lead	Cost
Worcester Common	City/State/Federal	$5.8 million
Bus Port/Ramp Demolition	City/Federal	$6.0 million
GAR Memorial Hall Adaptive Reuse	Private	$1.6 million
Washington Square Reconfiguration	State/Federal	$4.0 million
Union Station Parking Structure	City/State	$9.0 million
Regional Justice Center	State	$180.0 million
Hilton Garden Inn	Private	$22.0 million
Skywalk	City/Private/State	$3.5 million
Gateway Park Site Improvements	Private/Federal/City	$12.4 million
Lincoln Square District Reuse Strategy	City	$50,000
Bus Study	WRTA	$50,000
Downtown Parking Model	City DPW	$86,000

Note:
Cost estimates are in 2004 dollars and do not account for future inflation. Costs are conceptual only and include construction costs and indirect soft costs, such as design, legal fees, administration and permits.

Downtown improvements encourage active use, as seen in this typical outdoor cafe.

1 to 5 Year Projects	Lead	Cost
Worcester Common Outlets Redevelopment (1)	Private/City/State	$300.0 million
Front Street Extension and Other Streets (2)	City/Private	$5.9 million
Main Street Streetscape: Belmont to Central Street	City	$1.0 million
Worcester Center Boulevard Reconstruction: Foster to Franklin	City	$3.9 million
Main Street Adaptive Reuse	Private	$37.0 million
Washington Square Redevelopment Parcels	Private/City	$46.0 million
Wyman Gordon Redevelopment	Private	$40.0 million
Madison Street Improvements	City	$1.6 million
Kelly Square Reconfiguration (3)	City	–
Canal District Adaptive Reuse & Infill (1)	Private	$10.3 million
Canal Environmental Impact Study (4)	City/State	$2.5 million
Main Street Streetscape: Central Street to Federal Square	City	$1.5 million
Lincoln Square District Adaptive Reuse (3)	Private/City	–
Downtown Traffic Analysis	City/Private	$200,000

Note:
(1) Project is likely to extend from 1 to 10 years
(2) Costs of typical streets above ground
(3) Cost of construction to be determined
(4) Cost prepared by Icon

5 to 10 Year Projects	Lead
Parking Structure in Downtown District	City
Francis McGrath Traffic Calming	City
Renovation/Redevelopment around Common	Private
Greenway Triangle Redevelopment Parcels	Private
Worcester Center Boulevard Redevelopment Parcels	Private
Parking Structure in Canal District	City
Canal, Bridges, and Turning Basin	City
Public Market in Canal District	City/Private
North Main Street Redevelopment Parcels	Private
Worcester Center Boulevard North Redevelopment Parcels	Private
Worcester Center Boulevard North Traffic Calming	City
Parking Structures in North Main District	City
Lincoln Square Reconfiguration	City
Crowne Plaza Parking Redevelopment	Private
Streetscapes: Downtown, Canal, North Main	City

ACTION AGENDA IMPLEMENTATION

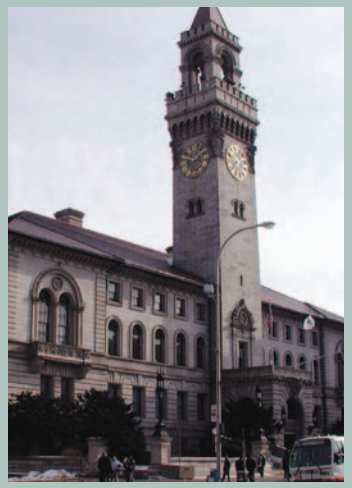
Implementation of the Action Agenda is a complex undertaking that will require cooperation between the public and private sectors, as well as between various branches and levels of government to succeed. There are several planning steps necessary to gain official approval of the plan and initiate the first phases of implementation. The immediate next step involves adoption of the Action Agenda and implementation strategy by Worcester's City Council.

In order to realize the improvements recommended in the Action Agenda, consensus on the major policy initiatives must be achieved. In particular, the role of the public sector must be structured to define clear leadership and specific responsibilities within that framework. Policies for implementation must recognize the capacity of different organizations and the overall strengths of downtown Worcester within the regional market. Ultimately, the vision of the plan will be achieved by focusing efforts and keeping long-term objectives in clear sight. At the same time, the Action Agenda allows for flexibility so the City can respond to opportunities as they arise.

URBAN DESIGN GUIDELINES

The following urban design principles will shape development in downtown Worcester:

Consistent Street Walls. Buildings should be set close to the street and should define open space and streets with consistent heights along their facades. Building heights should to be in proportion to right-of-way widths with recommended ratios of 1:1 or 1:1.5 right-of-way to building height. Where greater height is appropriate, the upper levels should be stepped back to provide consistent street walls along the street and in relation to the buildings on the opposite side. On residential streets, buildings may be set back on the site to allow for landscaped planting beds (typically 10 to 15 feet).



Historic and Landmark Buildings. New development must respect existing landmark buildings, such as Union Station, by careful massing, limitation on height where appropriate, and consideration of view corridors. New development should also relate to surrounding historic buildings with consideration of overall height as well as the building proportions and materials.

Active Streets. Multiple building entrances should open out to the public realm of the street. Lobbies, community rooms, and other active uses can enliven the ground floor of apartment and loft buildings. For rowhouses, stoops provide rhythm and interest along the street. Ground-floor retail is encouraged wherever possible, and should be targeted to both sides of key streets and to prominent corners.

Architectural Features. Structures in prominent locations should have distinct profiles to serve as landmarks. On prominent locations, such as key termini of streets and view corridors, buildings should feature corner tower elements, special entryways, or other architectural details that mark a landmark position. Corner elements can be slightly higher and/or push out closer to the street in relation to the rest of the façade. These variations will also create a distinct profile in the development massing. Articulation of the building mass is encouraged to create the impression of an aggregation of smaller forms. At the street level, buildings should be proportioned and offer detail that relate to the pedestrian environment.

Parking Facilities. Wherever possible, parking structures should be placed toward the interior of a block, underground, or with the smallest possible façade facing the street. Parking garages should have facades that relate to the scale, proportion, and character of surrounding buildings, with a balance of solid wall and window-like punched openings. Ramps should be located on the interior of the garage so that sloped floors are not visible from the street. The scale of parking structures should be carefully considered to minimize impacts on the urban fabric with recommended sizes in the range of 300 to 500 cars. Surface parking should be minimized and where it exists should be behind buildings or have street trees and landscape planting along the edge to continue the definition of the street wall.

The implementation of key projects will act as a catalyst for sustained downtown development activity, including the renovation of vacant space, conversion of underutilized space, and new infill development. A fundamental principle of the Action Agenda is that public investment will help to reposition downtown and attract and encourage new private development. A major component of this investment will, therefore, be to fund the capital improvements and build the necessary public amenities.

We recommend the following to guide public decision-making for implementing the projects outlined in the Agenda:

1. The City should focus its public investment in new infrastructure to leverage subsequent private investment. The overarching goal here is to induce the market. For example, the introduction of new streets on the Worcester Common Outlets site will create the context within which private development on adjacent properties can occur.
2. Be strategic in location. Public decision-making with respect to civic improvements should be prioritized to include those sites or projects that will maximize opportunities for private investment. A private developer is currently pursuing the redevelopment of the Worcester Common Outlets site. The City should focus on this project as an immediate priority, with other areas to follow.
3. Maximize opportunities for federal and state funding for civic improvements
4. Build quality bearing in mind long-term affordability. The City should invest in high-quality design and use materials that will endure over time. In order to be strategic with public investment, special features may need to be phased in over time.
5. Incorporate priorities into capital improvement plans
6. Review and refine the City's marketing strategy so that it is consistent with the Action Agenda priorities.

Role of the Private and Institutional Sectors

Private investment in the downtown will cause revitalization. From the development perspective, the role of the private sector is to capitalize on market opportunities by investing in real estate projects. As the market analysis demonstrates, downtown Worcester can support residential, office and retail development.

Private investment occurs when the rewards of investment outweigh the risks associated with the investment. Private investors must foresee an adequate financial return-on-investment to implement a project. Often in urban redevelopment the costs associated with development outweigh projected revenues. In these cases, the private investor may engage the public or non-profit sector to close the financial gap.

When engaging in public/private development, the private sector must demonstrate that the proposed project has long-term value to the community. The private sector must also demonstrate why public or non-profit resources are required for project feasibility. The private sector must treat the public/non-profit entity as a partner in the real estate deal.

Typically, once the project is determined to be feasible, the private sector assumes the responsibility of developing, owning and managing the real estate asset. In some cases, the public/non-profit partner shares in project proceeds.

Strong leadership is a central ingredient to success in any endeavor. City revitalization requires strong leadership from both the private and public sector. With projects like the Medical Center and the Convention Center, the City has demonstrated its commitment to downtown revitalization.

To achieve a new economic position and downtown revitalization will require more than simply City commitment. The leaders of Worcester's community, industry, and institutions must support the Action Agenda and work with the City to implement the Agenda. Without such a commitment by the private and institutional sector, the chances for success are greatly reduced.

It is therefore recommended that a City Manager's Downtown Advisory Committee should be established to support the development agenda for the downtown and to advocate for its implementation. Membership should include representation from a broad range of

institutions and businesses that have a stake in the success not only of the downtown but of the City as a whole, and should include those who have made or are about to make investments in downtown.

Role of the Public Sector

In the early 1990s a Development Office, with a Chief Development Officer and staff, was established to implement the recommendations of a public process focused entirely on downtown development. The accomplishments of that focused approach led to the completion of the Convention Center, Medical City, the Central Street Gateway, and other major street reconstruction and signage. The Development Office was separate from the Office of Planning and Community Development (OPCD) and the Worcester Redevelopment Authority (WRA). As detailed in a recent study conducted by the Kennedy School of Government entitled "No More Magic Bullets: Devising a Realistic Approach to Downtown Revitalization," the 2000 restructuring of the Development Office, the WRA, and the OPCD led to budget reductions, staff reductions, including all of the staff of the WRA, and a separation of planning functions between the Office of Neighborhood Services and the Office of Economic Development. The study also observed that other communities, notably Providence, Rhode Island, and Cambridge and Lowell, Massachusetts, both smaller than Worcester, currently have over twice the number of staff focued on planning and development.

A central challenge to implementing the Economic Development Action Agenda will be defining the roles, responsibilities, and staffing needs to create a successful program. While a number of City departments will be involved in certain aspects of implementation, it is critical to the success of this effort that one organization be focused exclusively on the downtown. The organization designated should possess the following qualifications:

- Financial expertise and the ability to negotiate deals with new and existing businesses
- Close working relationship with all City departments and staff and the ability to form partnerships
- Credibility with the City Council
- Understanding of the basic principles, design concepts, implementation strategies, and economic recommendations of the Action Agenda
- Ability to coordinate with the development of urban design guidelines and amendments to the Zoning Ordinance
- Ability to coordinate with the construction phase of infrastructure projects
- Ability to promote downtown and to target appropriate businesses and tenants
- Fundraising experience in both the public and private sectors
- Ability to work with various citizens groups, from historic district residents to business owners

While the Development Office has the core skills and experience to lead this effort, future staff configuration should include expertise in the following areas: Planning, Design, Law, Engineering, Budgeting, Real Estate, and Project Management.

The City of Worcester graciously thanks all those who participated in focus groups, the charrette, and public meetings.

WORCESTER ECONOMIC DEVELOPMENT ACTION AGENDA | *APPENDIX*

AUGUST 2004

SASAKI
with ZHA

WORCESTER ECONOMIC DEVELOPMENT
ACTION AGENDA / APPENDIX

prepared for

The City of Worcester, Massachusetts

prepared by

Sasaki Associates

ZHA

August 2004

TABLE OF CONTENTS

Appendix A Issues and Opportunities Analysis

Appendix B Public Participation – Summary of Charrette Comments

Appendix C Market and Economic Analysis

Appendix D Conceptual Cost Estimates

Appendix E Implementation Strategies

APPENDIX A. ISSUES AND OPPORTUNITIES ANALYSIS

Regional Context

Issues

- Business groups identified the tax competitiveness of Worcester relative to other cities in the region as a concern
- The City requires a recruitment strategy to attract new businesses
- There has been a lack of significant new investment in downtown over the past decade
- The City has had difficulty retaining students after they graduate, and attracting the 25-34 year-old demographic

Opportunities

- The presence of a large number of colleges and universities in the area is a major competitive advantage and market opportunity
- The City possesses many amenities to attract regional convention and tourism business (e.g. Art Museum, Blackstone National Heritage Corridor; regional conventions)
- Bio-technology is a growth area
- The City is well-served by the regional transportation (highway, rail)
- There are opportunities to develop niche housing, such as lofts and condominiums downtown
- There are many strong neighborhoods in the City

Transportation and Circulation

Issues

- Wayfinding is complex (e.g. vehicular access to downtown, pedestrian circulation within the downtown area)
- There are poor connections between downtown and surrounding areas, particularly with Shrewsbury Street
- The Mall and Worcester Blvd. create barriers between downtown are adjacent areas
- Major downtown destinations are not concentrated, so it is difficult to walk between destinations
- High demand generators do not engage their surroundings (medical center, convention center)

Opportunities

- The regional transportation and commuter rail system are great assets
- State highway improvements will improve access to the City
- There is significant potential to re-establish connections between downtown and surrounding areas through the redevelopment of the mall
- Downtown has a good supply of parking

Land Uses and Development Program

Issues

- There is a lack of uses/attractions to bring people downtown
- There is little housing downtown
- There are few services to support office employees, such as convenience retail, cafés, restaurants, etc.
- Downtown destinations are not concentrated so there is little synergy between uses destinations

Opportunities

- There is demand for housing downtown and potential for niche housing types, such as lofts and condominiums
- Successful existing uses, such as the Art Museum, Mechanics Hall and Centrum, bring people downtown
- Vitality already exists in several areas downtown, including the club district and on Shrewsbury Street
- The physical character and ethnic diversity of areas and neighborhoods surrounding downtown are great assets
- There is significant market potential for student-oriented destinations and retail uses

Downtown Assets and Opportunities

Issues

- Perceptions of downtown discourage people from visiting/living/working downtown
- General building maintenance and maintenance of public places (Worcester Common, public streets) needs to be improved
- Poor connections between downtown and surrounding neighborhoods are problematic

Opportunities

- The quality of the historic building stock downtown is very high
- Revitalization in the Canal District has been occurring through private investment
- The plan for the Canal District will further promote the revitalization of that area
- The creation of an Arts District area will encourage further revitalization downtown
- The restoration of Worcester Common will improve perceptions of downtown and encourage further investment
- The redevelopment of the mall will generate significant redevelopment opportunities
- Public/private partnerships, such as the St. Vincent's hospital project, provide a good model for revitalization

APPENDIX B. PUBLIC PARTICIPATION - SUMMARY OF CHARRETTE COMMENTS

WHY WORCESTER?
Worcester's Competitive Advantages

1. **What makes Worcester special?**
2. **How does Worcester compare to other places in the region?**
3. **What is the role of downtown in the region?**
4. **Identify three ways that downtown could make Worcester more successful.**

Group 1

1. Housing downtown – provide diverse housing types
2. Concentration of uses; mixed uses
3. Pedestrian friendly design; not insular, human scale, perceptions of safety (public/private responsibility)
4. Connectivity
5. Redevelopment sites, individual entrepreneurs

Group 2

1. Connections, walkability, richness of open space, neighborhoods, college campuses, human centered transportation
2. Residential life; building on college assets, keep students in Worcester; affordable housing, diversity of housing types; improve services, maintain neighborhoods, historical preservation, building re-use; connect residential life to services
3. Collegiate nexus, leverage intellectual capital; improve coordination with the city; attract and preserve diversity; incentives to keep students in Worcester
4. Cultural – build on ethnic diversity

Group 3

1. Build physical connections
2. Change Worcester's image; build on strong historical assets; aesthetic improvements – clean, safe, energetic; involve youth; build on cultural diversity (markets, film festivals …)

3. Capture entrepreneurial spirit both within the business community and those who plan for the future of the city

Group 4

1. People – how can we get people to be part of downtown; safety, street level retail, transportation (walking, buses, cars …)

2. Residential – new housing types (lofts, condos … range of types)

3. Master Plan – focus on downtown, update regulations and zoning

4. Restaurants, retail; connections; street level activity

GETTING TO THE HEART OF THE CITY
Transportation and Circulation

1. **What can we do to improve access to downtown?**
2. **Is transit working well?**
3. **How do you know you've arrived downtown?**
4. **How well do connections to neighboring districts work?**
5. **How could parking be improved?**
6. **Summarize your top three recommendations to improve transportation and circulation.**

Group 1

1. East-west connectivity inside the city – Shrewsbury Street to Front Street
2. Re-assess the I-290 ramp system; Shrewsbury Street off-ramp impact on Washington Square
3. Sensitive integration of parking garages – modest scale, ground floor retail; active street edges
4. In-city trolley system; bring students downtown
5. Undo the damage (e.g. mall parking, Shrewsbury off-ramp)

Group 2

1. Identify key gateways into downtown and around downtown; Exit 16 as principal entry to downtown
2. "Re-cherish" the downtown – locate parking at perimeters of downtown; downtown trolley/bus; encourage development that is consistent with livable downtown
3. Livability/street life; getting from east to west; walkability; small retail outlets
4. Monorail from downtown to airport

Group 3

1. 'Big Dig' – bury highway and connect neighborhoods
2. "No neighborhood left un-connected;" connections enhanced and expanded; pedestrians, bicycles ...

3. Improve walk from Union Station to downtown; narrow Worcester Center Blvd.; replace lanes with bike path; connect through mall site; improve safety of pedestrian connections

4. Open-up site lines to improve wayfinding; develop bikeway system; connect destinations

5. Comprehensive traffic plan for whole city

Group 4

1. Signage – "you can't get there from here;" no clear wayfinding

2. Improve access; east-west connections; bikeways; consider pedestrian safety at rotary?

3. Link different destinations; connectivity; direct transit routes rather than hub system, re-think transit routes

WHAT IS MISSING DOWNTOWN?
Land Uses and Development Program

1. **Identify the places that bring you downtown today?**
2. **What new places, activities or events would bring you downtown?**
3. **What would make downtown a more attractive to live?**
4. **To work?**
5. **Summarize your top three recommendations.**

Group 1

1. People living/working downtown
2. Continuous, active, mixed-use; 18-hour activity - active street-frontage, cafés, late night entertainment
3. Supportive streetscapes - street furniture, street trees, outdoor dining, lighting … ; system of incentives and disincentives to encourage investment

Group 2

1. Mixed-use neighborhoods; re-use of historic buildings/spaces; variety of uses; more than just housing (institutional, museums, public buildings, retail …)
2. Residential support uses – retail, food, grocery stores
3. Active streets after 5 pm; attractive streetscapes/public spaces; possible pedestrian streets – e.g. Norwich and Portland

Group 3

1. Reasons for students, commuters, residents and visitors to stay downtown; possible defined districts
2. Better architecture and architectural review; cohesive/attractive civic environment
3. Security for people living and visiting downtown

Group 4

1. Creating downtown neighborhood atmosphere; support network, e.g. grocery stores, places to jog/walk
2. More events/entertainment, fairs, festivals; link events to downtown businesses
3. Improved image – clean, more attractive, interesting streetscape ideas

WHERE ARE THE OPPORTUNITIES?
Building on Our Assets

1. **Delineate the downtown districts and places as you perceive them.**
2. **What are downtown's key physical assets?**
3. **Where are the opportunities for change?**
4. **Where should we focus our efforts? What should the role of the City be?**
5. **Summarize your top three recommendations for change.**

All Groups (General Discussion)

- General activity; downtown as one place, no districts
- Improve connections, something to tie districts together
- Continuous venues along the street
- Large historic district, preserve historic integrity
- Keeping college students downtown; good housing for professionals
- Develop architectural review standards/guidelines; new development should be compatible with old
- Stronger historic preservation regulations, raising the bar
- Encourage diverse neighborhoods
- Preserve district identity; create a place where we can all come together, e.g. Union Station marketplace
- No sense of community downtown, no advocate; how can we create community downtown, make downtown a community
- Institutional district around auditorium/court house/art museum; national registered historic districts exist; Water Street, Millbury Street have existing character that should be promoted
- Put lighting on Union Station
- Ethnic market; create historic place from three-decker housing; build-on existing neighborhood character
- Believe in Worcester's potential
- Create signature buildings; no more second rate buildings; high quality design
- Green Island Neighborhood and Wyman Gordon property – infill housing; residential development, owner-occupied housing; strengthen residential element of island; light-industry/commercial; small businesses, parking, green space; small factories; employment use; consider integrity of property within neighborhood

CASE STUDY: REDEVELOPMENT OF THE MALL AREA

1. **What should we keep?**
2. **Identify potential view corridors, potential streets, and connections.**
3. **Where is the center – the 100% corner?**
4. **What are the land use strategies?**
5. **Where should height be placed?**
6. **What is the character?**
7. **What are the top three priorities requirements?**

Group 1

- Extending Front Street
- Keep garage next to Foothills
- Extend Green Street into old Trumble Street
- Residential where food court is located
- Greenspace, public market
- Make railroad more attractive to walk under
- Narrow Worcester Center Blvd.

Group 2

- Connectivity – Front Street/Union Station/Shrewsbury Street
- Green Street to Worcester Center Blvd.
- Demolish parking
- Turn galleria inside out – shops on the outside and inside
- Residential downtown – limit to 12 stories
- Opening-up waterway; extend canal into City; year-round use
- Build a baseball stadium downtown
- Mixed-use on Front Street from Main to Washington
- Take advantage of existing courtyard behind garage for market
- Activate medical center spaces/recesses
- More housing, e.g. around YMCA

Group 3

- Towers should stay
- Connecting corridors – Shrewsbury to Front Street; mixed-use
- Center will shift from City Hall
- Green connections to Common
- Soften views; hide the parking, place it behind residential/retail buildings; improved landscaping, redesigning overpasses to improve Front Street approach to Union Station
- Narrow Worcester Blvd.; create green edges

Group 4

- Re-establish City grid; Mechanics Street as residential connector
- Carve out small development parcels
- Re-establish Green Street, Front Street and Mechanics Street
- Re-establish a downtown neighborhood
- 60 units per acre – 900 units (1500 – 2000 people)
- Reinforce existing commercial
- Re-establish the canal as far as possible

APPENDIX C. MARKET AND ECONOMIC ANALYSIS

DRAFT

Market Analysis

Worcester Economic Development Action Agenda

Prepared by:

ZHA, Inc.

Annapolis, Maryland

June 2004

INTRODUCTION

ZHA was retained by Sasaki, Inc. to evaluate the market feasibility of office, residential and retail land uses in Downtown Worcester, Massachusetts. A market analysis is a methodology employed by investors to test the support for a certain product. A market analysis informs the process from a short- to mid-term perspective. This report summarizes the results of these markets analyses.

The report begins with an overview of Worcester, Massachusetts and its market characteristics. A regional economic framework is presented to highlight how regional trends impact the Worcester economy. The market analyses follow the economic framework. A conclusion section completes the report.

WORCESTER OVERVIEW

The City of Worcester is the third largest city in New England with approximately 173,000 residents. Providence, Rhode Island is slightly larger in population. The City of Boston with approximately 589,000 people is the largest city in Massachusetts.

Population and Household Trends
Massachusetts, Boston MSA, City of Worcester
1990-2002

	Population			
	1990	2002	Chng	% Chng
Massachusetts	6,015,050	6,393,677	378,627	6.3%
Boston MSA	5,684,646	6,119,968	435,322	7.7%
Worcester	169,759	172,940	3,181	1.9%

	Households			
	1990	2002	Chng	% Chng
Massachusetts	2,247,109	2,472,246	225,137	10.0%
Boston MSA	2,111,447	2,347,382	235,935	11.2%
Worcester	63,884	67,348	3,464	5.4%

Source: Claritas, Inc.; ZHA
econ frame/trends

Worcester experienced growth between 1990 and 2002, particularly in the number of households. Over this 12-year period, the number of Worcester households increased by over five percent.

The City is approximately 50 miles from Boston, Providence, and Springfield. It is known as the Crossroads of New England for people traveling north to New Hampshire and Maine and/or south to New York or Connecticut. There are approximately nine million people within an hour's drive of Worcester.

Employment Trends City of Worcester 1999-2002				
	1999	2002	Change %	Change Avg Ann
Government	15,241	14,117	-7.4%	-2.5%
Construction	2,728	3,049	11.8%	3.8%
Manufacturing	12,901	9,115	-29.3%	-10.9%
Transportation, Communication, Public Utilities	2,715	2,953	8.8%	2.8%
Trade	17,789	16,258	-8.6%	-3.0%
Finance, Insurance and Real Estate	9,060	8,083	-10.8%	-3.7%
Services	40,494	44,996	11.1%	3.6%
Total Jobs	100,928	98,571	-2.3%	-0.8%

Source: Massachusetts Department of Employment and Training; ZHA
office/employment trends

The City's economy is in transition, shifting from a dependence on manufacturing to an economy centered on health care, services, and biotechnology. The City has spent millions of dollars on a convention center, expanded airport, infrastructure improvements, and the renovation of the train station (Union Station) to support this transition. Worcester now is a regional center for employment, health care, social services, culture and education.

In terms of culture, the City of Worcester contains venues such as the Centrum Centre Arena and Convention Complex, Mechanics Hall, the Performing Arts School of Worcester, and Foothills Theatre. Museums include the Worcester Art Museum, Worcester Historical Museum and Higgins Armory Museum.

The Centrum Centre and Convention Complex is in the heart of Worcester's Downtown. Worcester's Centrum Centre is one of the nation's most successful arenas, hosting musical acts of national and international fame, innovative trade shows, concert theater productions, and family and sporting events. In addition, the Centrum is home to the Worcester IceCats of the American Hockey League.

The Centrum Centre has a new, state-of-the-art convention center with 100,000 square feet of exhibit space, 24,000 square feet in 11 meeting rooms, and a 12,100-square-foot ballroom - the largest in Central Massachusetts. Combined with the 14,800-seat arena, the Centrum Centre can accommodate almost any mid-sized meeting, convention or trade show.

According to the 2003 Comprehensive Economic Development Strategy by the Worcester Regional Chamber of Commerce and others, the Worcester region contains 37,000 students at 16 colleges. The Worcester region also possesses a highly skilled workforce.

Worcester has excellent road, rail, air, and fiber access. Worcester is at the crossroads of the Massachusetts Turnpike, Route 290 and improved Route 146. There is commuter rail service between Worcester and Boston. Union Station has been recently renovated as the hub of the commuter rail as well as national rail

service through AMTRAK. Worcester is wired with over 15,000 miles of optical wire. Almost every major office park and building in the City can access this fiber optic network.

Worcester has the infrastructure to support growth; however, the City is near build-out. To provide the land necessary to accommodate economic growth and capitalize on existing infrastructure, redevelopment must occur in the City. Worcester has aggressively pursued the restoration of brownfield sites for development.

ECONOMIC FRAMEWORK

Regional Growth

Top Metros in Total Households
United States

METRO MARKET	RANK
New York	1
Los Angeles-Long Beach	2
Chicago	3
Philadelphia	4
Washington	5
Detroit	6
Atlanta	7
Boston PMSA	**8**
Houston	9
Dallas	10

Source: Sales, Marketing & Management; ZHA presentation/pop

The City of Worcester is on the edge of the Boston PMSA. The Boston PMSA is ranked 8th (among 120 MSA's) in the country in number of households. Boston is a massive consumer market.

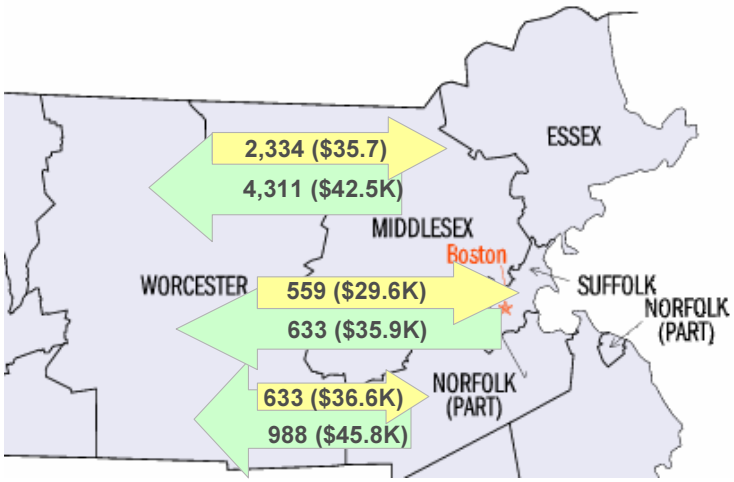
Top Metros in Effective Buying Income United States	
METRO MARKET	**RANK**
Chicago	1
New York	2
Los Angeles-Long Beach	3
Washington	4
Philadelphia	5
Boston PMSA	**6**
Detroit	7
Atlanta	8
Houston	9
Dallas	10

Source: Sales, Marketing & Management; ZHA presentation/pop

The Boston PMSA ranks 6th among national metropolitan areas in median household effective buying income. Effective buying income (calculated by Sales, Marketing and Management, Inc.) is a measurement of the average household's disposable income. High effective buying income and the pure size of the Boston market makes it a powerful economic engine that Worcester may have the opportunity to capitalize upon.

During the mid-1980's it became clear that development was moving west from Boston toward Interstate 495. Since 1990, the Interstate 495 corridor has been the fastest growing area in Massachusetts in terms of job creation and housing construction.

Migration Patterns by County
Households and Median Income
2001 – 2002



Source: US Internal Revenue Service; ZHA

As the migration map demonstrates, Worcester County has benefited from the western expansion of Boston. There was more in-migration from Middlesex, Suffolk and Norfolk counties than out-migration. Households moving into Worcester County had higher incomes than those leaving the County.

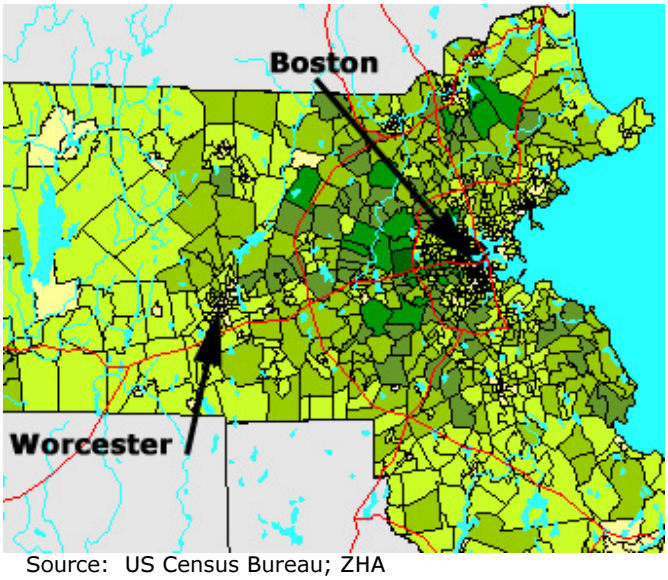
Migration Patterns
Worcester County
1997-98 and 2001-02

	1997-98			2001-02		
	In	Out	Balance	In	Out	Balance
Middlesex County	3,233	2,262	971	4,311	2,334	1,977
Norfolk County	831	614	217	988	633	355
Suffolk County	384	439	(55)	633	559	74
Hampden County	350	344	6	379	na	na
Essex County	249	na	na	301	439	(138)
Other Counties	924	1,017	(93)	1,092	1,529	(437)
Total	5,971	4,676	1,046	7,704	5,494	1,831

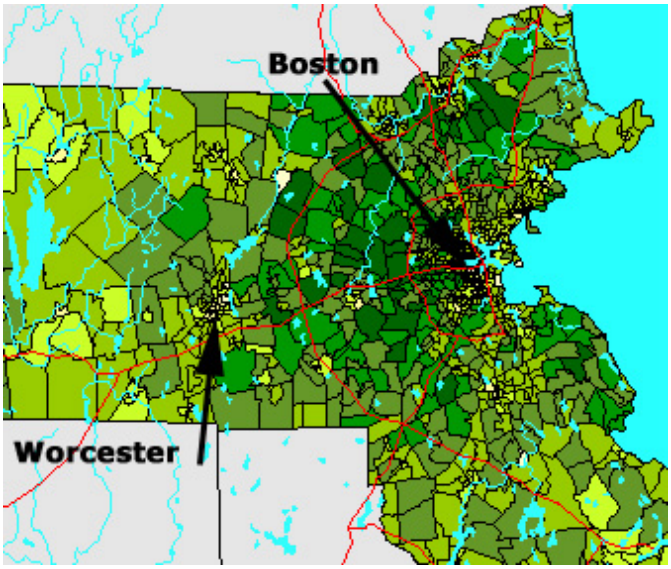
Source: US Internal Revenue Service; ZHA
worcester econ frame/mig

Worcester County experienced a net in-migration among neighboring counties of 1,831 households between 2001 and 2002.

1990
Median Income



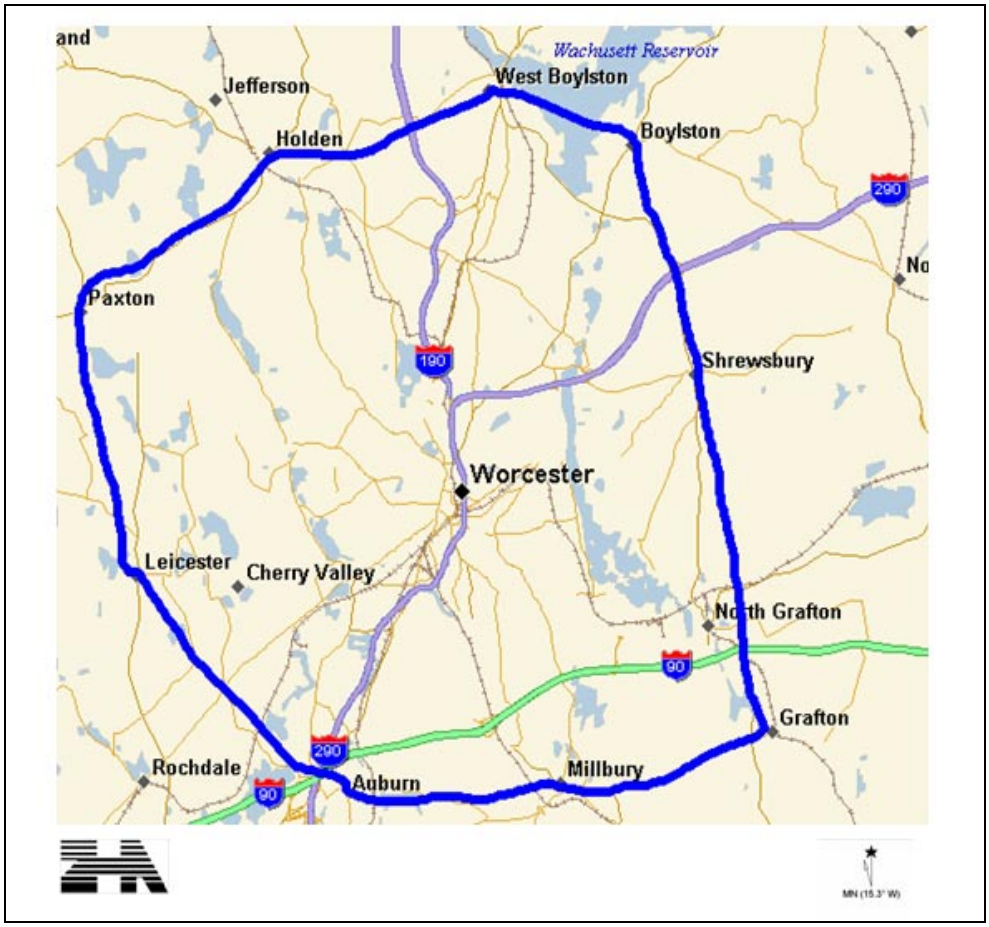
2000
Median Income



Source: US Census Bureau; ZHA

In the maps above, dark colors represent higher median income than lighter colors. As is illustrated, the western expansion of the Boston market has had increased median incomes for points west over the last ten years. The households moving into the County had higher incomes than the average Worcester County household and those households moving out of the County. Growth in households and income translates into an expanding economy. Once again, the City of Worcester may have an opportunity to capitalize on this growth.

Map of the Nine-Town Region



The City of Worcester is essentially the center of a Nine-Town Region. The Nine-Town Region consists of Auburn, Boylston, Grafton, Holden, Leicester, Millbury, Paxton, Shrewsbury and West Boylston. This region was identified as a more meaningful market area for the City than Worcester County as a whole.

Population Trends Boston MSA, Worcester County, Nine-Town Region and City				
	1990	2002	Change	Avg. Annual
Boston MSA	5,684,646	6,119,968	435,322	0.7%
Worcester County	709,728	779,294	69,566	0.9%
Worcester 9-Town	103,391	119,282	15,891	1.4%
Worcester	169,759	172,940	3,181	0.2%

Source: US Census; Claritas, Inc.; ZHA
econ frame/POP TRENDS

As population growth rates indicate, the nine towns surrounding Worcester experienced dramatic growth between 1990 and 2002. The Nine-Town Region grew at an average annual growth rate of 1.4 percent, significantly higher than the County average.

Population trends also demonstrate that the City of Worcester has not experienced nearly the growth rate of the Nine-Town Region. Essentially, the Nine-Town Region's rapid growth is suburban in nature where households are moving to these towns to find less expensive single-family home prices.

It is important to note, that while the City did not experience rapid growth between 1990 and 2002, it did grow. This is important, as the City steadily lost population between 1950 and 1980. The turn-around is evidence that the City of Worcester has benefited from regional growth trends.

In sum, the City is well positioned in a growing region. The challenge for the City is how to capture a larger share of this growth. This will require a strategy that positions the City as a unique and distinct location attractive to a Boston-oriented market.

Biotech Industry

The Progressive Policy Institute's 2002 State New Economy Index, which uses 21 economic indicators to measure innovation-driven, knowledge-based, technology economies, ranked Massachusetts the top innovation state in the country. As of 2002, metro Boston had 141 biotech firms, second only to San Francisco's 153.

With 16 colleges, the University of Massachusetts' Medical School (UMMS), Massachusetts Bio-Technology Research Park, and, a skilled labor force, the Worcester region is well positioned to attract technology, biomedical, pharmaceutical, and manufacturing companies. Among all U.S. Universities, UMMS is ranked 49th in research and 12th in primary care. Total research funding at UMMS totaled $111 million in FY01.

There is a biotech industry cluster in Worcester. In fact, Massachusetts already boasts a biotech corridor between Boston and Worcester. Worcester is an attractive alternative to biotech firms because it offers a skilled labor force, less expensive space, a world-class medical school and proximity to Boston and Cambridge.

The greater Worcester area contains approximately 36 biotech companies or approximately one-quarter of metro Boston's supply. Approximately 12 percent of the Massachusetts biotech labor force work in Worcester County, while 37 percent work in Boston or Cambridge.

Worcester is in a position to grow knowledge-based industry given its locational, institutional and economic assets. The challenge will be to attract these industries where City land is relatively limited and City growth marginal. A second challenge for the City is to get these high-paid employees to live in the City. According to interviews, most employees of Worcester's knowledge-based companies live outside of the City.

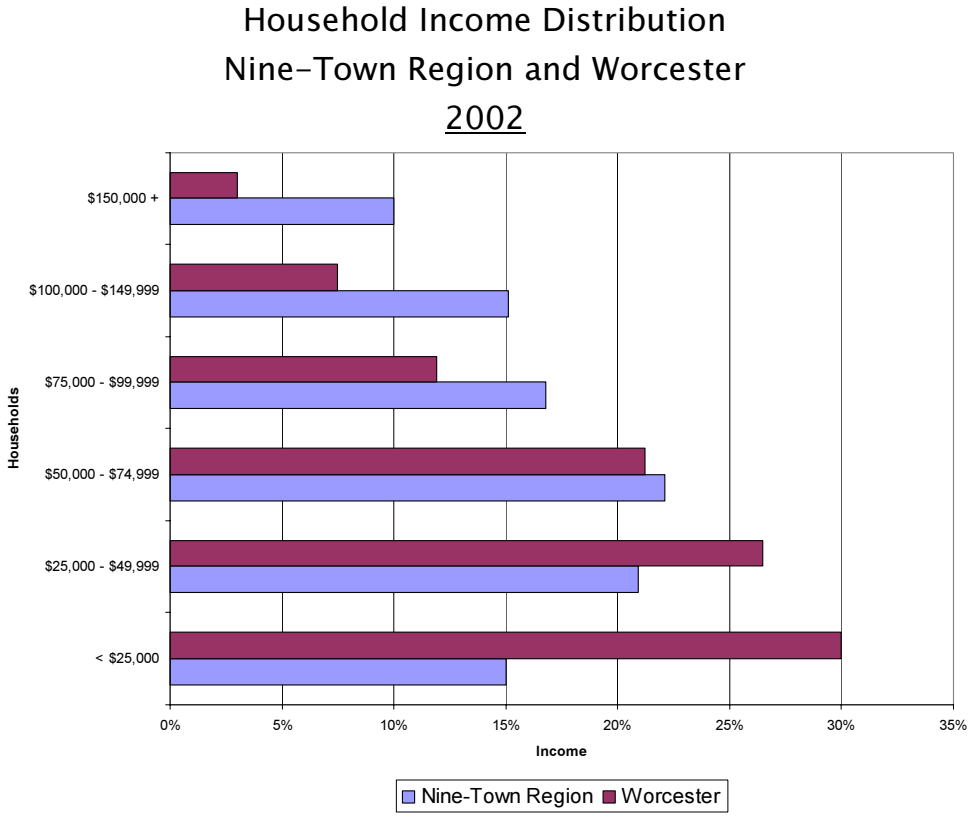
Access

As has been noted, the City has excellent access via road, air, and train. The City has its own airport and is within an hour and a half drive of Boston's Logan Airport. A strong transportation network allows the City to capitalize on regional growth. A strong transportation network is also critical to industry recruitment.

Commuter rail between Boston and Worcester was introduced in 1994. Commuter rail makes Worcester an integral part of the Boston economy. This is a major asset to the City. Transit offers an opportunity to attract young professionals who work in the Boston region to live in Worcester. Transit also can help attract businesses to Worcester who need to have access to Boston's economy, yet want an affordable location. Transit also offers a unique opportunity to develop mixed-use development projects that require less parking.

Diversity

As a City, Worcester experiences the advantages and disadvantages inherent in diversity. Worcester is diverse from a cultural, ethnic, racial, and economic perspective.



Source: Claritas, Inc.

Almost one-quarter (23 percent) of the City's households possess incomes over $75,000. Almost one-third (30 percent) of the households earn on average less than $25,000 per year. Worcester's average household income was $53,200 in 2002, 31 percent below the state average and well below the Nine-Town Region's average of $80,200.

Population Composition
City of Worcester
1990-2000

	1990		2000	
	#	%	#	%
White	147,827	87%	133,124	77%
Non-White	21,932	13%	39,524	23%
Total	169,759	100%	172,648	100%

Source: US Census; ZHA
econ frame/div

The City of Worcester is becoming more and more racially and ethnically diverse. Over the last decade, the percentage of the City's non-white population increased from 12.9 percent to 22.9 percent. During the 1990's the white population decreased by approximately 10 percent while the non-white population increased

by 80 percent. Between 1990 and 2000, the City's African-American population grew by 55 percent, Asians by 78 percent, and Latinos by 69 percent.

Change in Population and Minority Population
Worcester's Urban Submarkets and the City
1990 - 2000

	Population	Non-White	Hispanic
City	3,609	18,291	9,897
Submarket			
Downtown	-305	1,037	346
East Side	-185	969	1,370
Green Island	672	3,186	-69
Main South	359	1,571	1,181
Oak Hill	-223	3,269	1,579
Piedmont	-264	1,634	876
Sub-Total	54	11,666	5,283
% of City	1.5%	63.8%	53.4%

Source: RKG, "Housing Market Study: 2002"
econ frame/min

The Housing Market Study conducted for the City in September 2002 by RKG, Inc. provides data that exhibits that most of the growth in the minority population occurred in the urbanized areas of the City. Whereas the Downtown area of Worcester experienced a net loss in population between 1990 and 2000, the Hispanic and Non-White population grew by approximately 1,400 people.

Per Capita Income Trends
Nine Town Region and Worcester

Year	Nine-Town Region	Worcester
1989	$18,585	$13,330
2002	$30,974	$21,305
Growth Current $'s	67%	60%
Growth Constant $'s	15%	10%

Source: Claritas, Inc; ZHA
econ frame/per cap

Taking into consideration inflation, Worcester's per capita income increased by ten percent between 1989 and 2002. This compares to a real increase in per capita income of 15 percent in the Nine-Town Region between 1989 and 2002.

Worcester must capitalize on its diversity by offering a range of employment, housing and social opportunities to service the needs of its diverse community. The City has the opportunity to leverage its diversity as a unique market position. Diversity defines "urban" and there are multiple market segments that desire an "urban" lifestyle.

RESIDENTIAL MARKET ANALYSIS

Supply

Residential Unit Growth
Worcester and Nine-Town Region

	1990	2000	Change	% Change
Nine-Town Region	39,786	45,390	5,604	14.1%
Worcester	69,336	70,723	1,387	2.0%
Total	109,122	116,113	6,991	6.4%

Source: US Census; ZHA, Inc.
residential supply/residential

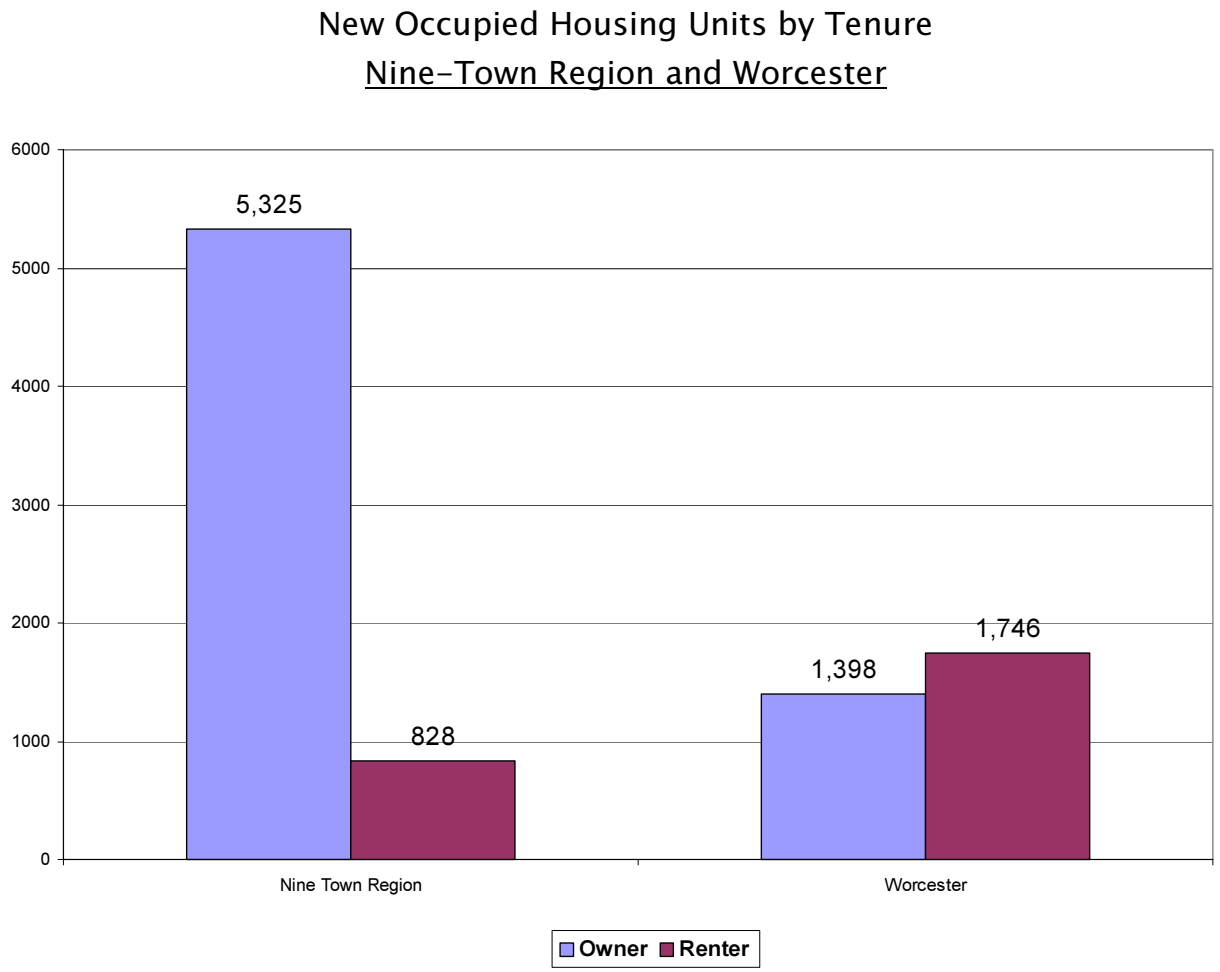
Between 1990 and 2002, Worcester and the Nine-Town Region surrounding it experienced a six-percent increase in residential units. Approximately 80 percent of this growth occurred in the Nine-Town Region, outside of the City. The City's supply of units increased by 2 percent, while the Region increased by 14 percent.

Occupied Residential Unit Growth
Worcester and Nine-Town Region

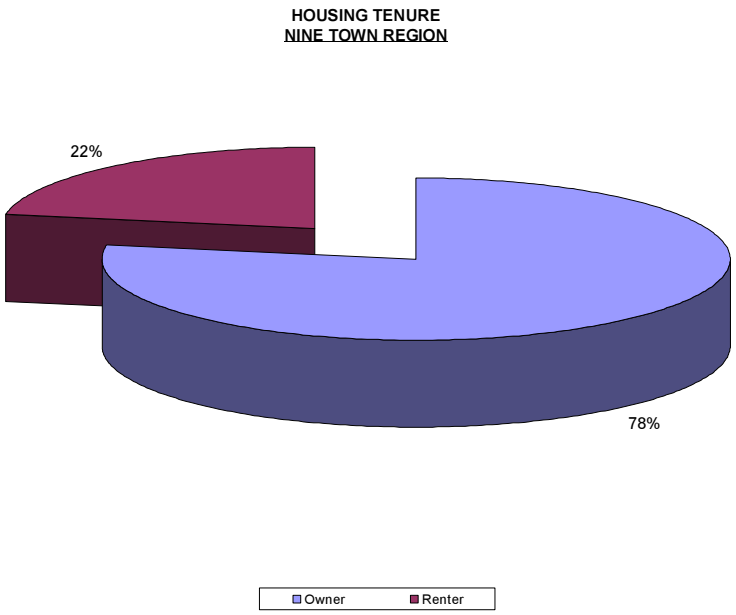
	1990	2000	Change	% Change
Nine-Town Region	29,061	34,386	5,325	18.3%
Worcester	63,884	67,028	3,144	4.9%
	92,945	101,414	8,469	9.1%

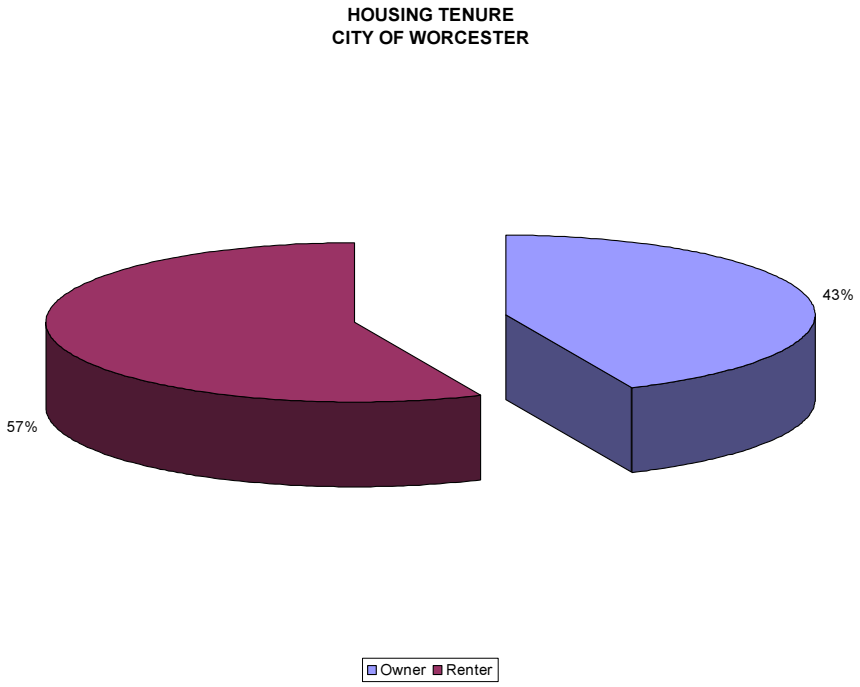
Source: US Census; ZHA, Inc.
residential supply/Occupied

The residential occupancy rate in Worcester and the Nine-Town Region increased during the 1990's. Worcester's residential units were 95-percent occupied in 2000 – which means the housing market is at capacity. The number of occupied residential units increased by approximately 3,100 units in the City during the 1990's. This represents about a 5-percent increase in occupied units. By contrast the Nine-Town Region's occupied housing unit supply increased by 5,325 units or 18 percent during the 1990's.



Wherein the City growth was essentially split between owner and renter-occupied residential units, growth in the Nine-Town Region occurred predominantly among owner-occupied units.





In 2000, 78 percent of the Nine-Town Region's occupied housing was owner-occupied. Approximately 43 percent of the City's housing was owner-occupied.

The City's housing stock is old. Almost half (47 percent) of the City's housing units were built prior to 1940. Only 6 percent of Worcester's units were built after 1989. This compares to 11.5 percent of the Nine-Town Region's housing stock being built during the 1990's.

In the RKG report entitled, "Housing Market Analysis, City of Worcester, MA: September, 2004", Worcester's urbanized area consists of the Downtown, East Side, Green Island, Main South, Oak Hill, and Piedmont neighborhoods. This same report defines Worcester's "Downtown" Area as census tracts 7316 and 7317.

According to this report:

> In 2000, the urbanized areas of the City contain 38 percent of the City's housing supply. The Downtown contains 4,054 housing units or 5.7 percent of the City's total units.

Housing Units
Worcester's Urban Submarkets and the City
1990 - 2000

	1990	2000	Change
City	69,336	70,723	1,387
Submarket			
Downtown	4,057	4,054	-3
East Side	5,025	5,018	-7
Green Island	2,154	2,050	-104
Main South	4,757	4,497	-260
Oak Hill	7,290	7,248	-42
Piedmont	4,223	3,909	-314
Sub-Total	27,506	26,776	-730
% of City	39.7%	37.9%	-52.6%

Source: RKG, "Housing Market Study: 2002"
econ frame/units

> The Downtown lost housing units between 1990 and 2000. In fact, the City's urbanized submarkets all lost residential units during the 1990's.

Age of Housing Stock
Worcester's Urban Submarkets and the City
1990 - 2000

	>1980	1960-80	1940-60	<1940
City	14.9%	18.6%	23.1%	43.3%
Submarket				
Downtown	8.0%	18.0%	7.2%	70.2%
East Side	17.3%	20.0%	11.1%	51.6%
Green Island	9.2%	7.0%	15.0%	68.8%
Main South	6.1%	13.2%	8.8%	71.9%
Oak Hill	11.0%	7.0%	14.4%	67.6%
Piedmont	10.8%	27.9%	7.4%	53.9%
Sub-Total	10.6%	15.2%	10.7%	63.5%

Source: RKG, "Housing Market Study: 2002"
econ frame/hsg chng

Over 70 percent of the Downtown's housing supply was built before 1940. Less than 10 percent, or approximately 320 housing units, have been built over the last 23 years.

Change in Households by Tenure and Age
Worcester
1990 - 2000

	Urban Submarkets	City
Owner (by Age)	-283	1,398
34 and Under	-77	-618
35 - 44	197	1,183
45 - 54	215	2,026
55 - 64	-197	-361
65 and Older	-421	-832
Renter (by Age)	488	3,144
34 and Under	-51	-178
35 - 44	1,022	1,957
45 - 54	950	1,901
55 - 64	-32	-31
65 and Older	-1,401	-1,903
Total	205	3,144

Source: RKG, "Housing Market Study: 2002"
econ frame/ten age

Between 1990 and 2000, the City's urban submarkets lost a lot of renters over the age of 65. These households were replaced by renters in the peak earning years of 35 to 54 years old.

Basically, the residential analysis indicates that the City has not benefited from the regional and national trends indicating a renewed interest in City life.

Selected Worcester Multifamily Projects

Project Name	No. of Units	Bedrms	Approx. Unit Size (S.F.)	Approx. Rent PSF	Occup. Rate	Opened
Arbor Point	330	1 2	733 to 844 1,025 to 1,161	$1.69 $1.55	30%	June 2004
The Royal Worcester	155	1 2	575 782	$1.48 $1.27	97%	Redev. early 1990's
Wexford Village	264	S 1 2	350 to 450 500 to 750 1,000 to 1,100	$2.17 $1.55 $1.13	91%	na
Plantation Towers	107	JR 1 1 2	700 755 1,035 to 1,095	$1.42 $1.45 $1.22	93%	late 1980's
Princeton Place	260	1 2	650 to 900 900	$1.37 $1.25	98%	early 1990's
Redwood Hills	180	1 2	740 940 to 1150	$1.15 $1.00	98%	1970's
Eastview Apartments	200	S 1 2	450 750 950	$1.33 $1.03 $0.97	99%	1970's

Source: Apartment.com;ZHA
resmultifamilyworcester

The table above highlights the character of existing apartment complexes in Worcester. The table on the following page summarizes competitive regional supply. Apartment complexes in Worcester experience high occupancy even though many of complexes are quite old. Rents generally range from $1.00 to $1.70 per square foot.

Arbor Point is a new apartment complex in Worcester. Arbor Point is targeting the more affluent market of young professionals. Arbor Point has 330 units and charges $1.55 to $1.70 per square foot for one- and two-bedroom apartments. These rents approximate rates in Shrewsbury.

Selected Regional Multifamily Projects

City	Project Name	No. of Units	Bedrooms	Approx. Unit Size (SF)	Approx. Rent PSF	Occupancy Rate	Opened
Westborough	Avalon West	120	1	776 to 1,037	$1.51	97%	1997
			2	1,282 to 1,561	$1.29		
			3	1,391 to 1,562	$1.38		
	Avalon @ Flander's Hill	280	1	755 to 1,283	$1.59	95%	2003
			2	1,123 to 1,566	$1.56		
			3	1,256 to 1,573	$1.64		
	Windsor Ridge @ Westborough	300	1	780	$1.67	90%	1974
			2	960	$1.64		
			3	1220	$1.64		
Shrewsbury	Avalon Arbor	302	1	650 to 812	$1.64	93%	1992
			2	950 to 1226	$1.37		
			3	1,326	$1.28		
	Shrewsbury Commons	384	S	440	$1.96	92%	1975 & 1989
			1	650 to 775	$1.57		
			2	830 to 905	$1.43		
			Exec	NA	NA		
	Ashford Crossing	180	1	600 to 800	$1.56	90%	1974
			2	950	$1.30		
Marlborough	Windsor Heights @ Marlborougl	348	1	500 to 785	$1.54	95%	1974
			2	600 to 970	$1.60		
			3	1120	$1.63		
	Avalon Orchards	156	1	827 to 1,229	$1.49	96%	2002
			1 w/loft	1023	$1.47		
			2	1,131 to 1,499	$1.44		
	Jefferson @ Wheeler	274	1	724 to 874	$1.55	81%	2003
			2	964 to 1,309	$1.45		
	Windsor Meadows @ Marlboroug	264	E	500 to 580	$1.76	92%	1974
			1	815	$1.41		
			2	920	$1.44		
	Arbor Court	108	E	400	$2.13	92%	1971
			1	575	$1.65		
			2	800 to 850	$1.40		
	Applebriar Apartments	164	1	818 to 900	$1.50	95%	1990
			2	1,096 to1,446	$1.34		
	Royal Crest	473	1	600 to 800	$1.60	95%	1973
			2	1,000 to 1,100	$1.27		
			Exec	1,000 to 1,100	$2.18		

Source: Apartment.com;ZHA
resmultifamilysupplyregional

Demand

Housing demand is determined by understanding "pent-up" demand in the existing market and projected housing demand given household growth. Only certain types of households demand urban living, thus, the character of the households demanding housing is also considered.

As is indicated in the lifestyle data (see the table on the following page), a share of the downtown residential demand will come from the empty nester and retiree households. In addition, there is significant potential demand from younger singles and couples. The range of household types requires that a mix of residential products be offered to cater to different tastes and lifestyles.

Approximately 30,000 households currently residing in Worcester County and 8,000 households in the City are within the lifestyle categories that may be inclined to live in an urban environment. Approximately, 51 percent of these household types are potential renters and 49 percent are potential owners. There is very little new housing supply to address the tastes and preferences of these household types.

Existing Urban Residential Demand
Worcester County and City

	2002		
	County	City	Total
Urban-Inclined Households	7,965	29,971	37,936
Move Rate	5%	5%	5%
Annual Turnover	398	1,499	1,897

Source: ZHA, Inc.
res/2002

Households By Lifestyle Characteristics
Worcester County and City
2002

Household Lifestyle Category	County	City
Elite Suburbs		
Blue Blood Estates	-	-
Winner's Circle	2,419	417
Executive Suites	1,521	-
Pools & Patios	3,576	1,193
Kids & Cul de Sacs	2,005	-
Urban Uptown		
Urban Gold Coast	-	-
Money & Brains	-	-
Young Literati	-	-
American Dreams	-	-
Bohemian Mix	-	-
2nd City Society		
Second City Elite	12,022	3,936
Upward Bound	7,777	1,574
Gray Power	1,731	408
Landed Gentry		
Country Squires	18,420	-
God's Country	32,326	-
Big Fish, Small Pond	15,132	-
Greenbelt Families	24,107	289
The Affluentials		
Young Influentials	2,637	348
New Empty Nests	13,919	7,544
Boomer & Babies	476	286
Suburban Sprawl	2,836	1,683
Blue-Chip Blues	4,046	2,199
Inner Suburbs		
Upstarts & Seniors	5,270	4,600
New Beginnings	428	428
Mobility Blues	333	333
Gray Collars	3,558	2,057
Urban Midscale		
Urban Achievers	-	-
Big City Blend	-	-
Old Yankee	-	-
Mid-City Mix	-	-
Latino America	-	-

Household Lifestyle Category	County	City
2nd City Center		
Middleburg Managers	10,118	3,785
Boomtown Singles	3,793	3,475
Starter Families	18,432	11,385
Sunset City Blues	11,957	4,295
Towns & Gowns	874	874
Exurban Blues		
New Homesteaders	6,841	-
Middle America	13,702	-
Red, White, & Blue	13,046	-
Military Quarters	3	-
Country Families		
Big Sky Families	9,412	
New Eco-Topia	1,390	-
River City USA	1,040	-
Shotguns & Pick-Ups	-	-
Urban Cores		
Single City Blues	-	
Hispanic Mix	-	-
Inner Cities	-	-
		-
2nd City Blues		5,519
Smalltown Downtown	8,364	4,310
Hometown Retired	5,594	6,410
Family Scramble	8,791	-
Southside City	-	
Working Towns		-
Golden Ponds	7,784	-
Rural Industria	5,463	-
Norma-Rae-ville	-	-
Mines & Mills	5,847	
Heartlanders		
Agri-Business	-	-
Grain Belt	-	-
Rustic Living	1,173	-
TOTAL	288,163	67,348
Percent Urban Housing-Inclined	18%	44%

Source: Claritas, Inc.; ZHA
res/urban

On average, approximately five percent of the residential market turns over per year. According to the RKG, Inc.'s Housing Market Study, in 2001 Worcester's residential turnover rate was higher at seven percent. For purposes of this analysis, the average turnover rate of five percent was applied, resulting in almost 2,000 urban-inclined households moving per year in Worcester County and the City.

Urban Residential Potential
Worcester and Nine-Town Region
2002-2010

	Worcester	Nine-Town Region	Total
Projected Net New Households	1,375	4,253	5,628

Source: ZHA, Inc.
res/PROJ

Household projections are from Claritas, Inc. These projections are based on trends and do not reflect a significant shift in the City's market position. Without significant market change, City growth between 2002 and 2010 is projected to total 1,375 new households. An additional 4,250 new households are projected for the Nine-Town Region. By 2010, new household growth will result in demand for over 5,600 dwelling units in the City and Nine-Town Region.

Downtown Residential Potential

New residential project(s) downtown can capture a portion of this demand for two reasons (1) downtown offers a unique environment suited to many of the households in the market, and (2) there is such a scarcity of new residential product in the Worcester's urbanized area. New residential supply must offer a mix of rental and for-sale products designed to accommodate the lifestyles of empty nesters, young professionals and, to a lesser extent, families.

Existing Urban Residential Demand
Worcester County and City

	2002		
	County	City	Total
Annual Turnover	398	1,499	
Capture Rate	2%	6%	
Units Demanded in 5 Years	40	450	489

Source: ZHA, Inc.
res/2002

At a capture rate of two percent within the County and six percent within the City, *existing* urban-inclined households could support approximately 490 housing units. These capture rates are conservative because the market has yet to be tested.

Downtown Residential Potential
Worcester and Nine-Town Region
2002-2010

	Worcester	Nine-Town Region	Total
Projected Net New Households	1,375	4,253	
Capture Rate	5%-10%	1% - 3%	
Potential Units	70-140	40-130	110-270

Source: ZHA, Inc.
res/PROJ

Assuming conservative capture rates, household growth in the region could support between 110 and 270 units downtown. Once again, these capture rates are conservative because there is no track record of new downtown residential.

Supportable Downtown Residential
2004-2010

	Number	Share
Rental	270-320	49%
Own	280-330	51%
Total Dwelling Units	550-650	

Source: ZHA
res/conc

ZHA concludes that there is a market for 550 to 650 housing units in the Downtown area. Approximately one-half of the residential demand is from renters and the other, owners.

To successfully market the Downtown area as a place to live, a variety of housing types should be offered to appeal to a variety of household types and lifestyles. ZHA suggests that the following product-types be considered:

- Mid-Rise Multi-Family: 50 to 70 dwelling units per acre; for-sale or rent; one parking space per unit; for-sale units, dedicated parking with secure access; for rental units, public or private parking.

- Lofts: 40 to 50 dwelling units per acre; high ceilings; varying levels of finish; flexible space.

- Townhouse/Rowhouse: 20 dwelling units per acre; attached single family; attractive to empty nesters, non-traditional families, young singles and couples, families.

Rental rates will range with the product and location. Given existing competition, rent ranges from $1.50 to $1.80 per square foot is reasonable. For-sale product prices will also depend on location. Interviews with brokers suggest that prices from $130 to $170 per square foot are supportable.

RETAIL MARKET ANALYSES

Introduction

ZHA evaluated different retail product types at different locations in the Downtown area. ZHA evaluated the market for a regional shopping center in the Downtown Core. As part of the regional shopping evaluation, ZHA evaluated the market for a movie theater Downtown.

ZHA evaluated the market for a neighborhood/community shopping center at the Wyman Gordon site on the corner of Madison (Route 122) and Washington Streets. The findings of these analyses are presented herein.

Regional Retail Center in the Downtown Core

Lifestyle Center

ZHA evaluated Downtown Worcester as a potential site for a "lifestyle" shopping center. The attributes of a lifestyle shopping center are as follows:

- They are in a "main street" configuration;
- They generally range in size from 150,000 to 500,000 square feet;
- They are comprised of upscale stores, dining and entertainment venues;
- They are attracted to markets that are growing quickly with high average incomes;
- They position themselves close to affluent markets to be more convenient (in terms of both location and ease of getting in and out) than a regional mall; and,
- They are perceived as very safe environments.

Lifestyle Center Comparison

TRADE AREA	Worcester (15-Minute Drive Time)		A	B	C	D	E	F
Population 1990	274,893		543,811	377,883	195,766	379,719	315,935	362,623
Population 2002	298,227	/1	768,035	562,828	246,441	437,199	423,508	487,602
Population Change	23,334		224,424	184,915	50,675	57,480	107,573	124,979
Population Growth Rate	8%		41%	49%	26%	15%	34%	35%
Number of Households 2002	115,791		295,913	232,666	92,116	162,480	171,524	190,940
Average Household Income	$62,643		$66,167	$57,154	$98,604	$101,156	$61,899	$72,288
No. of Households $75,000 +	33,562		94,132	52,216	38,219	63,849	36,978	57,079
% of Households $75,000+	29%		32%	22%	42%	39%	22%	30%
CORE AREA	**(10-Minute Drive Time)**							
Population 1990	204,488		217,809	166,946	81,934	138,225	106,200	142,223
Population 2002	214,827	/1	343,084	247,741	95,251	173,152	147,230	201,292
Population Change	10,339		125,275	80,975	13,317	34,927	41,030	59,069
Population Growth Rate	5%		58%	48%	16%	25%	39%	42%
Number of Households 2002	84,604		130,082	108,008	34,924	59,506	62,567	79,017
Average Household Income	$55,080		$69,318	$61,269	$106,302	$125,445	$57,584	$76,982
No. of Households $75,000 +	20,051		46,937	25,890	15,957	29,387	12,728	26,180
% of Households $75,000+	24%		36%	24%	46%	49%	20%	33%

/1 2003 projection for Worcester's trade areas.

Source: International Council of Shopping Centers; ZHA, Inc.
lifestyle retail/comp

In comparing Worcester's demographics to six other lifestyle centers it appears that Worcester may be able to support such a center. The major constraint to Worcester's ability to attract this type of investment may be the growth rate in the trade areas. Worcester's growth rate is far below the growth in trade areas surrounding comparable lifestyle centers.

Market Coverage of Typical Lifestyle Center Stores

STORE TYPE	Worcester	Auburn	Shrewsbury	Millbury	Marlborough	Sturbridge	Leominster	Natick
Apparel	*Numbers Represent Estimated Drive Time From Downtown Worcester*							
American Eagle		8						
Abercrombie					17			36
Ann Taylor					17			36
Gap	5				17	23		
Old Navy	5				17		24	
Chicos					17			36
Talbots					17			36
Pottery Barn								
J Jill					17			36
Children's Place		8						
Victoria's Secrets		8			17			
Pacific Sun		8						
Eddie Bauer					17			36
Banana Republic								36
Bath& Body								
Bath & Body Works	5	8			17	23	24	36
The Body Shop								36
Books&Music								
Borders			12		17			
Barnes & Noble	5	8		11			24	
Home Furnishings								
Bed Bath & Beyond								
Crate & Barrel								36
Pier 1		8	12				24	
Restoration Hardware								
Pottery Barn								
Williams Sonoma								36
Restaurants								
California Pizza								36
Macaroni Grill								
PF Changs								

ZHA evaluated the market presence of typical lifestyle center stores to assess how well the market is covered. Where stores are present in the Worcester marketplace they are housed in a regional mall, which is now considered a less competitive product for the high-end shopper.

In terms of store-types the opportunities exist at the high end of the apparel market (Talbots, Ann Taylor, Eddie Bauer, etc.), home furnishing and accessories and restaurants. If a critical mass of such stores can be assembled, a lifestyle center may be successful. Given the demographics of the City and growth rates, it will likely be difficult to attract the high-end tenant in the near term.

For purposes of near-term planning, ZHA concludes that the market may need to mature (i.e., grow faster at higher average incomes) before a lifestyle center can be supported. Worcester's growth rates do not compare well and income is at the low end of the scale.

Cinema

Movie Theater Supply

ZHA evaluated the movie theater market. The closest movie theater to Worcester Commons is the National Amusements Showcase Cinema on Broad Street, 3.6 miles away. National Amusements contains 18 screens, of which four theaters have state-of-the-art stadium seating and digital sound.

The next closest theater is Boyleston Cinema immediately north of National Amusements approximately seven miles from the site. Other competitive theaters are to the west of Westborough and Marlboro.

There are currently no state-of-the-art multiplex theaters within ten miles south of Worcester Commons. There is a new state-of-the-art 14-screen Cineplex about to open in Millbury. This theater complex will be within a ten-minute drive from downtown.

Movie Theater Potential

The demand for cinemas is typically tested on the market within a five-minute drive from the site. Currently, downtown Worcester is not within a five-minute drive to any of the cinema multiplexes.

Given the location of the competition, ZHA identified a five-minute drive trade area for a multiplex theater complex located at the site of Worcester Commons.

Movie Theater Trade Area
Downtown Worcester

	Movie Theater Trade Area	
	2003	2008
Population	101,028	103,208

Source: Claritas, Inc.; ZHA, Inc.
movie demographics/pop

The trade area contained 101,000 people with a median household income over $32,000 in 2003. By 2008 the trade area is projected to contain 103,200 people with a median income of $35,000. The population density in the trade area is a positive factor. The trade area's median income, however, is relatively low.

Cinema Conclusion

There is a market for additional cinemas in the Worcester area. The core of the Downtown is an attractive location for cinema development because of its excellent road access. The Downtown, however, because of the City's diversity, has a trade area with relatively low household income.

ZHA concludes that a state-of-the-art multiplex containing seven to ten screens is supportable from a market standpoint. Such a product would be approximately 45,000 to 55,000 square feet.

To attract an industry investor, however, it may be necessary to program the cinema in a later development phase to demonstrate the re-positioning of the Downtown as a destination for a mix of incomes, including higher-income households. Market rate and luxury residential unit absorption in the short-term will have a significant impact on average household income in the trade area.

Community Shopping Center

Retail potential in the Core of Downtown largely depends on the tenant mix assembled. Without the Worcester Common Mall, retail in the Downtown is largely oriented to servicing the daytime market of residents and workers (services, eating and drinking establishments) and the entertainment market at night (clubs). There are a select number of on-street retailers that draw residents to the downtown to shop.

Currently, the retail market is most robust between the Mall and Main Street from Franklin to Central. The retail stores in older buildings primarily service the captive employee market. Retail weakens on Main Street south of Franklin and north of Central.

Retail potential will increase with an infusion of Downtown residential development. Retail is necessary, however, to offer potential residents the ambiance and convenience of Downtown living. In the near-term, new retail must be strategically located and existing retail must be improved to create a viable and attractive mixed-use environment.

Market realities lead ZHA to conclude that in the initial phases of Downtown redevelopment, the objective should be to create a functional mixed-use center, not a regional shopping center. ZHA concludes that the regional shopping center approach may be problematic at the onset with so little income and recent growth in the Downtown. Instead, ZHA recommends a more modest retail program that is oriented to eating and drinking, convenience, and specialty shopping. Such an approach will support existing retail operations and allow incremental retail investment. There may be an opportunity to preserve those retailers in Worcester Commons that are currently successful. Buildings may be programmed to accommodate residential in the near-term yet allow retail to replace residential on the ground floor as demand warrants.

Phase I retail will initially rely on the daytime employee population, visitors to the Centrum and other destinations, and local residents. Retail needs to be clustered and within easy walking distance to offices and destinations. Retail store-types to target include cards, a drug store, a microbrewery, cafes, and a Border's bookstore. New retail totaling 100,000 to 150,000 square feet is a realistic program in the short-term. This square footage does not include a cinema nor does it include existing retail elsewhere in the downtown.

NEIGHBORHOOD/COMMUNITY SHOPPING CENTER AT WYMAN GORDON

Introduction

ZHA evaluated the demand for a neighborhood or community shopping center at the Wyman Gordon site in Downtown Worcester. The characteristics of these centers are as follows:

- These centers generally range from 80,000 to 150,000 square feet;
- These centers are most often anchored by a grocery store;
- These centers target local households; and,
- These centers require good visibility.

Because these centers are most often anchored by a grocery store, the analysis begins with an analysis of the market for a grocery store in Downtown Worcester. The analysis proceeds to evaluate the level and character of the competition convenient to the Downtown to determine the appropriate shopping center orientation.

Grocery Store Analysis

Grocery Store Supply

The map above illustrates the location of supermarkets currently serving the Downtown market. Shaw's supermarket at 368 Southbridge Street is the closest food store to the Downtown. Shaw's is within a two-minute drive to the Wyman Gordon site.

Other supermarkets are within a four- to five-minute drive to the Wyman Gordan site. To the west, supermarkets locate on Route 12. To the east supermarkets locate on the major east/west axes such as Routes 9 and 122.

Grocery Store Market Areas

Given the location of the competition, the primary market area for a grocery store sited at Wyman Gordon would be the households within a three-minute drive of the site. According to Claritas, Inc., there are 19,240 households within a three-minute drive of the Wyman Gordon site.

The secondary market area for a supermarket sited at Wyman Gordon would be households within a five-minute drive from the site. This trade area is currently being served by the supermarkets within two-and-one-half miles of the site.

Grocery Store Demand

Food Store Sales Potential
Wyman Gordon Site
Primary and Secondary Markets

	Primary 3-Minute Drive	Secondary 5-Minute Drive
Households	19,292	18,979
Population	49,214	51,814
Per Capita Income	$14,647	$18,866
Total Income	$720,837,458	$977,544,250
Food Spending Potential	$54,062,809	$73,315,819

Source: Claritas, Inc.; ZHA
3 minute drive time-grocery/pot

There are 19,292 households within a three-minute drive of the Wyman Gordon site. This trade area represents $54 million of food spending potential. There are an additional 19,000 households representing approximately $73 million in food spending within a three- to five-minute trip to the Wyman Gordon site.

Grocery Store Capture

The three-minute drive time trade area can support more than the one Shaw's supermarket. While surrounding supermarkets capture sales from this trade area, a new supermarket at Wyman Gordon will likely dilute sales to these more distant grocery stores. It is reasonable to assume that a new state-of-the-art supermarket at the Wyman Gordon site could capture one-third (33 percent) of the primary trade area's spending potential.

Food Store Sales Potential Wyman Gordon Site Primary and Secondary Markets			
	Primary 3-Minute Drive	Secondary 5-Minute Drive	Total
Food Spending Potential	$54,062,809	$73,315,819	
Capture Rate	33%	7%	
	$17,840,727	$5,132,107	$22,972,834
Supportable Square Feet			66,000

Source: Claritas, Inc.; ZHA
3 minute drive time-grocery/cap

The secondary market is more competitive. Between the three- and five-minute drive times a store at the Wyman Gordon site would face competition from stores on Route 12 and Stafford as well as stores near Sunderland. Given that the Wyman Gordon site is close to places of employment and is relatively easy to access, it is not unreasonable to assume that a new store could capture between five and ten percent of this trade area's potential sales. ZHA has assumed a seven-percent capture rate.

Grocery Store Market Support

ZHA concludes that a supermarket of 50,000 to 65,000 square feet is feasible at the Wyman Gordon site. The Wyman Gordon site has strong access via Madison/Route 122.

Shopping Center Analysis

Supply

Community shopping centers surrounding the Downtown are located approximately 2.5 miles away from each other.

Convenience Shopping Centers Worcester Market Area			
Name	**Center Type**	**Sq. Ft.**	**Anchors**
Lincoln Plaza	Power Center	600,000	Super Stop&Shop; Target; Bed Bath N Beyond; Dick's Sporting
Country Club Plaza	Community	175,000	Shaw's
Perkins Farm Marketplace	Community	212,000	Super Stop&Shop; Fashion Bug; Payless Shoes; Radio Shack; Toys
RK Worcester Fair	Community	182,000	Price Chopper; Pharmacy, Restaurants; Bank
Southwest Commons	Community	102,000	Big Y; Blockbuster;Chuck E Cheese;CVS
Stop & Shop Plaza	Community	212,000	Stop&Shop; Fashion Bug; Hallmark;Radio Shack; Payless Shoes

Source: National Research Bureau; ZHA
3 minute drive time-grocery/comm

Currently, within the downtown there are very few stores targeting daily household needs.

Demand and Capture

Community shopping centers primarily draw from households residing within a five-minute drive time. There are 38,270 such households within a five-minute drive to Wyman Gordon.

Community Shopping Center Potential and Capture Wyman Gordon Site	
	5-Minute Drive
Households	38,271
Population	101,028
Per Capita Income	$16,811
Total Income	$1,698,381,708
Non-Food Shopping Center Sales Potential	$411,008,373
Non-Food Retail Capture Rate	5%
Supportable Sales	$20,550,419
Supportable Square Feet	82,000

Source: Claritas, Inc.; ZHA
3 minute drive time-grocery/shop pot

Net of food spending, the primary market represents $411 million in non-food, shopping center-inclined retail spending potential. At a conservative capture rate of five percent, approximately 82,000 square feet of retail could be supported on the Wyman Gordon site in addition to the grocery store.

Conclusion

ZHA concludes that a neighborhood shopping center is a supportable use on the Wyman Gordon site. In light of an overall Downtown strategy, the shopping center at the Wyman Gordon site should be neighborhood-oriented. A tenant mix of a grocery store, hardware store, sit-down restaurant, a small pharmacy, and personal and business services is a target tenant mix. ZHA recommends a center of approximately 150,000 square feet.

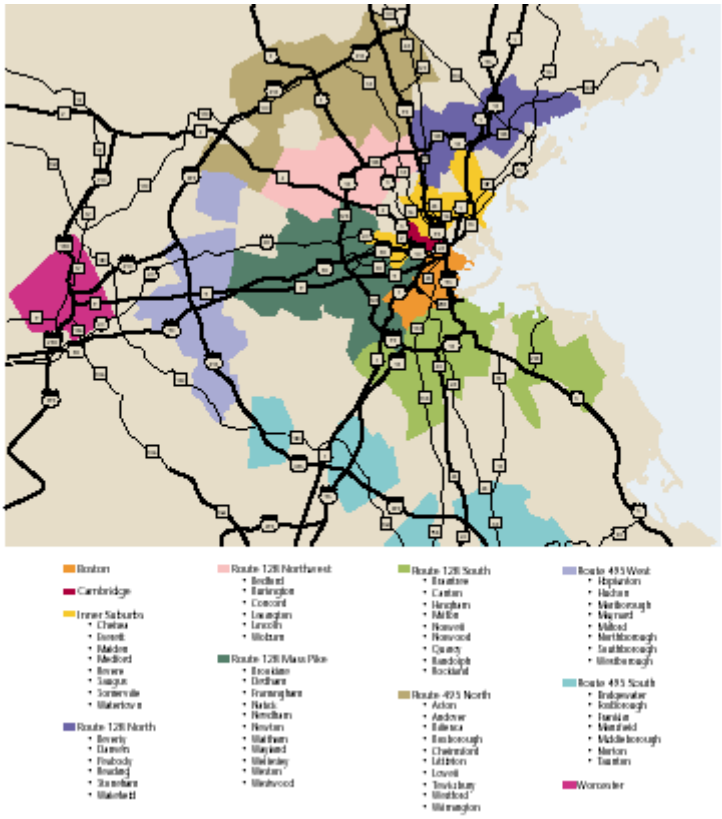
OFFICE MARKET ANALYSIS

Overview and Existing Conditions

Although Worcester is not included in the official definition of the Boston Primary Metropolitan Area, from an office standpoint Worcester is considered a Boston "submarket."

Boston Office Sub-Markets

2003



Source: Meredith & Grew

As illustrated on Meredith & Grew's office submarket map, Worcester represents Boston's western-most office submarket. Meredith & Grew's 2003 Office Market Report tracks approximately two million square feet of multi-tenant office space in Worcester.

Office Supply
Boston Submarkets
2003

Market	Inventory (SF)	Share of Total
Boston	55,365,757	29%
Cambridge	17,491,659	9%
Inner Suburbs	5,020,546	3%
Rt 128 North	7,552,257	4%
RT 128 Northwest	20,208,716	11%
RT 128 Mass Pike	24,635,365	13%
RT 128 South	12,737,589	7%
RT 495 North	24,675,135	13%
RT 495 South	4,485,730	2%
RT 495 West	17,069,039	9%
Worcester	2,041,767	1%
TOTALS	191,283,560	100%

Source: "Market Viewpoint, 4th Quarter 2003," Meredith & Grew
worcestertables1/supply

Worcester's office supply represents one percent of the Boston metro office market supply.

Office Vacancy Rates Boston Submarkets 2003			
Market	Inventory (SF)	Direct Vacancy Rate	Direct and SubLease Vacancy Rate
Boston	55,365,757	12.3%	15.5%
Cambridge	17,491,659	15.3%	24.1%
Inner Suburbs	5,020,546	20.2%	25.8%
Rt 128 North	7,552,257	19.0%	22.4%
RT 128 Northwest	20,208,716	17.0%	24.0%
RT 128 Mass Pike	24,635,365	16.1%	22.2%
RT 128 South	12,737,589	13.5%	16.7%
RT 495 North	24,675,135	16.1%	31.2%
RT 495 South	4,485,730	4.6%	8.1%
RT 495 West	17,069,039	21.0%	34.0%
Worcester	2,041,767	16.4%	17.8%
TOTALS	191,283,560	15.2%	22.2%

Source: "Market Viewpoint, 4th Quarter 2003," Meredith & Grew
worcestertables1/vacancy

According to Meredith & Grew, as of year-end 2003 approximately 17.8 percent of Worcester's multi-tenant office space was vacant. While high, Worcester's vacancy rate is below the average for the overall market and well below the Route 495 West submarket.

Asking Office Rent Boston Submarkets 1999 - 2003						
Boston Submarket	1999	2000	2001	2002	2003	% Chng '99-00
Back Bay & Financial District	$44.71	$50.99	$48.79	$41.61	$36.00	-19.5%
Other Boston	$26.67	$43.00	$36.48	$29.16	$26.15	-1.9%
Cambridge	$44.88	$54.41	$38.08	$30.96	$25.27	-43.7%
Inner Suburbs	$27.28	$31.52	$31.96	$23.75	$21.62	-20.7%
Route 128 North	$22.11	$26.69	$26.31	$20.62	$20.16	-8.8%
Route 128 Northwest	$25.74	$30.47	$30.22	$20.86	$19.15	-25.6%
Route 128 MassPike	$27.66	$34.14	$32.77	$25.98	$22.59	-18.3%
Route 128 South	$22.20	$26.08	$24.63	$24.26	$20.08	-9.5%
Rt 495 North	$17.04	$23.72	$18.57	$17.56	$15.12	-11.3%
Rt 495 South	$19.52	$19.48	$21.85	$21.38	$20.44	4.7%
Rt 495 West	$20.63	$26.72	$22.05	$23.90	$20.76	0.6%
Worcester	$17.50	$17.34	$18.96	$18.80	$18.28	4.5%

Source: "Market Viewpoint, 4th Quarter 2003," Meredith & Grew
worcestertables1/rent2

Worcester is an affordable office location. According to Meredith & Grew, at the end of 2003 Worcester's average rent per square foot was $18.28. This rent is significantly less than the 495 West Submarket ($20.76 per square foot). Worcester was one of the few submarkets to experience an increase in average rent from 1999 to 2003.

Worcester Office Supply

Worcester's office supply is located in the Central Business District and near the Hospital on Route 9. Of the two million square feet of office Meredith & Grew tracks, approximately 1.6 million square feet is in the CBD and 570,000 square feet outside the CBD.

Worcester Office Supply
Central Business District And Remainder Of City
2003

	CBD		Non-CBD		Total	
Class-A	2,256,536	44%	1,016,449	29%	3,272,985	38%
Class-B	1,321,678	26%	1,820,138	51%	3,141,816	36%
Class-C	1,553,508	30%	714,560	20%	2,268,068	26%
Total	5,131,722	100%	3,551,147	100%	8,682,869	100%

Source: Worcester Regional Research Bureau; Meredith & Grew; ZHA
office/supply

The Worcester Regional Research Bureau (the "Bureau") conducts an inventory of Worcester office space. The Bureau's inventory includes small buildings and owner-occupied buildings. In their publication entitled "Downtown Worcester Office Occupancy: 2003 Survey", total office space in Worcester totals 8.8 million square feet. Just over one-third of this space is considered Class-A. CBD office supply represents 58 percent of Worcester's total office supply. According to the Bureau's inventory, office outside of the CBD totals 3.7 million square feet.

Central Business District Office Supply Worcester 2003				
	Multi-Tenant		Total	
	Sq. Ft.	Vacancy	Sq. Ft.	Vacancy
Class-A	1,422,736	11.7%	2,256,536	8.9%
Class-B	1,067,178	8.7%	1,321,678	7.3%
Class-C	1,038,184	22.9%	1,553,508	15.3%
Total	3,528,098	14.1%	5,131,722	10.4%

Source: Worcester Regional Research Bureau; Meredith & Grew; ZHA
office/MULTI

By analyzing the inventory, ZHA estimates that 30 percent of the CBD office space is owner occupied. Among the multi-tenant office buildings, the vacancy rate averages 14 percent.

As of year-end 2003, CBD Class-A multi-tenant office space was 12 percent vacant and Class-B space 9 percent vacant.

Class-A rent among non-medical office buildings in the Central Business District ranges from $12.00 to $21.00 per square foot. On average, rents in the CBD are lower than they are outside of the City. This is because the office outside of the CBD is often medical/technical space, which is typically a more expensive product ($24.00 to $26.00 per square foot) than conventional office space.

Buildings With Vacancy By Size Of Vacancy Worcester Office Market 2003				
		Number of Buildings with Vacancy and Size of Vacancy		
Building Type	Buildings	1,000-10,000	10,001-25,000	25,001+
Class-A	18	7	5	2
Class-B	33	17	1	0
Class-C	30	10	6	1
Total				

Source: Worcester Regional Research Bureau; ZHA
worcestertables1/size vacant

According to the Worcester Regional Research Bureau's, "Benchmarking Economic Development in Worcester: 2003", of the 49 Downtown office buildings with space available, 34 buildings have less than 10,000 square feet available. There are no buildings with 25,000 contiguous square feet available. There is, therefore, no opportunity for a large organization to rent office space in Downtown Worcester currently.

The last multi-tenant office building developed in Downtown Worcester was 10 Chestnut Place in 1990. This building currently commands the highest (non-medical) office rent, $21.00 per square foot. More recently, medical office was developed as part of Worcester Medical Center and the Massachusetts College of Pharmacy.

Office Demand

Office demand is a function of employment growth and office supply substitution. Office-inclined employment is derived from certain industries. ZHA applies employment in finance, insurance and real estate; engineering and management services; and, certain industries in the service industry to project employment.

Estimated Versus Actual Office Supplt
Worcester
2002

Total Employment	98,571
Emp. Office-Inclined Industries	28,966
Avg. Office Space /Employee (Square Feet)	250
Estimated Office Demand (Square Feet)	7,241,558
Actual Occupied Office Space (Square Feet) /1	7,637,042
Estimated versus Actual	94.8%

/1 2003 data.

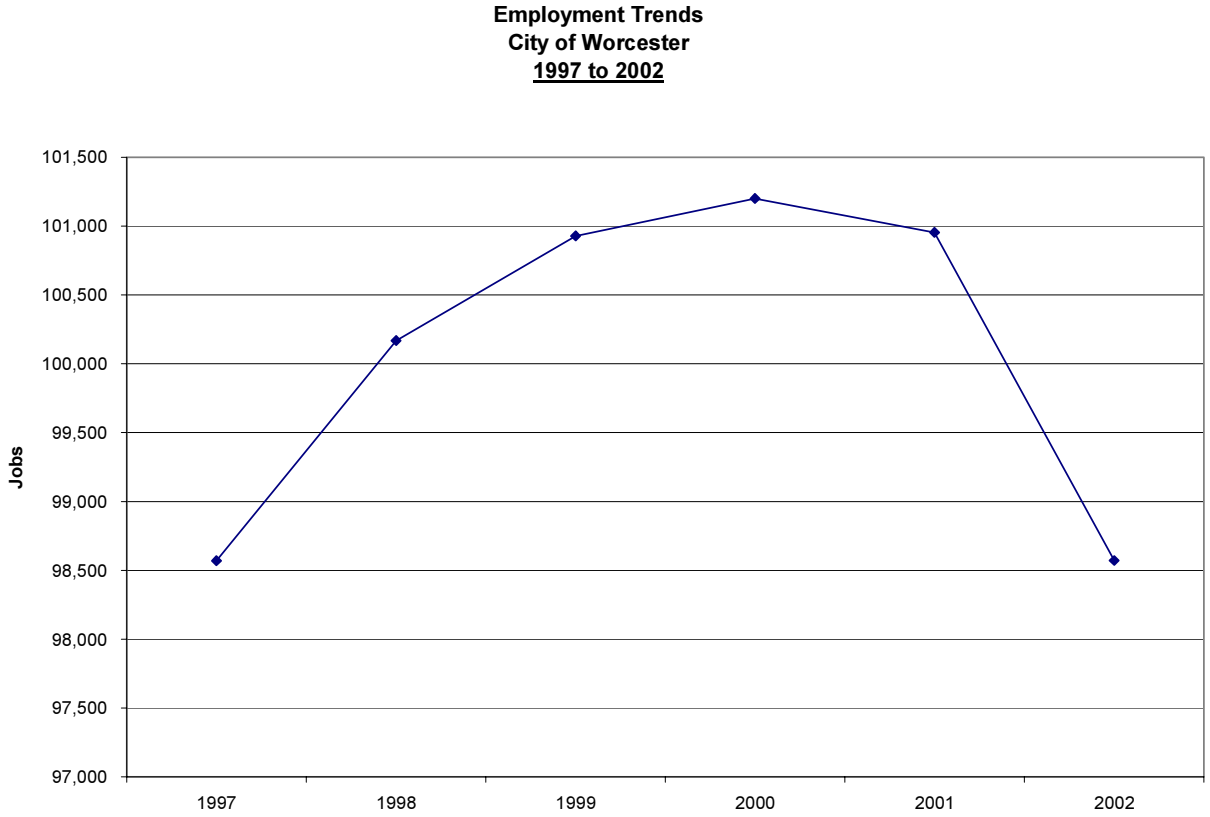
Source: Worcester Regional Research Bureau; Meredith & Grew; ZHA
office/est

As a test, ZHA calculated 2002 employment in office-inclined industries and compared the calculated office demand to actual occupied office in Worcester. The five percent difference in supply is likely a function of government offices leasing space and/or schools or colleges leasing space.

Employment Trends City of Worcester 1999-2002				
	1999	2002	Change %	 Avg Ann
Government	15,241	14,117	-7.4%	-2.5%
Construction	2,728	3,049	11.8%	3.8%
Manufacturing	12,901	9,115	-29.3%	-10.9%
Transportation, Communication, Public Utilities	2,715	2,953	8.8%	2.8%
Trade	17,789	16,258	-8.6%	-3.0%
Finance, Insurance and Real Estate	9,060	8,083	-10.8%	-3.7%
Services	40,494	44,996	11.1%	3.6%
Total Jobs	100,928	98,571	-2.3%	-0.8%

Source: Massachusetts Department of Employment and Training; ZHA
office/employment trends

Overall, Worcester lost jobs between 1997 and 2002. Most of the job losses occurred in 2001. Service jobs increased during this same time period.



Source: Massachusetts Department of Employment and Training; ZHA
Office/employment

Jobs in Worcester increased from 1997 to 2000 by 2,630. During the economic recession, these jobs gains were lost. As of 2002, there were 98,571 jobs in Worcester.

Employment Projections
Worcester
2000-2010

	2000	2010	Change	Change %	Change Avg. Ann.
Jobs	111,283	116,388	5,105	4.6%	0.4%

Source: Massachusetts Highway Department "RTP-2003-Projections"; ZHA
rtp2003proj/rtp

The Massachusetts Highway Department (MHD) was the source for Worcester's employment projections. As indicated in the table above, MHD projects that Worcester will gain 5,100 jobs by 2010. This projection was based on pre-2000 employment trends and is, therefore, likely high.

Revised Employment Projections 2002-2010				
	Actual 2002	Proj Growth	2010	New Jobs
Scenario 1	98,571	0.4%	102,172	3,601
Scenario 2	98,571	0.2%	100,357	1,786

Source: Massachusetts Highway Department "RTP-2003-Projections"; ZHA
rtp2003proj/proj

To estimate employment growth in Worcester in the light of the economic slowdown, ZHA applied two scenarios. One scenario applies to actual 2002 jobs the average annual growth rate projected by MHD. This scenario assumes a full recovery of the market. The second scenario applies to actual 2002 jobs half the average annual growth rate projected by MHD.

Supportable Office Space Worcester 2002-2010			
	New Jobs	Office Inclined Employees	2010 New Sq Ft
Scenario 1	3,601	1,058	264,600
Scenario 2	1,786	525	131,200

Source: Massachusetts Highway Department "RTP-2003-Projections"; ZHA
rtp2003proj/office space proj

Assuming the percent of office-inclined employment stays constant over time, office-inclined employment growth is projected to support between 131,200 and 264,600 square feet of office in Worcester between now and 2010.

Surplus Multi-Tenant Office Space Worcester 2003			
Central Business District	**Multi-Tenant Square Feet**	**Vacant SF**	**Vacancy %**
Class-A	1,422,736	166,314	11.7%
Class-B	1,067,178	93,334	8.7%
Sub-Total	2,489,914	259,648	10.4%
	Surplus Vacancy /1	*10,657*	
Outside CBD			
Class-A	772,949	162,022	21.0%
Class-B	1,820,138	291,525	16.0%
Sub-Total	2,593,087	453,547	17.5%
	Surplus Vacancy /1	*194,238*	
Grand Total	5,083,001	713,195	14.0%
	Surplus Vacancy /1	*204,895*	

/1 Surplus vacancy is vacant space above 10 percent of supply.

Source: Worcester Regional Research Bureau; Meredith & Grew; ZHA
office/surplus vacant

All of this growth could be absorbed into vacant space in the Worcester market. However, a significant share (64 percent) of the vacant Class-A and -B space is in non-CBD buildings.

For tenants interested in office space in the Central Business District there is relatively little vacant office space available. Multi-tenant CBD buildings are 10.4 percent vacant leaving only 10,700 square feet of surplus office space.

Conclusion

Office demand will depend on how the economy recovers between 2003 and 2010. ZHA's analysis indicates that assuming some recovery, there will be office demand. The most constrained office market is Downtown.

Supportable Multi-Tenant Office
Worcester's Central Business District
2003-2010

	Office Projection	
	Low	**High**
Demand (Sq. Ft.)	131,200	264,600
Surplus Vacancy (Sq. Ft.)	(10,657)	(10,657)
Net Demand (Sq. Ft.)	120,543	253,943
CBD Capture	50%	50%
Supportable Square Feet	60,000	127,000

Source: ZHA, Inc.
office/conc

Between now and 2010, Downtown Worcester can likely support 60,000 square feet to 127,000 of office space. Assuming an anchor tenant of 20,000 square feet there may be an opportunity to develop a multi-tenant building of approximately 60,000 square feet downtown. Rent for this space would be $24.00 to $28.00 per square foot (full-service) depending on the building-type (non-medical or medical).

The remaining office demand will likely manifest itself in build-to-suit office buildings. From a programming perspective, an additional office pad capable of accommodating an office building of at least 60,000 square feet should be identified and available for development on an as-needed basis.

CONCLUSIONS

Market Positioning

Given the results of the market analyses, ZHA recommends the following near-term market positions for the North Main Street Area, the Downtown Core Area, the South of Franklin Street Area, and the Canal District.

North Main Street

Market Position*:* The institutional area within existing multi-tenant buildings positioned to attract businesses seeking more affordable downtown office or ground level retail/entertainment space; vacant lots positioned to attract commercial or residential development.

Potential Program and Development Parameters:

- Multi-tenant office space;
- Multi-family rental and/or condominiums;

- Additional entertainment and restaurant uses;

- Infill development will likely depend on public parking supply for 80 percent of parking needs.

Downtown Core Area

Market Position: The mixed-use city center for the region positioned to attract urban households, local and regional businesses, and shoppers from the community.

Program:

- Multi-family and loft development both rental and condo; 50-70 dwelling units per acre (four- to six-story buildings), potentially above retail in places;
- Community Retail Center; 100,000 – 150,000 square feet new; emphasis on eating and drinking, convenience, and specialty stores;
- Multi-tenant office of 60,000 square feet;
- Build-to-suit office building pad to support at least 60,000 square feet.

South of Franklin Street

Market Position*:* An expansion area for both the Downtown Core and the Canal District investment. Well positioned to house headquarter office space in renovated warehouse space as well as residential and office lofts, art studio uses, and, artists housing or live/work units.

Development Parameters*:*

- From a market perspective, redevelopment of South Franklin will likely follow Downtown Core revitalization;

- As applicable, leverage historic tax credits to encourage the redevelopment of warehouse space;

- Consider artist housing to leverage low-income housing tax credits;

- Successful revitalization will require a mixed-use zone and City cooperation regarding building codes.

Canal District

Market Position: A unique urban neighborhood positioned to attract urban dwellers who desire a lower-density "neighborhood" environment with easy access to services, employment, and entertainment.

Program:

- New loft development and rowhouse development on vacant/under-utilized parcels;

- Neighborhood shopping center of 150,000 square feet.

Implementation Issues

Investment Opportunities

Market Strength: Unlike many older cities, Worcester has excellent market potential. As the market analyses demonstrate, the opportunities for residential, retail, and office development are strong. The City is in the middle of a thriving regional economy.

Institutional Presence: There are a significant number of powerful institutions in and around Worcester. These institutions include the Medical Center and numerous colleges. Institutions enhance a City's economic stability and have a vested interest in the City's success.

A Viable Downtown: Worcester's Downtown is vital and viable. The Downtown remains the premiere office location with an estimated 19,000 employees. Downtown continues to contain the community's cultural and entertainment anchors. Downtown is the hotel hub and it contains a very successful convention center and arena. Downtown Worcester remains the heart of the City.

A Downtown with Significant Infill Opportunities: There is a proposal to demolish a significant amount of the Worcester Commons Mall. This will result in land available for re-development in the Core Downtown. The Wyman Gordon site represents 14 acres of vacant remediated brownfield land in the Canal District. Few downtowns have large land areas available for infill. The City's future economic development largely depends on the success of the redevelopment of these parcels.

A Downtown Well-Positioned for Funding: Worcester is a classic example of a City that must transform from a manufacturing economy to a service economy. Worcester is strategically located within Boston's commuting shed and is transit-accessible. Worcester's population is increasingly diverse incorporating a broad range of income groups. Worcester is well positioned to become the proxy for the Smart Growth policies supported by the State.

Investment Barriers

Weak Marketing: Worcester's image must change from "an older City" to "an urban destination." A strong marketing message must be developed and "rolled out" in concert with the redevelopment of the Worcester Commons Mall. To maximize market and investment opportunities a "buzz" must be created about Downtown Worcester.

Private/Institutional Leadership: Many cities receive significant guidance and leadership from the businesses and institutions that depend on the City's success. There appears to be very little institutional involvement in the City's strategic planning. Business and institutions must engage in strategic planning to ensure that investments are warranted and beneficial to the whole economy. Institutional involvement typically results in a strategy endorsed by the public and private sector – this is important to investors.

Posture: To obtain private and public investment, Worcester must be construed as an excellent private investment location. Worcester's whole perspective must change from one of a struggling older City to one of a dynamic urban investment location. Worcester's investment prospectus must communicate the natural assets and potential upside of investment. Worcester must position itself as a place for "venture capital."

Lack of a Strategy Delineating Public Policy Priorities: In the Downtown Area, there is currently the Arts District, the Canal District, the Shrewsbury Street Corridor, and the Core of Downtown. Where should public investment be targeted in the near term? What is the role of each of these Districts? It is very important that the City articulate public policy commitments and priorities.

Joint Development Experience: Many of the development opportunities will require joint development. In joint development, the public and the private sectors become partners in the project. Experienced developers understand that the success of a joint development project hinges on the public sector's ability to perform. The more experienced the public sector's manager is in real estate and joint development the less risky the project is to the private investor. It may be necessary for Worcester to retain an experienced joint development professional to implement the various redevelopment projects.

Implementation Recommendations

In light of the opportunities and barriers, ZHA recommends the following initiatives be implemented to enhance the Downtown's investment potential:

A Comprehensive City Development Strategy – The Comprehensive Development Strategy to identify City objectives, priorities and target projects.

A Leadership Council – A leadership council with representatives from business and institutions to engage the City's private leadership in determining the future of the City.

A Marketing Campaign – A well-timed professional marketing campaign to transform the perception of Worcester.

A Real Estate Development Expert – The City needs a real estate development expert to navigate the planning, negotiation and implementation of the critical joint development projects.

Worcester frame 430 – NEW FORMAT

APPENDIX D. CONCEPTUAL COST ESTIMATES

Worcester Economic Development Action Agenda - Conceptual Civic Infrastructure Costs

	Quantity	Unit Cost	Construction Costs	Indirect Costs	Total Project Costs
				25%	
Civic Improvements					
a) Worcester Center Area Streets					
- Front Street Extension	1,150 lf	$1,528	$1,757,583	$439,396	$2,196,979
- Typical Side Street	1,500 lf	$1,378	$2,067,500	$516,875	$2,584,375
- Typical Alley	950 lf	$925	$878,354	$219,589	$1,097,943
- Worcester Center Blvd. Reconstruction	1,750 lf	$1,796	$3,142,708	$785,677	$3,928,385
Total Worcester Center Area Streets			**$7,846,146**	**$1,961,536**	**$9,807,682**
b) Other Priority Projects					
- Union Station Garage[8]			$9,000,000	N/A	$9,000,000
- Madison Street at Wyman Gordon	750 lf	$1,678	$1,258,750	$314,688	$1,573,438
- Main Street Sidewalk	3,500 lf	$541	$1,892,917	$473,229	$2,366,146
Total Other Priority Projects			**$12,151,667**	**$787,917**	**$12,939,583**
Total All Priority Projects			**$19,997,813**	**$2,749,453**	**$22,747,266**

Notes

1. Cost estimates are in 2004 dollars and do not account for future inflation.
2. Costs estimates are conceptual only and should be refined as the project is designed.
3. **Cost estimates are valid for a typical urban street section and do not take into account construction over underground structures.** These conditions may add significant cost premiums and should be studied on a site-specific basis to more accurately estimated costs.
4. Cost estimates do not include traffic signalization or utility relocations.
5. Cost estimates are for construction costs. Indirect or soft costs are in addition.
6. Contractor's overhead and profit are built into the above unit costs.
7. Contingency addresses both design and construction.
8. Cost for Union Station Garage includes indirect costs.

Front Street Extension

Typical Length: 1,000 lf typical 80 ft ROW
Total Length: 1,150 lf from Worcester Common to Washington Square

	Quantity		Unit Cost	Cost	Total Cost	Comments
Site Preparation					-	
Demolition and Removal	-	sf	$0	-		Included in mall demolition
Site Paving					$583,000	
Asphalt	37,000	sf	$7	$259,000		Two 10.5' travel lanes, two 8' parking lanes
Curb	2,000	lf	$30	$60,000		Granite, 2 rows
Sidewalk	44,000	sf	$6	$264,000		22' concrete, 5" depth, both sides
Site Furnishings					$100,000	
Benches & Trash Receptacles	33	ea	$3,000	$100,000		2 steel benches, 1 receptacle 60' o.c., both sides incl. attachment
Site Landscaping					$120,000	
Street Trees	67	ea	$1,000	66,667		30' o.c., two rows
Tree Grates	67	ea	$800	53,333		1 per tree
Site Utilities					$419,667	
Street Lights	33	ea	$5,000	$166,667		60' o.c., both sides, incl. foundation/service
Site Drainage with Piping	2,000	lf	$60	$120,000		Both sides incl. catch basins, manholes 300' o.c., pipe
Sanitary Sewer	1,000	lf	$60	$60,000		Incl. manholes, pipe, both sides; gravity system
Water	1,000	lf	$70	$70,000		8"-12" pipe
Hydrants	2	ea	$1,000	$2,000		500' o.c., alternate sides
Irrigation	1,000	sf	$1	$1,000		
Subtotal					$1,222,667	
Contigency			25%		$305,667	
Total Cost					**$1,528,333**	
Cost/lf:					**$1,528**	

Notes

1. Cost estimates are in 2004 dollars and do not account for future inflation.
2. Costs estimates are conceptual only and should be refined as the project is designed.
3. **Cost estimates are valid for a typical urban street section and do not take into account construction over underground structures.** These conditions may add significant cost premiums and should be studied on a site-specific basis to more accurately estimate costs.
4. Cost estimates do not include traffic signalization or utility relocations.
5. Cost estimates specify construction costs. Indirect or soft costs are in addition and typically include design, legal fees, administration and permits.
6. Contractor's overhead and profit are built into the above unit costs.
7. Contingency addresses both design and construction.
8. Cost for Union Station Garage includes indirect costs.
9. Estimated costs for other parking structures range from $15,000 - $18,000 per space, including soft costs and depending on location

Typical Side Street

Typical Length: 1,000 lf typical 60 ft ROW
Total Length: 1,500 lf including Foster to Front, Front to Franklin, Notre Dame to Worcester Center Bvld.

	Quantity		Unit Cost	Cost	Total Cost	Comments
Site Preparation					-	
Demolition and Removal	-	sf	$0			Included in mall demolition
Site Paving					$463,000	
Asphalt	37,000	sf	$7	$259,000		Two 10.5' travel lanes, two 8' parking lanes
Curb	2,000	lf	$30	$60,000		Granite, 2 rows
Sidewalk	24,000	sf	$6	$144,000		12' concrete, 5" depth, both sides
Site Furnishings					$100,000	
Benches & Trash Receptacles	33	ea	$3,000	$100,000		2 steel benches, 1 receptacle 60' o.c., both sides incl. attachment
Site Landscaping					$120,000	
Street Trees	67	ea	$1,000	$66,667		30' o.c., both sides
Tree Grates	67	ea	$800	$53,333		1 per tree
Site Utilities					$419,667	
Street Lights	33	ea	$5,000	$166,667		60' o.c., both sides, incl. foundation/service
Site Drainage with Piping	2,000	lf	$60	$120,000		Both sides incl. catch basins, manholes 300' o.c., pipe
Sanitary Sewer	1,000	lf	$60	$60,000		Incl. manholes, pipe, both sides; gravity system
Water	1,000	lf	$70	$70,000		8"-12" pipe
Hydrants	2	ea	$1,000	$2,000		500' o.c., alternate sides
Irrigation	1,000	sf	$1	$1,000		
Subtotal					$1,102,667	
Contigency			25%		$275,667	
Total Cost					**$1,378,333**	
Cost/lf:					**$1,378**	

Notes

1. Cost estimates are in 2004 dollars and do not account for future inflation.
2. Costs estimates are conceptual only and should be refined as the project is designed.
3. **Cost estimates are valid for a typical urban street section and do not take into account construction over underground structures.** These conditions may add significant cost premiums and should be studied on a site-specific basis to more accurately estimate costs.
4. Cost estimates do not include traffic signalization or utility relocations.
5. Cost estimates specify construction costs. Indirect or soft costs are in addition and typically include design, legal fees, administration and permits.
6. Contractor's overhead and profit are built into the above unit costs.
7. Contingency addresses both design and construction.
8. Cost for Union Station Garage includes indirect costs.
9. Estimated costs for other parking structures range from $15,000 - $18,000 per space, including soft costs and depending on location

Typical Alley (Mechanic Street Extension from Commerical to Front)

Typical Length: 1,000 lf typical 40 ft ROW
Total Length: 950 lf Mechanic Street extension from Commercial Street to Front Street

	Quantity		Unit Cost	Cost	Total Cost	Comments
Site Preparation					-	
Demolition and Removal	-	sf	$0			Included in mall demolition
Site Paving					$321,000	
Asphalt	21,000	sf	$7	$147,000		Two 10.5' travel lanes
Curb	2,000	lf	$30	$60,000		Granite, 2 rows
Sidewalk	19,000	sf	$6	$114,000		9.5' concrete, 5" depth, both sides
Site Furnishings					-	
Benches & Trash Receptacles	-	ea	$3,000	-		N/A
Site Landscaping					-	
Street Trees	-	ea	$1,000	-		
Tree Grates	-	ea	$800	-		
Site Utilities					$418,667	
Street Lights	33	ea	$5,000	$166,667		60' o.c., both sides, incl. foundation/service
Site Drainage with Piping	2,000	lf	$60	$120,000		Both sides incl. catch basins, manholes 300' o.c., pipe
Sanitary Sewer	1,000	lf	$60	$60,000		Incl. manholes, pipe, both sides; gravity system
Water	1,000	lf	$70	$70,000		8"-12" pipe
Hydrants	2	ea	$1,000	$2,000		500' o.c., alternate sides
Irrigation	-	sf	$1	-		
Subtotal					$739,667	
Contigency			25%		$184,917	
Total Cost					**$924,583**	
Cost/lf:					**$925**	

Notes

1. Cost estimates are in 2004 dollars and do not account for future inflation.
2. Costs estimates are conceptual only and should be refined as the project is designed.
3. **Cost estimates are valid for a typical urban street section and do not take into account construction over underground structures.** These conditions may add significant cost premiums and should be studied on a site-specific basis to more accurately estimate costs.
4. Cost estimates do not include traffic signalization or utility relocations.
5. Cost estimates specify construction costs. Indirect or soft costs are in addition and typically include design, legal fees, administration and permits.
6. Contractor's overhead and profit are built into the above unit costs.
7. Contingency addresses both design and construction.
8. Cost for Union Station Garage includes indirect costs.
9. Estimated costs for other parking structures range from $15,000 - $18,000 per space, including soft costs and depending on location

Worcester Center Blvd. Reconstruction

Typical Length: 1,000 lf typical 80 ft ROW
Total Length: 1,750 lf from Foster Street to Franklin Street

	Quantity		Unit Cost	Cost	Total Cost	Comments
Site Preparation					$200,000	
Demolition and Removal	100,000	sf	$2	$200,000		Demolition of existing pavement @ 100' width
Site Paving					$598,000	
Asphalt	58,000	sf	$7	$406,000		Four 10.5' travel lanes, two 8' parking lanes
Curb	2,000	lf	$30	$60,000		Granite, 2 rows
Sidewalk	22,000	sf	$6	$132,000		Concrete, 11' wide, 5" depth, both sides
Site Furnishings					$100,000	
Benches & Trash Receptacles	33	ea	$3,000	$100,000		2 steel benches, 1 receptacle 60' o.c., both sides incl. attachment
Site Landscaping					$120,000	
Street Trees	67	ea	$1,000	$66,667		30' o.c., both sides
Tree Grates	67	ea	$800	$53,333		1 per tree
Site Utilities					$418,667	
Street Lights	33	ea	$5,000	$166,667		60' o.c., both sides, incl. foundation/service
Site Drainage with Piping	2,000	lf	$60	$120,000		Both sides incl. catch basins, manholes 300' o.c., pipe
Sanitary Sewer	1,000	lf	$60	$60,000		Incl. manholes, pipe, both sides; gravity system
Water	1,000	lf	$70	$70,000		8"-12" pipe
Hydrants	2	ea	$1,000	$2,000		500' o.c., alternate sides
Irrigation		sf	$1	-		
Subtotal					$1,436,667	
Contigency			25%		$359,167	
Total Cost					**$1,795,833**	
Cost/lf:					**$1,796**	

Notes

1. Cost estimates are in 2004 dollars and do not account for future inflation.
2. Costs estimates are conceptual only and should be refined as the project is designed.
3. **Cost estimates are valid for a typical urban street section and do not take into account construction over underground structures.** These conditions may add significant cost premiums and should be studied on a site-specific basis to more accurately estimate costs.
4. Cost estimates do not include traffic signalization or utility relocations.
5. Cost estimates specify construction costs. Indirect or soft costs are in addition and typically include design, legal fees, administration and permits.
6. Contractor's overhead and profit are built into the above unit costs.
7. Contingency addresses both design and construction.
8. Cost for Union Station Garage includes indirect costs.
9. Estimated costs for other parking structures range from $15,000 - $18,000 per space, including soft costs and depending on location

Madison Street

Typical Length:	1,000	lf typical 80 ft ROW
Total Length:	750	lf

	Quantity		Unit Cost	Cost	Total Cost	Comments
Site Preparation					$120,000	
Demolition and Removal	60,000	sf	$2	$120,000		Demolition of existing pavement @ 60' width
Site Paving					$583,000	
Asphalt	37,000	sf	$7	$259,000		Two 10.5' travel lanes, two 8' parking lanes
Curb	2,000	lf	$30	$60,000		Granite, 2 rows
Sidewalk	44,000	sf	$6	$264,000		22' concrete, 5" depth, both sides
Site Furnishings					$100,000	
Benches & Trash Receptacles	33	ea	$3,000	$100,000		2 steel benches, 1 receptacle 60' o.c., both sides incl. attachment
Site Landscaping					$120,000	
Street Trees	67	ea	$1,000	$66,667		30' o.c., two rows
Tree Grates	67	ea	$800	$53,333		1 per tree
Site Utilities					$419,667	
Street Lights	33	ea	$5,000	$166,667		60' o.c., both sides, incl. foundation/service
Site Drainage with Piping	2,000	lf	$60	$120,000		Both sides incl. catch basins, manholes 300' o.c., pipe
Sanitary Sewer	1,000	lf	$60	$60,000		Incl. manholes, pipe, both sides; gravity system
Water	1,000	lf	$70	$70,000		8"-12" pipe
Hydrants	2	ea	$1,000	$2,000		500' o.c., alternate sides
Irrigation	1,000	sf	$1	1,000		
Subtotal					$1,342,667	
Contigency			25%		$335,667	
Total Cost					**$1,678,333**	
Cost/lf:					**$1,678**	

Notes

1. Cost estimates are in 2004 dollars and do not account for future inflation.
2. Costs estimates are conceptual only and should be refined as the project is designed.
3. **Cost estimates are valid for a typical urban street section and do not take into account construction over underground structures.** These conditions may add significant cost premiums and should be studied on a site-specific basis to more accurately estimate costs.
4. Cost estimates do not include traffic signalization or utility relocations.
5. Cost estimates specify construction costs. Indirect or soft costs are in addition and typically include design, legal fees, administration and permits.
6. Contractor's overhead and profit are built into the above unit costs.
7. Contingency addresses both design and construction.
8. Cost for Union Station Garage includes indirect costs.
9. Estimated costs for other parking structures range from $15,000 - $18,000 per space, including soft costs and depending on location

Main Street Sidewalk

Typical Length: 1,000 lf typical 10 ft sidewalk width
Total Length: 3,500 lf Federal Square to Lincoln Square, one side

	Quantity		Unit Cost	Cost	Total Cost	Comments
Site Preparation					$20,000	
Demolition and Removal	10,000	sf	$2	20,000		Demolition of existing sidewalk @ 10' width
Site Paving					$135,000	
Asphalt		sf	$7	-		N/A
Curb	1,000	lf	$30	$30,000		Granite, 1 row
Sidewalk	10,000	sf	$11	$105,000		10' wide (5' concrete @ 5" depth and 5' brick); cost is average
Site Furnishings					$50,000	
Benches & Trash Receptacles	17	ea	$3,000	$50,000		2 steel benches, 1 receptacle 60' o.c., side incl. attachment
Site Landscaping					$60,000	
Street Trees	33	ea	$1,000	$33,333		30' o.c., one row
Tree Grates	33	ea	$800	$26,667		1 per tree
Site Utilities					$167,667	
Street Lights	33	ea	$5,000	$166,667		60' o.c., one side, incl. foundation/service
Site Drainage with Piping	-	lf	$60	-		N/A
Sanitary Sewer	-	lf	$60	-		N/A
Water	-	lf	$70	-		N/A
Hydrants	-	ea	$1,000	-		N/A
Irrigation	1,000	sf	$1	$1,000		
Subtotal					$432,667	
Contigency			25%		$108,167	
Total Cost					**$540,833**	
Cost/lf:					**$541**	

Notes

1. Cost estimates are in 2004 dollars and do not account for future inflation.
2. Costs estimates are conceptual only and should be refined as the project is designed.
3. **Cost estimates are valid for a typical urban street section and do not take into account construction over underground structures.** These conditions may add significant cost premiums and should be studied on a site-specific basis to more accurately estimate costs.
4. Cost estimates do not include traffic signalization or utility relocations.
5. Cost estimates specify construction costs. Indirect or soft costs are in addition and typically include design, legal fees, administration and permits.
6. Contractor's overhead and profit are built into the above unit costs.
7. Contingency addresses both design and construction.
8. Cost for Union Station Garage includes indirect costs.
9. Estimated costs for other parking structures range from $15,000 - $18,000 per space, including soft costs and depending on location

APPENDIX E. IMPLEMENTATION STRATEGIES

The City can pursue a number of different strategies to achieve its goals including:

1. Parking Strategy
2. Zoning Ordinance Amendments
3. Rehabilitation Building Code
4. Design Guidelines
5. Financial Incentives
6. National Trust for Historic Preservation Main Street Program
7. Residential Market Program
8. Commercial Marketing
9. Technical Assistance

These actions may be led by different city agencies, based on capacity and the task at hand. Many can be tackled simultaneously since they involve separate entities and funding sources.

1. Parking Strategy

Parking regulations must be designed to support, not penalize, mixed-use development. The parking regulations should be designed to minimize the provision of on-site parking and maximize the opportunities for shared use parking. The current parking regulations in the Downtown do not recognize the principles of shared parking.

To achieve the infill development proposed in the Action Agenda, particularly in the core of the Downtown, public parking must be developed. Public parking is appropriate when a range of land uses benefit from the parking, not simply one user. The market is currently not strong enough to support the private financing of structured parking. Therefore, to achieve the Action Agenda's goals the public sector must participate in the financing and development of structured parking to support new and existing development in the Downtown.

In developing a parking strategy, the City must examine:

- How parking will be financed
- What entity will own, manage and enforce the parking
- Where the proceeds from parking use and enforcement will go
- How the private sector will contribute to parking construction and operations.

Other cities have established parking enterprise districts, in-lieu fee programs, and parking authorities. The appropriate parking strategy depends on the market, resources available, the parking demand, and City policy objectives.

2. Zoning

Worcester's Planning Board is currently undertaking a comprehensive update of the City's zoning ordinance, which is expected to be complete within the next few months. City staff advise that the update has focused principally on code

enforcement and language clarity, and does not contain specific provisions dealing with downtown development, land uses or urban design.

Existing Zoning

The downtown area is currently zoned principally Business BG-6, which permits a wide variety of business uses, as well as residential uses except single family dwellings. The maximum FAR within the Business BG-6 district is 6. The Canal District is zoned business BG-4 and manufacturing MG-2. The manufacturing zoning permits mainly light industrial uses and most businesses uses. Some business uses, such as personal service shops, require a special permit. Residential uses are not permitted under the MG-2 zoning.

Mixed-Use Development Overlay

The City has also adopted a Mixed-Use Development Overlay district, which applies to the most of the study area, parts of the Canal District and the Greenway Triangle. The Zoning Ordinance states that the purpose of this overlay is to encourage mixed development of residential, business, institutional and open/recreational space uses by:

- Creating major new mixed-use areas in planned locations at appropriate densities, heights and mixture of uses
- Encouraging the preservation and rehabilitation of structures of historic or architectural merit in the overlay zones
- Encouraging flexibility in architectural design and building bulk
- Making recreation areas accessible to residents and visitors
- Creating environments conducive to a higher quality of life and environment for residents, businesses, employees and institutions.

Essentially, the overlay district allows mixed-use development and increases in density of up to twenty percent, provided certain standards are met. Mixed-use developments in the overlay zone require a special permit from the Planning Board.

City staff advise that the Mixed-Use Development Overlay Zone has not been very successful because developers perceive it to be too restrictive and offering little incentive to encourage redevelopment. However, while the zoning as currently structured may not have been successful, the intent to encourage mixed-use development is compatible with the vision and objectives of the Action Agenda and could be a potentially valuable tool for redevelopment. As the overlay has already been adopted, it may be easier for the City to amend the provisions of the zone that have discouraged development, rather than creating an entirely new zone for the downtown area. Specific provisions that could be considered are:

- Allowing residential use throughout the overlay district (residential uses are only allowed where permitted in the underlying zoning), and possibly increasing the permitted proportion of residential uses within a mixed-use development from the current 50% maximum.

- Eliminating the requirement to provide a recreation or open space area equivalent to 5% of the gross floor area that is accessible to the public.

The City should also consider extending the boundaries of the Mixed-Use Overlay Zone, which currently covers most of the Action Agenda study area, to include the Wyman Gordon site, Kelley Square and the Greenway Triangle areas.

Adaptive Reuse Overlay

The Zoning Ordinance also contains an Adaptive Reuse Overlay zoning, the purpose of which is defined as:

- Provide for the coordinated and mixed development of residential, business, industrial, manufacturing and institutional uses
- Encourage adaptive reuse of abandoned, vacant or underutilized business or manufacturing buildings or structures
- Create major new mixed used areas in planned locations at appropriate densities, heights and mixtures of use
- Encourage flexibility in architectural design, restoration and building bulk.

The Adaptive Reuse Overlay allows multi-family residential in addition to the uses permitted in the underlying zoning. Modifications to other use, parking or dimensional controls are authorized by special permit from the Planning Board.

Like the Mixed-Use Overlay, the intent of the Adaptive Reuse Overlay is consistent with the vision and objectives of the Action Agenda and could be a useful tool in implementing the Agenda. While the parking standards may be too high for the downtown context (one and a half spaces per residential unit and one space per 500 square feet for professional offices), the Planning Board does have the authority to provide relief from these provisions by special permit.

The Adaptive Reuse Overlay has only been applied to a small area adjacent to the Arts District. The City should consider the potential application of this Overlay to the broader downtown area, in particular the Canal District where it could encourage the reuse of historic warehouse and industrial buildings.

Current Proposed Zoning Amendment

The City is currently considering changes to the existing zoning code. To ensure that the objectives of the Agenda are achieved, the City should assess all elements of the proposed changes. In particular, parking requirements should be reviewed within the context of the broader downtown parking strategy. This approach should address concerns regarding the availability of parking, while supporting new development and reuse initiatives. It is not recommended that the City adopt the more restrictive parking provisions at this time, given their potential to discourage desired development activity.

The existing Zoning Ordinance requires two parking spaces per residential unit. The zoning amendment currently under consideration would make several changes to the parking provisions of the zone:

- Reduce the parking requirement to one space per residential unit in BG zones.
- *Increase* the minimum required parking in the Adaptive Reuse Overlay zone to one space per unit.
- Require that parking be held in common ownership within 1000 feet of the building.

A lower parking standard for the BG zone is appropriate for a downtown context where alternative means of transportation are available to the private automobile. Reducing the parking requirement within the BG zone is an appropriate strategy that could help to encourage residential development and reuse downtown. However, the proposal to increase the minimum parking requirement in the Adaptive Reuse Overlay zone will impose an additional requirement that that will reduce the effectiveness of this tool in encouraging new investment. Further, the common ownership requirement will encourage demolition and ground floor parking that will destroy the historic fabric and lively street edges.

The Action Agenda contains a general urban design framework and urban design guidelines for downtown. It is recommended that the City review the development standards contained in the Zoning Ordinance relative to the urban design framework and guidelines and consider appropriate amendments to the Ordinance to ensure appropriate, high-quality and compatible development downtown.

3. Rehabilitation Building Code

The strict application of building code requirements to historic structures can be an impediment to rehabilitation as the costs to bring structures up to current standards can be prohibitive. To encourage the rehabilitation and adaptive reuse of historic buildings, many municipalities have adopted special code provisions that allow flexibility in applying code requirements.

In 1979, Massachusetts added "Chapter 34" to the State Building Code in 1979 to encourage building rehabilitation. It accomplishes several things:

- It sets forth performance standards for existing buildings.
- Creates specific "compliance alternatives" or ways for historic buildings to compensate for code deficiencies through other means.
- Allows local historic district laws to take precedence over state building code, insofar as exterior building features are concerned, when the two regulations conflict.
- Generally exempts historic buildings from complete code compliance so long as existing hazards are corrected and the building remains as safe after rehabilitation as before.

Other building code options for dealing with existing buildings include the International Existing Building Code, which was created by the International

Code Council, an organization formed by the ICBO, SBCC, and BOCA, and "Smart Codes," a new form of building code that recognizes that while older buildings must be safe and accessible, just as new buildings are, they can be evaluated and regulated differently.

It is recommended that the City review the use and application of its building code for historic structures with a view to facilitating the restoration and rehabilitation of these important assets. The Massachusetts state building code contains specific provisions for this purpose, which the City could apply. The City should also investigate innovative approaches and practices in other Massachusetts cities and their potential application in Worcester. In addition, the City should train its building inspectors about these code options and to consider alternative approaches for meeting code objectives in historic buildings. The National Trust for Historic Preservation is an excellent resource on this issue, and can provide technical assistance on options available to the City (see below).

4. Design Guidelines

The Action Agenda creates a vision for downtown Worcester and a framework for public and private investment, including guidelines at the broad urban design level. To ensure that the vision is achieved, it is recommended that the City adopt design guidelines to establish the physical parameters under which both public and private projects will be implemented, together with a set of rules and recommendations for action. In this way, both developers and reviewing public bodies will have a consistent set of rules to use in the formulation and consideration of individual projects. In the end, the actions of the public sector and multiple developers should complement each other to create a cohesive downtown environment.

Design guidelines for private development are also required to ensure that the designs of specific projects support the overall vision for downtown, complement adjacent development, and fit within the surrounding context. Design guidelines for private projects should address such development criteria as:

- Building character and response to adjacent landmarks and historic and context buildings
- Building placement, build-to lines and street walls,
- Building height, scale proportion and massing
- Site improvements
- Parking and parking structure design
- Service access.

Design guidelines can address architectural features and elements such as walls, roofs, doors and windows.

5. Financial Incentives

Urban development is often more expensive and complex than "greenfield" development. Up-front barriers such as land and demolition costs as well as the

provision of adequate parking at a reasonable cost can make urban re-development financially infeasible. Financial incentives are often offered by the public sector to enhance the feasibility of urban development.

The most valuable incentive in real estate development is up-front capital. Free capital reduces the operating performance requirements of the project, thereby enhancing feasibility. Up-front capital reduces the amount of equity and debt the private developer must obtain. Up-front capital often bridges the gap between a feasible and un-feasible project. Tax credits and public financing are examples of capital incentives.

Property tax reductions, low-interest loans, and betterment districts support urban revitalization, but are not as valuable as up-front capital. These incentives reduce operating costs and, as such, enhance the operating performance of a project. These incentives do not, however, remove the up-front development barriers that are the greatest constraint to urban development.

A variety of financial incentives are available to the City through state and federal programs. The incentives listed below are particularly relevant to implementing the target projects identified in this Action Agenda. They are described in terms of how they are applied and the criteria necessary their use.

New Market Tax Credits

The New Market Tax Credit is a federal initiative designed to stimulate new private investment in commercial enterprises in low-income urban and rural areas. Signed into law as part of the Community Renewal Tax Relief Act of 2000 this landmark legislation includes $15 billion in tax credits to investors. By making an investment in an eligible "community development entity", individual and corporate investors can receive a New Market Tax Credit worth 39 percent of the amount invested over the life of the investment.

A tax credit is a dollar-for-dollar reduction in an investor's federal tax liability. Any taxable investor (an individual, a company, or an investment fund) that makes an equity investment in a qualified community development entity is eligible for the tax credit.

A for-profit domestic corporation or partnership providing loans, equity investments or financial counseling to low-income communities or low-income persons is eligible for Community Development Entity (CDE) certification. The entity must apply to the Community Development Financial Institutions (CDFI) Fund at the United States Department of Treasury. The CDFI Fund certifies CDE's. As of 2003, there were 27 certified Community Development Entities in Massachusetts.

Investments need to be in "qualified active low-income community businesses." The definition of these businesses is broad, ranging from commercial real estate projects, retail uses, daycare centers, and business incubators. A number of the projects proposed in Worcester's Action Agenda would qualify for the tax credit.

A low-income area is defined as a census tract(s) where households have median incomes at or below 80 percent of the area or statewide average OR have a poverty rate of 20 percent. The census tracts within the Downtown Study Area satisfy the median income requirement.

The Governor has expressed his interest in better capitalizing on the federal tax credits. The developer of a project in Worcester could apply for tax credits from a Massachusetts-based certified Community Development Entity to support the revitalization of Downtown Worcester.

Federal Historic Tax Credit

The United States Government offers a 20 percent tax credit on the preservation of certified historic structures. For federal tax purposes an investor can reduce income on a dollar-for-dollar basis up to the tax credit amount. Developers sell tax credits and apply the proceeds to finance the development. Essentially, tax credits translate into project equity.

A certified historic structure is defined as a building that is listed in the National Register of Historic Places, either individually or as a contributing building in a National Register historic district, or as a contributing building within a local historic district that has been certified by the Department of the Interior. Buildings in historic districts must be "certified" or approved by the National Park Service as contributing to the district as part of the Historic Preservation Certification Application. Only certified historic structures qualify for the credits. The "structure" must be a building—not a bridge, ship, or a railroad car, for example.

The National Park Service must approve, or "certify" all rehabilitation projects seeking the 20 percent tax credit. A certified rehabilitation is a rehabilitation of a certified historic structure that is approved by the National Park Service as being consistent with the historic character of the property and, where applicable, the district in which it is located.

State Historic Tax Credit

On November 26, 2003, Governor Romney signed into law a state historic preservation tax credit. The 20% tax credit is targeted to income producing property that is at least 50 years old and certified historic by the Massachusetts Historical Commission. This five-year program will make $10 million available on an annual basis.

The state historic tax credit allows an investor to receive 20 percent of the cost of renovation in state tax credits. These credits represent a dollar-for-dollar decrease in the investor's income for state tax purposes.

The state historic tax credit will greatly enhance the feasibility of renovating and/or adaptively re-using the older buildings in the downtown area. Programs like this in other states have stimulated significant re-investment in older buildings.

State Investment Tax Credit

To stimulate business growth and foster job creation, the state has created the Economic Development Incentive Program for business development in specific Economic Target Areas. Worcester is an Economic Target Area and the downtown has been designated an Economic Opportunity Area. A Certified Project under this program is a business that is expanding, re-locating, or building new facilities within an Economic Opportunity Area.

One initiative within the Economic Development Incentive Program is the Investment Tax Credit. Massachusetts has a five percent investment tax credit for Certified Projects in an Economic Opportunity Area. This tax credit can offset an investor's income for state tax purposes.

State Abandoned Building Tax Deduction

Another initiative within the state Economic Development Incentive Program is the Abandoned Building Tax Deduction. There is also a 10-percent abandoned building tax deduction for costs associated with the renovation of an abandoned building in an Economic Opportunity Area. There are few abandoned buildings within the downtown area; however, some abandoned buildings exist in the Canal District.

A tax reduction is not as valuable as a tax credit. For one, tax reductions cannot be sold to a third-party, therefore, capital cannot be raised using this instrument. A tax reduction represents a smaller tax savings to the investor than a tax credit.

Special Tax Assessment

Under the Special Tax Assessment program, a business that is a Certified Project within an Economic Opportunity Area can have property taxes phased in over time. For example, in Year 1, the tax can be 0 percent of the assessed (existing and new) value. In Year 2, up to 25 percent of the Project's value, in Year 3, up to 50 percent, Year 4, up to 75 percent and Year 5, 100 percent taxed. Tax abatements may occur between a five and twenty year period.

Tax abatements reduce the operating costs of a project. This helps increase a project's return-on-investment. However, these incentives do not remove the up-front barriers to development that often make projects infeasible.

The local municipality foregoes the tax receipt benefits of a new project in order to attract the project investment. Often the spin-off effects of a project warrants tax-breaks.

Tax Increment Financing

Massachusetts' version of Tax Increment Financing allows municipalities to provide flexible targeted incentives to stimulate job-creating development. Tax Increment Financing Zones do not need to be Economic Opportunity Areas. To use Tax Increment Financing (TIF) the municipality must prepare a plan

describing proposed public and private improvements in the TIF Zone. The plan must be agreed to by all of the property owners in the TIF Zone. The City and the prospective Certified Project candidate agree to a property tax exemption based on a percentage of the value added through new construction/improvements.

The real estate taxes generated by the new increase in assessed value is then allocated (by the agreed-upon percentage of value added) to one or more of the following categories:

- Exemption from real estate taxes;
- Payment of real estate taxes;
- Payment of betterment fee in lieu of real estate taxes to finance related infrastructure.

TIF passes tax savings onto property owners for use in project development. Development and financing risk are borne by the property owners as well.

District Increment Financing

District Improvement Financing (DIF) legislation has recently been enacted in Massachusetts. District Improvement Financing allows local governments to issue bonds to fund certain planning efforts and infrastructure improvements and then repay the bonds using increases in property tax receipts. Essentially, to support revitalization a City borrows against a projected increase in tax receipts.

DIF is a powerful tool in economic development because it translates into up-front capital to support development/revitalization. Up-front capital is far more valuable to investors than tax breaks over time. DIF bonds can be used to fund financial gaps that make certain projects infeasible without public sector intervention.

Under DIF a municipality must identify a target area for development. The designated district may be a single parcel or a larger geographic area. The area cannot be so large as to account for a quarter or more of the municipality's tax base. The designated district must be certified by the state economic assistance coordinating council. The municipality creates a development plan for the district.

In a DIF, the municipality has the power to take land, clear land, develop and improve public facilities and infrastructure, and sell land for development. The municipality may pay for these initiatives with revenue bonds supported by the incremental increase in tax receipts. Eligible costs include those associated with the list above as well as the costs associated with the preparation of plan.

The revenue bonds must be repaid within 30 years. The municipality bears the risk of DIF bond default. Bonds issued under DIF count against a municipality's cap under Massachusetts Proposition 2 $^{1/2}$.

Grants

Grants are another source of up-front capital to support revitalization efforts. There are numerous grants available from the federal and state government. In the field of urban revitalization grants typically fall into the following categories:

- ***Economic Development***: Economic development projects seek to generate business development and/or job growth in economically challenged areas. The Economic Development Administration is the primary source of federal grants associated with such projects.

- ***Transportation and Multi-Modal Transit***: Grants have been available from the Federal and State government to support transportation safety, development and multi-modal transit. TEA-21 is a federal program that is up for renewal in May, 2004. The TEA-21 program is a source of grants relating to transit and multi-modal development. At the state level, there are public infrastructure grants.

- ***Brownfields (Industrial Land Redevelopment):*** The United States Environmental Protection Agency offers numerous grants related to support brownfields clean-up and re-development.

Massachusetts Preservation Projects Fund

The Massachusetts Preservation Projects Fund provides funding for the restoration, rehabilitation, stabilization, and documentation of historic and archaeological properties owned by municipalities or nonprofit organizations. In years when the funds are authorized, matching grants of up to 50 percent are available to qualifying properties listed on the State Register to ensure their physical preservation. A unique feature of this program is the option applicants have to apply for up to 75 percent of a total project cost if they are willing to commit an additional 25 percent toward an endowment fund for long-range preservation and maintenance of the property. Eligible projects include the acquisition of endangered properties, the restoration of historic buildings, research projects such as historic structures reports, archaeological data recovery projects, and studies regarding innovative preservation techniques.

The City should investigate the availability of grants under the Preservation Projects Fund for municipal or non-profit projects in downtown Worcester, such as the Municipal Auditorium and the Vocational School.

6. Residential Marketing Program

A barrier to residential development is Worcester's perceived image in the Boston Metropolitan Area. To generate market interest and momentum, Worcester must advertise a new image to overcome perceptions. The redevelopment of the Worcester Commons Mall should be the trigger for a significant marketing effort by the City. The redevelopment will demonstrate significant investment in and "buzz" about the City.

The marketing effort should target the young professional market (singles, couples and families) as well as the empty nester market. The City's location, affordability, diversity, employment opportunities and educational and cultural assets must be touted as well as its neighborhoods.

It is recommended that the City work with the Chamber of Commerce to develop a fresh "image" of Worcester. The City should also work with the Centrum, the private developer responsible for the redevelopment of the Worcester Commons Mall, and major institutions to develop the image. The marketing should take advantage of the current private sector interest in the Mall redevelopment and other parcels downtown.

7. Commercial Marketing

The residential marketing program will benefit industry recruitment efforts to the extent that it will communicate quality of life and the City's renaissance. In addition, the City must retain existing businesses and recruit new businesses to not only generate employment opportunities but enhance commercial tax receipts and office development potential.

From an economic development standpoint the City must know existing businesses and their needs, while also targeting new industries. A benefits and incentives package must be prepared specifically to these target industries. Strategically located sites should be identified and marketed to targeted industries. The City must development an economic development strategy that is proactive. The strategy must be designed to support existing targeted business as well as target business recruitment.

8. National Trust for Historic Preservation Main Street Program

Worcester should consider the creation of a Main Street program under the framework established by the National Trust for Historic Preservation. The Trust's National Main Street Center developed the Main Street Four-Point Approach, a comprehensive methodology for revitalization of traditional commercial districts. The approach, which is tailored to meet local needs and opportunities, focuses the work of local staff and volunteers in four key areas:

- *Organization*: Building consensus and cooperation among public and private groups and individuals, and identifying sources of funding for revitalization activities
- *Design*: Enhancing the district's physical appearance through building rehabilitation, compatible new construction, public improvements, and design management systems
- *Promotion*: Marketing the commercial district through events and advertising to attract customers, potential investors, new businesses, residents, and visitors
- *Economic Restructuring*: Strengthening the district's economic base and creating new opportunities through careful analysis and appropriate mixed-use development

The Main Street program is designed to improve all aspects of the downtown and can involve tasks such as economic management, strengthening public participation, recruiting new businesses, rehabilitating buildings, and expanding parking. The program builds on downtown's inherent assets -- rich architecture, personal service, and most of all, a sense of place. Community leaders (both public and private sector) discuss goals, establish an organization, raise money to hire a Main Street manager, and create committees and a board of directors to carry out the work. Once established, the program's participants examine the area's needs and opportunities and develop a long-term, incremental strategy based on the Main Street Four Point Approach to strengthen commercial activity and improve buildings. Because it is a locally driven program, all initiative stems from local issues and concerns.

The Main Street program focuses on centralized marketing and management for areas with multiple property owners. It has potential for high-impact improvements at minimal cost and its economic restructuring element is intended to produce better understanding of market dynamics. It is a program that offers the potential to focus public and private financial incentives on opportunity sites. A central feature of the program is a full-time professional downtown manager, who operates at the public-private interface and is capable of dealing with issues of design and planning, finance and management.

Financial support for the program comes from the local entities who have a stake in the downtown: city government, merchants, businesses, and the public. The success of the Main Street program over the years lies in the fact that it is a local initiative, both organizationally and financially. People care more about the success and become involved in something they personally have to pay for or donate their time to.

9. Technical Assistance

It is recommended that the City develop a database of land use information to assist potential developers in understanding the development opportunities in downtown Worcester. The database should contain up-to-date property information such as site statistics, zoning and permitted uses on a parcel-by-parcel basis. Responsibility for maintaining the database should lie with one City department, such as Economic Development or Neighborhood Services, or with a downtown development entity. A single staff person or unit should be assigned to provide assistance and additional information about individual properties, City regulatory requirements and the approval process, as well as incentives, grants and loans available to encourage investment in Worcester. Development of the database should be coordinated with the City's marketing initiatives.

pjp\g:\34625.00\projmgmt\report docs\final report\appendix e - implementation.doc

GREATER WORCESTER AREA

Comprehensive Economic Development Strategy

2004 ANNUAL REPORT

Submitted by

The Greater Worcester Area Comprehensive Economic Development Strategy Committee

Prepared by

WORCESTER REGIONAL Chamber of Commerce

City Manager's Executive Office of Economic Development

Central Massachusetts cmrpc Regional Planning Commission

TABLE OF CONTENTS

Introduction ……2

The CEDS Committee 3

Vision Statement 7

CEDS District Map 8

Past Year's Activities/Area Overview 9
- Major Development Initiatives 19
- Significant Development Highlights.....33
- Educational Facilities and Other Institutions 36
- Job Loss……39
- Tax Increment Financing Agreements.....42
- Grants and Awards.....43
- Workforce Training Fund and Express Grants 44
- MassDevelopment Assistance 46
- WBDC SBA 504 Program Activity.....47

Changes in the Area's Economy.....48

Priority Goals, Objectives, and Strategies 56

Projects to Attain Goals: 2004 CEDS Project List 65

Changes in the Project List from 2003 69

Evaluation Process.....70

2004 CEDS Membership List.....84

2004 CEDS Chair and Staff.....87

ATTACHMENTS

CEDS Project Information Form 90

Meeting Agendas…… 92

THE GREATER WORCESTER AREA

COMPREHENSIVE ECONOMIC DEVELOPMENT STRATEGY COMMITTEE

ANNUAL REPORT 2004

The following 2004 Annual Report for the Greater Worcester Area Comprehensive Economic Development Strategy (CEDS) Committee summarizes the activities of the Committee and provides an update of the area's economic development activities and prioritized projects. The 2004 Annual Report covers the period between July 1, 2003 and June 30, 2004.

For those individuals who may be reading the Annual Report for the first time, the following summary explains the CEDS process and CEDS Committee.

A Comprehensive Economic Development Strategy (CEDS) is a plan that emerges from a broad-based continuous planning process addressing the economic opportunities and constraints of a region. The guidelines for developing a CEDS include effective general planning practices that can be used by any community to design and implement a plan to guide its economic growth. An acceptable CEDS is a prerequisite to be eligible to receive funds under most EDA programs, including Public Works Program grants, the Economic Adjustment Program, and 203 Planning grants. The Greater Worcester Area CEDS Committee generally meets four to five times annually to discuss ongoing economic planning and development projects in the region, to update the prior year's CEDS Project List and prepare a current project list, and to evaluate the CEDS process and goals.

Subsequent to these meetings, the support staff prepares the Annual Report for submission to the Economic Development Administration. This year once again, the support staff to the CEDS Committee includes Julie Jacobson, Interim President and CEO at the Worcester Regional Chamber of Commerce, Paul Morano, Business Assistance Administrator from the City of Worcester's Executive Office of Economic Development, and Bill Scanlan, AICP from the Central Massachusetts Regional Planning Commission (CMRPC). By unanimous Committee vote, Stephen R. Willand, Ph.D., Director of the City of Worcester's Executive Office of Employment and Training, was again elected Chair of the 2004 CEDS Committee.

The CEDS process establishes a forum to insure that regional activities are evaluated against and consistent with regional goals and objectives. This FY '04 Annual Report on CEDS activities is being submitted to EDA in order to document the strength, process and involvement of member communities in the central Massachusetts CEDS region.

THE CEDS COMMITTEE

The Comprehensive Economic Development Strategy (CEDS) Committee consists of representatives from the public and private sectors from the Worcester Region – defined for purposes of the CEDS as the City of Worcester and the 39 surrounding communities that make up the CMRPC's service area (see page 8 for a complete listing of all communities in the Greater Worcester Area CEDS). The CEDS is a regional planning vehicle under the guidelines of the U.S. Department of Commerce's Economic Development Administration (EDA). The CEDS process replaced the former Overall Economic Development Program, or OEDP, in 1999 when EDA was re-authorized under new legislation.

During the past few years, no funding had been available to coordinate the CEDS program activities. Therefore, the Worcester Regional Chamber of Commerce offered to host and jointly staff the FY'01, FY'02, and FY'03 CEDS Committee. This year's '04 CEDS Committee was again hosted by the Worcester Regional Chamber of Commerce and jointly staffed by three agencies – the City of Worcester, the CMRPC, and the Worcester Regional Chamber of Commerce. This year's CEDS Committee activities are funded through an EDA 203 Urban Planning Assistance grant received by the City of Worcester.

This marks the fourth year that the CEDS Committee has been staffed and administered through a public-private partnership. The Chamber's commitment to ensure the ongoing and timely meetings of the CEDS Committee is in response to EDA's recommendation that all CEDS committees include more private sector representation. The Chamber's participation complements its mission to provide a coordinated approach to economic development, which will foster business growth and expansion while facilitating the attraction of new companies to the Worcester region.

The Worcester Regional Chamber of Commerce is a regional, private, not-for-profit organization consisting of approximately 4,000 members from more than 110 communities in Massachusetts, making it the largest chamber in New England. The Worcester Regional Chamber of Commerce has four affiliates – the Auburn Chamber, the Blackstone Valley Chamber, the Holden Chamber, and the Webster-Dudley-Oxford Chamber of Commerce – each of which is an invited member of the CEDS Committee. The Worcester Regional Chamber of Commerce and its affiliates primarily serve the CEDS area, defined as the City of Worcester and 39 surrounding communities. Thus, the participation of the Chamber as a partner in the CEDS process brings a private sector, regional business perspective to the CEDS Committee.

The structure of this collaboration has insured that the region's cities and towns are adequately represented in all matters related to CEDS and that the many economic development and planning activities at both the City and town level are well coordinated with those of other communities in the region. The CEDS Committee provides an extremely important function in facilitating communication relative to regional economic development activities occurring, or planned, at both the state as well as the local level. In addition, the CEDS Committee and the process it developed provide an important vehicle through which member communities can plan for the promotion of job creation and regional economic growth.

Prior to the 2001 CEDS process, the staff undertook a comprehensive review of past membership lists and completely updated those lists to form a comprehensive and current list of business, community and government leaders in the CEDS region. The membership list is updated annually in an effort to keep the contact list current so that the appropriate representatives are invited to each and every CEDS meeting held throughout the year. This updated membership list is attached herein and includes both employment affiliation and type of representation each invitee brings to the CEDS Committee. It is important to note that changes in contact names, phone numbers, and addresses may change throughout the year, and that the staff makes every effort to correct the list when such changes are brought to our attention.

Attendance at the CEDS Committee meetings over the past four years has greatly improved over prior years. We believe that this increased attendance can be attributed to the careful preparation of a comprehensive membership listing and the strength of the public-private partnership between the City of Worcester (as the core city of the region), the CMRPC, and the Worcester Regional Chamber of Commerce to rejuvenate and staff the CEDS Committee.

The first meeting of the FY 2004 CEDS Committee was hosted by the Worcester Regional Chamber of Commerce on Wednesday, October 15th 2003 and held at the Worcester Centrum Centre in conjunction with the New England Business Expo. This venue was chosen in an effort to increase attendance at the meeting and to provide CEDS Committee members with access to Expo events that were of particular interest to them. This presented a unique opportunity for CEDS Committee members to participate in some of the exciting Expo events held that day, many of which were directly related to economic development. Of particular interest this year was the Business & Government Partnership Reception that was held immediately following the CEDS meeting. The first meeting of the 2003 CEDS Committee was also held in conjunction with the New England Business Expo and CEDS members expressed an interest in repeating that opportunity again this year. The remaining three 2004 CEDS Committee meetings were held in the Fuller Conference Center at the Worcester Regional Chamber of Commerce, 339 Main Street, Worcester, Massachusetts, from 12:00 to 1:30 p.m. The second meeting was on Tuesday, March 30th 2004, the third meeting was held on Tuesday, May 25th 2004, and the fourth and final meeting was held on Tuesday, June 22nd 2004.

During the four meetings held from October 2003 to June 2004 the Committee covered a number of different topics. The Committee discussed the overall CEDS process and the need to encourage greater participation by the member communities, agencies, and organizations in order to ensure that the process, and the resulting reports and evaluations, are inclusive of the entire CEDS area and are representative of the region's economic development activities as they pertain to the CEDS goals. The Committee discussed pending economic development projects and reviewed the prior year's projects to ensure that the 2004 Project List contains all active and important regional projects that significantly impact the regional economy. This report also contains updated data that was collected and prepared by the CMRPC on the regional economy and discussion of significant development activities that have occurred during the past year or which are planned for the upcoming year. This year, the CEDS staff identified and secured a guest speaker for each Committee meeting, in an effort to inform CEDS members about new and ongoing economic development and planning activities in the region that may impact their communities or provide

members with a valuable resource in their daily operations. The guest speaker format also served to increase meeting attendance.

This fiscal year's CEDS Committee meetings and discussion topics are listed below:

Wednesday, October 15th 2003
First meeting of 2004 CEDS Fiscal Year. Nominate and vote for Chairperson, overview of CEDS Process, update on 2003 CEDS Annual Report, vote to accept 2003 CEDS Annual Report, Guest Speaker Susan Houston, Executive Director of the Massachusetts Alliance for Economic Development (MAED)

Tuesday, March 30th 2004
Participation requirements for 2004 Project List**,** evaluation process (review evaluation process, review evaluation survey, discuss goals and objectives and amend if necessary); select goals for FY'04; update on EDA funding, invited speaker (to be announced).

Tuesday, May 25th 2004
Submit new Project Information forms, present projects for consideration to committee, submit projects or initiatives to be included in "Past Year's Activities" section of Annual Report, invited speaker (to be announced).

Tuesday, June 22nd 2004
Final deadline for submission of new Project Information forms, evaluation of the status of projects on 2003 Project List, submission of all evaluation forms due, and review draft Annual Report and 2004 Project List.

VISION STATEMENT

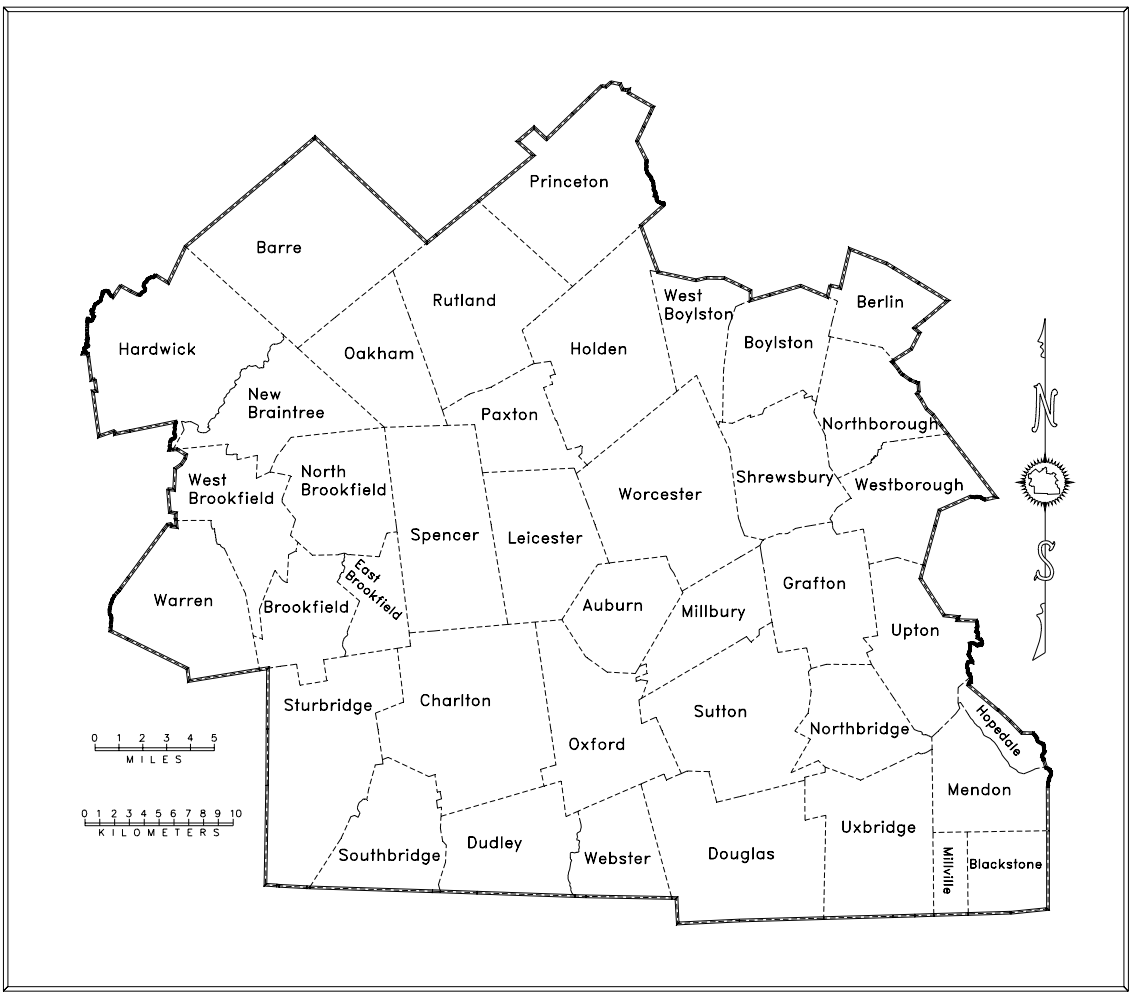
The vision for the Greater Worcester Area is to build upon the region's economic strengths to sustain the positive economic momentum of today and help the region withstand the inevitable economic downturns. The area is strong in several economic resources, including a skilled and educated workforce, intellectual capital available at 16 institutions of higher education, a variety of federal, state and local development agencies, and infrastructure, including an excellent transportation network and a multi-million fiber optic infrastructure network. The 2004 Greater Worcester Area CEDS reflects the region's goal to implement a successful economic development planning process that utilizes its economic resources, addresses its economic problems, and fulfills its economic potential through the following goals:

1) Strengthening the existing manufacturing base in the region.
2) Fostering the creation and expansion of start up and small businesses in the manufacturing, service, and retail sectors.
3) Providing a well-trained workforce with up-to-date skills.
4) Insuring an adequate supply of industrial land/space with appropriate infrastructure.
5) Establishing a systematic approach to supporting and developing new and emerging industries.
6) Promoting community and regional cooperation in Land Use Planning and Zoning, Utility Development, Transportation Network Development, Environmental Regulation, and Housing.

The annual Greater Worcester Area CEDS will reflect, identify, and implement the projects and programs that complement the spirit of this vision statement.

GREATER WORCESTER AREA

COMPREHENSIVE ECONOMIC DEVELOPMENT STRATEGY DISTRICT



Greater Worcester Area CEDS Communities

Auburn	Holden	Paxton	Westborough
Barre	Hopedale	Princeton	West Boylston
Berlin	Leicester	Rutland	West Brookfield
Blackstone	Mendon	Shrewsbury	Worcester
Boylston	Millbury	Southbridge	
Brookfield	Millville	Spencer	
Charlton	New Braintree	Sturbridge	
Douglas	Northborough	Sutton	
Dudley	Northbridge	Upton	
East Brookfield	North Brookfield	Uxbridge	
Grafton	Oakham	Warren	
Hardwick	Oxford	Webster	

PAST YEAR'S ACTIVITIES

JULY 1, 2003 – June 30, 2004

An Area Overview

The level of economic activity in the Worcester region has remained fairly stable over the past twelve months, despite the struggling national economy and the deteriorating fiscal condition of the Commonwealth of Massachusetts. While many regions have been severely impacted by global, national, and statewide conditions, the Worcester region can proudly point to positive economic indicators and growth in various industry sectors.

While economic indicators are slowly pointing to a national recovery, there is good reason to believe that the Worcester region has already begun to emerge from the gradual yet intermittent recovery period in an auspicious position.

Although analysts base their forecasts in large part on certain economic indicators, there remains no better tool for measuring the success of a region than actual "shovels in the ground". The implementation of projects that have been in the planning stages for years translates to job creation and new tax revenues generated. Based on the "shovels in the ground" measure, as well as recent benchmarks pointing towards anticipated growth in the Worcester region, the forecast for the future of the Worcester region looks bright.

A recent analysis of development in the Worcester region since July of 2003 indicates that a number of projects are proposed or underway which will stimulate private investment, create new jobs, and generate new tax revenues. Clearly, business development activity and interest in the Worcester region has remained strong, despite a struggling national economy.

From July of 2003 to June of 2004, more than 100 companies and entrepreneurs have contacted the Worcester Regional Chamber of Commerce alone to relocate, expand or establish a new operation. Inquiries received from companies and individuals seeking to expand in or relocate their operations to this region remained relatively strong and stable throughout the past year. The greatest demand in the Worcester region has been for manufacturing and distribution space. However, it may take a couple of years for many of these proposed projects to come to fruition, while a number of these proposals may not move forward at all due overall economic conditions.

Clearly, the human and physical infrastructure capacity of a region is critical to the ability of a company to sustain its operations, thrive and prosper. While the region has the human infrastructure in place to attract new companies and to sustain the growth of existing companies, identifying available sites to accommodate the increased demand for large amounts of space remains one of our region's greatest challenges. To do so, the City of Worcester must continue to concentrate on redeveloping and assembling critical brownfield sites, while smaller communities in the region must address their lack of

infrastructure to support major development projects. Communities in the region have dedicated much effort towards the development of this infrastructure, yet much work remains to be done to provide "pad-ready sites" for future development. The City of Worcester is currently stimulating the clean up of brownfield sites by administering a $1 million revolving loan fund. This loan fund was established in 2003 through a $1 million federal Environmental Protection Agency (EPA) grant for the remediation of environmentally contaminated properties. Worcester's Mayor has also launched a public-private brownfields initiative called the Mayor's Brownfield Roundtable, designed to provide education and outreach assistance to property and business owners to encourage the redevelopment of brownfields sites. Finally, the Worcester Business Development Corporation (WBDC), a private not-for-profit development corporation, has been very successful in brownfields redevelopment as part of its Gateway Park project, discussed in more detail later in this report.

One of the Worcester region's greatest assets is its access to the tremendous intellectual capital available -- 37,000 students, faculty and administrators at 16 colleges and universities, as well as a highly-skilled and educated workforce which enables the region to attract and retain emerging industry as well as traditional industry sectors. Technology, biomedical, pharmaceutical, and manufacturing companies thrive in environments rich in institutions of higher education and comprehensive employment and training networks. Further enhancing the region's appeal is its extensive transportation system, expansive fiber optic infrastructure network, affordable commercial and industrial space, and an enviable quality of life. A thriving arts and cultural community, a multitude of housing opportunities, and abundant recreational and leisure activities abound in the Worcester region.

There are a number of development projects recently completed or underway in Worcester and the region that are indicative of the steady level of demand. Significant projects include:

- Gateway Park, a 55-acre redevelopment project for mixed-use office and institutional uses
- Proposed $22 million Hilton Garden Inn, a 200-room hotel in the downtown
- $75 million redevelopment of Lincoln Plaza, including Lowe's Home Improvement, Dick's Sporting Goods, Target, Stop & Shop Supermarket, Staples and Barnes & Noble Booksellers
- Expansion of Worcester Airport Industrial Park.
- Major expansion of Abbott Bioresearch Center, Inc.'s state-of-the-art biologics production facility to manufacture D2E7, a drug treatment for rheumatoid arthritis
- New construction of Chadwick Court commercial building, housing Commonwealth National Bank branch and Starbucks Coffee
- Union Blues, a premier 200-seat upscale Jazz/Blues club in the magnificently renovated historic train station
- Ongoing and proposed construction of 3 supermarket complexes
- Several new and proposed entertainment venues

- The Shoppes at Millbury, a new 750,000 square feet mall
- The ongoing development of CenTech Park in Grafton, which is nearly at capacity

The Worcester region will likely continue to attract attention from companies seeking a competitive location, excellent transportation network, trained and educated workforce, and an exceptional quality of life. Given this, the region will no doubt recover from the current economic state in relatively strong position.

As the 2004 CEDS evaluation process reveals, there were 7 new or expanded manufacturing facilities in the region during the past year, 140 small businesses established or expanded, and 17 industrial parks are in the planning stages.

The housing sector remained a strong point for the local economy as new home construction continued at a steady pace and housing prices continued to rise. According to a report by the National Association of Realtors, Worcester has the second fastest growth rate in housing valuations in the country, indicative of the overall strength of the regional economy.

Regionally, the Blackstone Valley in the southeastern portion of the region experienced a steadily increasing level of new development. Three communities have adopted a zoning overlay district along Route 146 to improve the quality of new non-residential development. Construction is continuing on The Shoppes at Millbury, a new 750,000 square feet mall near the new intersection of Route 146 with the Massachusetts Turnpike. Several large warehouse and distribution centers have been attracted to the Sutton Industrial Park, including an approved cross-dock facility for Home Depot. Communities continue to promote economic development along Route 146 to take advantage of the excellent highway access for trucking and distribution companies. In addition, development of CenTech Park in Grafton, a high technology office and industrial park, continues at a fast pace, with most lots sold and construction underway or complete. The Blackstone Valley area has also become attractive for residential development as housing costs are lower here than in towns to the east, yet within reasonable commuting distance to major employment centers along Route 495.

Many of the towns in the Blackstone Valley are involved in collaborative planning efforts to maximize economic and community potential. Four communities are collaborating on the River Visioning process, which is looking at Route 122 as a potential growth area for economic development. The towns of Northbridge, Sutton, Uxbridge and Douglas are studying the feasibility of creating a consistent zoning overlay zone in a targeted geographic area that encompasses a portion of each town. The area currently has multiple zoning restrictions that prevent cohesive, planned development of available parcels. The towns want to develop a vision for the area and look at its development potential and other opportunities, including housing, sewer and water infrastructure capacity. This initiative is complementary to several ongoing Master Planning processes and the Section 418 planning process. The town of Douglas is seeking a PWED and CDAG grant for the development of an industrial park on Route 16 and an

industrial/business park south of Route 16. The town is also undertaking downtown projects and Main Street improvements, and has begun preparing the scope for the Section 418 planning process. Douglas is looking to cooperate with neighboring Uxbridge for joint planning and development initiatives. The town of Uxbridge is involved in the River Envisioning Project as well as moving forward on 418 planning and updating its zoning by-laws, and the $800,000 renovation of the 12,000 square foot Uxbridge Church is underway. In addition, Uxbridge is converting the historic Waucantuck Mill (currently known as the Mill at West River Pond) into a 110-unit condominium housing project. The project is also designed to combine the condominiums with its natural setting, public amenities, commercial retail development, restaurants and shops. Sutton is pursuing a bikeway project, while the upscale Villas at Pleasant Valley are under construction. The town is also building two fire stations and a sewer treatment plant.

The southwest corner of the Region has become of increasing interest to developers and companies seeking industrial space for manufacturing and distribution operations. A major reconstruction of Route 20 through Charlton will be completed next year and is expected to have positive benefits in attracting new economic opportunities to the community. One in particular includes the proposed 138-acre Gardner Business Enterprise Park off of Rt. 20. which is estimated to create 900-1200 light manufacturing, R & D, Fiber-Optics and warehouse/distribution jobs. Communities such as Southbridge are also addressing their infrastructure needs and planning for future development of similar large sites.

The City of Worcester also experienced economic growth and economic development planners continue to work on a number of significant initiatives that will spur new growth in numerous areas of the city. The City Administration and the Arts District Task Force continue to administer the master plan for the Arts District in the City's Main South Neighborhood. The former 42,215 sq. ft. David Burwick Furniture Co. building at Main and Madison streets is to become part of an estimated $20 million project which includes the renovation of the building and the construction of 113 housing units.

The redevelopment of the 45-acre retail Lincoln Plaza "power center" is nearing completion. The opening of Barnes & Noble Inc., a 25,000 sq. ft. book superstore is one of many class "A" category retailers within the plaza. The plaza itself, which contains 2 million sq. ft. of retail space is considered to be worth over $22 million by estimators. Barnes & Noble Inc. now joins other large retailers in the plaza including Target, Stop & Shop, A.C. Moore Arts and Crafts, Dick's Sporting Goods, Bally's Total Fitness, Lowe's Home Improvement and the recently opened Staples Office Supply Superstore. About 15 to 20 smaller development spaces remain in the plaza, which is expected to be filled within a few years, partially due to the crowd of large name retailers whom have recently flocked to the area.

The first phase of infrastructure improvements at the South Worcester Industrial Park and environmental site assessments and cost estimates for environmental remediation in the

park were completed. The development of the Union Station/Washington Square Project continued to progress as negotiations with the State and the Worcester Common Outlets were nearly completed. Plans for a proposed 20-acre renovation of downtown Worcester on the site of the current Worcester Common Outlets that will include demolition of specified retail areas and certain parking garage space are underway. This plan will include the construction of a 225,000 sq. ft. of medical office building, 400 – 700 units of housing, 300,000 square feet of retail space and entertainment venues. The project will also include the reconfiguring of Worcester's central business district to its east side in order to create a pedestrian friendly downtown area for consumers.

Further infrastructure improvements include the ongoing $300 million Route 146/Massachusetts Turnpike connector project rebuilding Route 146 from a two-lane local road into a limited-access parkway. The project also includes the reconstruction of a mile and a half of local streets and the construction of three new bridges. Construction of this phase is slated for completion in 2006. In addition, Interstate 290 will undergo a $15.9 million facelift through downtown, which is expected to take four years to complete. This reconstruction project is the first of a series of "Fix-it-First' initiatives set by Governor Romney.

The Commonwealth of Massachusetts conducted a comprehensive, year-long, statewide planning process, the first major examination of the State's economy since 1992's "Choosing to Compete". The ensuing document, *"Toward a New Prosperity"*, reflects this statewide effort that included regional meetings, discussions with issue experts, and extensive policy research and analysis. *"Toward a New Prosperity"* offers a shared vision for economic development, based on the states past successes, persistent challenges, and emerging threats. The report examines the state's assets and identifies its needs based on six geographic regions and provides a strategic framework for action, supported by a range of practical policy options. The Central Massachusetts Region includes the Greater Worcester Area CEDS district and the authors of the report used the Greater Worcester Area CEDS 2002 Annual Report as part of their research on the Central Mass region.

As a follow-up to that report, and as one of his early actions to promote statewide economic development and strengthen regional economies, Governor Mitt Romney created six Regional Competitiveness Councils (RCCs) across the state which geographically coincide with the six regions identified in "*Toward a New Prosperity*". The Central Regional Competitiveness Council (CRCC) covers the Greater Worcester Area CEDS district as well as communities to the north. The 29-member Central Regional Competitiveness Council includes representatives from the chambers of commerce, industry leaders, and corporate CEOs from businesses throughout the region. Each RCC will assist the state in promoting the economic well-being of their respective regions by encouraging investment, increasing the competitiveness of the region's businesses, and creating economic opportunities for businesses and employees. Other objectives include the pursuit of an Industry Cluster Initiative in each region; collaboration with leaders in higher education to meet the needs of regional employers;

support for a high level network for rapid mobilization of targeted firms and companies at risk; and developing an integrated regional needs assessment and action plan to present to high level state officials. The RCCs meet on a quarterly basis.

The CEDS Committee was fortunate to have Eric Schultz, Chair of the Central MA RCC, speak at its June 22nd meeting. Eric spoke about the RCC, its mission, role in the overall context of statewide economic development, and the RCC's recent report, a copy of which is included herein. Information and research presented to the CEDS Committee by Eric during the final CEDS meeting of this fiscal year brought light to many positive aspects of our region, including specific areas that Central MA should focus their efforts more heavily upon. A summary of those findings are as follows:

Priority	**Rationale**
Strengths to Reinforce	
Strategic location	• High-speed **road access** to Boston, Providence and points west • **Centrally located** in Massachusetts and New England with a relatively lower cost position than Greater Boston • High **quality of life** (especially for those with families) and attractive to knowledge intensive industries
Cluster diversity	• Economic strength is driven by **diverse and strong** clusters. Economy is not a "one-hit-wonder." • **Diverse educational institutions** provide both managers and technicians with skills for R&D and precision production • Strong supply of **skilled craft labor** – in all areas of manufacturing
Higher education & research	• **12 higher education** institutions located in central Massachusetts • UMass Medical School and Research Center and WPI's linkage with the **life sciences** cluster

Barriers to remove	
Loss of key workforce segment (ages 19 to 24)	• Region is losing this segment at a faster pace than the state as a whole
Lack of coherent identity and branding	• Lack of unified regional leadership • North Central Region and Blackstone Valley are distinct from Greater Worcester • No clear brand identity for Worcester
Competitiveness in international marketplace	• Manufacturing and certain services are losing existing jobs to overseas • Major cluster wages lag the MA average, points to lower progress
Tax classification in urban locations	• Large urban cities such as Worcester, Auburn, and Fitchburg have dual tax classification structures that minimize attractiveness for employer retention and new employer attraction that typically prefer urban settings
Much "red tape" inhibiting development	• Often complex approval process required for new development

Tier	Priority Cluster
I	Education and Knowledge Creation
I	Life Sciences: Biotechnology, Analytical Instruments and Medical Devices
I	Communication Equipment and Information Technology
II	Financial Services
II	Plastics
II	Metal Manufacturing
III	Distribution Services and Transportation & Logistics

KEY

I **Growing/capacity to grow**
II **Declining/need attention**
III **Doing well, don't need regional emphasis**

Traded Cluster Action Steps

- **Education and Knowledge Creation**
  - Establish and fund a cross functional council to create and conduct a survey/assessment to determine adequacy of local higher education curricula to needs of business
    - Outcome: Educated workforce that is better aligned with regional employer needs
    - Retention of educated workforce, especially in the 19 to 24 year range
    - Fuel smart growth strategy/urban redevelopment

- **Life Sciences**
  - Establish a biomedical economic development resource team
  - Improve business and academic partnerships to increase technology transfer
  - Conduct ongoing educational forums that highlight advances in the field

- **Communication Equipment and Information Technology**
  - Both clusters will benefit from fiber optic build out
  - Will support technology transfer from educational institutions to local businesses

- **Financial Services**
  - Create Worcester/Providence/Boston financial services region
  - Link with initiatives to better align education with businesses (see Workforce Academy for Financial Services conducted in Boston)

- **Plastics**
  - Transition producers to high value-added products. Build linkages to life sciences cluster. (ex. Mass Plastics Council connecting with Mass BioTech Council)
  - Create statewide public/private plastics marketing initiative (similar to the biotech industry)

- **Metal and Other Precision Manufacturing**
  - Convene a group of interested manufacturing CEOs that will brainstorm opportunities for improved competitiveness

- **Cross Cluster Action Steps**
  - State incentives to move to single residential/commercial tax rate
  - Remove cost of the uninsured (Uncompensated Care Pool) as a hidden tax on employers offering health insurance
  - Convene a group of travel and hospitality, and higher education representatives to seek better linkages between college students and their families with the region's tourism and hospitality assets (hotels, retail, sports, nightlife, etc.)
  - Explore links between Providence, the Blackstone Valley and Worcester

Workforce Development and Education

- **Strengthen high school/vocational technology connection with needs of priority traded clusters**
  - Outcome:
    - Graduate a higher percentage of students from high schools that have educations that align this workforce with job opportunities
    - Create linkages for new and growing diverse cultures

- **Address nurse educator shortage driven by uncompetitive wages**
  - Outcome:
    - Graduate a higher number of nurses to support needs of businesses in health care industry

- **Address "foundation skills" shortage**
  - Target resources to expand adult basic education/English as a second language training

Infrastructure

- **Air transport**
  - Continued Massport financial and management support for Worcester Regional Airport
    - Outcome: Supports Worcester during its redevelopment/rebranding efforts
- **Roads**
  - Completion of Route 146/Interstate 290 construction project
    - Outcome: Links Worcester and Providence
  - Convert Route 146 to interstate highway status
    - Outcome: TBD
  - Upgrade routes 2 and 12
    - Outcome: Increase access to Fitchburg from Route 2
  - Revise state transportation definition of wide and heavy shipments
    - Outcome: Removes competitive disadvantage for Massachusetts and heavy manufacturing, especially in north Worcester County

- **Rail**
  - Increase daily commuter rail service to and from Boston and Union Station Worcester, and Leominster/Fitchburg
    - Outcome: Enables commute into and out of the Worcester and North Central regions and aligns better with Smart Growth Strategy

- **Communications**
  - Build-out fiber optic infrastructure
    - Outcome: Supports cluster strength in areas of higher education, life sciences/biomedical and financial services

Housing

- **Create incentives to refurbish urban housing**
  - Provide local aid incentives to communities that encourage high-density housing construction
  - Utilize tax increment financing and district improvement financing

- **Encourage development of residential units in upper floors of urban properties**

- **Implement/expand Urban Main Streets programs**
  - Outcome: Promotes smart growth; creates opportunities for retaining/attracting younger workforce population in key central Massachusetts cities

-Report Highlights Courtesy of Central Massachusetts Regional Competitiveness Council-

Major Development Initiatives

Worcester Business Development Corp. (WBDC)

The WBDC, in cooperation with local governments and private institutions, has continued to foster regional partnerships to expand the area's economic base. The WBDC has been very successful in developing CenTech Park in Grafton, which continues to attract new companies to the newly developed, light industrial/office park. Information Management Systems, Intelcore Technologies, Idexx Veterinary Services, and State Street Bank have decided to locate in the Park to take advantage of the location and infrastructure services available.

The WBDC is also the developer of Gateway Park, a 55-acre commercial/industrial district adjacent to the northern end of downtown Worcester. The Gateway Park district has a concentration of striking historic buildings, several of which have been or are scheduled to be rehabilitated for mixed-use office, retail and/or institutional uses. Due to former industrial uses in the project area, the Gateway Park district has been plagued with environmental contamination. The redevelopment of this area triggered the ongoing remediation and mitigation efforts of the developers, which will result in much-needed pad-ready sites.

During 2003-04, WBDC has continued its progress in the Gateway Park district. The most recent phase to be undertaken is the demolition of obsolete structures, which is the prerequisite for future development. Most notable has been the reclamation of the former New England Plating Company site, which was acquired, demolished, and cleaned up in preparation for its future use as a parking facility. Also underway is the planned renovation/construction of the site known as 60-68 Prescott Street. Design work is well underway and work is expected to begin in the Fall of 2004.

Gateway Park continues to be WBDC's signature project, demonstrating the possibilities for creative redevelopment in what has long been an underutilized and contaminated area. As other projects and other developments occur within Worcester, Gateway Park promises to become an economic engine that will connect the region and promote future growth throughout Worcester.

CenTech Park

The WBDC is the developer of CenTech Park in Grafton, a new business technology park that will provide nearly one million square feet of research and manufacturing space upon its completion. The 121-acre, 10 parcel CenTech Park abuts the Tufts University School of Veterinary Medicine and is just a 10-minute drive from the Massachusetts Biotechnology Research Park, the University of Massachusetts Medical Center and the Worcester Foundation for Biomedical Research. The Park has an MBTA commuter rail station at its entrance, providing daily service to and from Boston. CenTech Park is

located minutes from the Massachusetts Turnpike and has direct access to other major state highways.

Information Management Corporation has constructed an 18,000 square foot facility in order to expand its operations. The company currently has 28 employees. The company produces software for police and fire departments.

State Street Bank has constructed a 130,000 square foot data center for its high tech data operations. The company currently has 140 employees at their Shrewsbury location.

Primary Colors has constructed a 30,000 square foot, $1.8 million facility in CenTech Park to expand its operations. Primary Colors uses a complex and environmentally safe procedure to colorize plastics. The company currently has 30 employees.

IDEXX Veterinary Services Inc. was the third company to locate at CenTech Park, moving into a newly constructed 30,000-square foot building. IDEXX occupies the first floor, which totals about 15,000 square-feet. IDEXX offers veterinary testing services, animal pharmaceuticals, diagnostic products and water testing. The company employs a total of 2,000 people across the New England area.

Verrillon, formerly Intelcore Technologies, completed construction of a new 40,000 square feet manufacturing and research facility at CenTech Park. *Verrillon* makes customized fiber products that help maximize the performance of existing telecommunications networks. Despite the glut of fiber on the market, the company hopes their specialty products will find a niche by improving efficiency of existing telecommunications networks. The new building contains a 7-story drawing tower for the manufacture of fiber. The company currently has 45 employees.

A partnership of two local businessmen has purchased an eight-acre site in the park and is currently constructing an 80,000 square foot spec building. The development is expected to be completed next year and has the potential to bring hundreds of more jobs to the area.

Current Statistics of CenTech Park:

New Jobs Created	353
New Taxes Generated	$935,340
Anticipated square footage at build-out	650,000 GFA

Additionally, the Commonwealth of Massachusetts is funding a 1.1-mile connector road that will link Routes 20 and 30. This new road will provide a direct link to the MBTA Station, Tufts School of Veterinary Medicine, Tufts Bio-Medical Park, and CenTech Park. The road is scheduled to be completed by late fall of 2004 and will expose hundreds of acres for future economic development. The WBDC is acquiring an additional 69 acres (CenTech Park East) of land from the Commonwealth to add

approximately 600,000 square feet of light industrial space in the Town of Shrewsbury. Also, the WBDC and the Town of Shrewsbury are developing an additional 60 acres known as CenTech Park North. Both of these new projects are located off the new connector road.

Massachusetts Biomedical Initiatives

Massachusetts Biomedical Initiatives (MBI) is an independent, tax-exempt corporation created to support the growth and expansion of biotechnology, medical device and bioinformatic companies throughout the Worcester region. MBI operates two Worcester incubator facilities (100 Barber Ave and 25 Winthrop St), which are currently home to 15 new biomedical companies with 60 employees. By creating the right environment for the industry to grow and expand, MBIdeas has become the "brand" name and world class model for providing incubator space and business development assistance for start-up life science companies in order to fuel regional economic growth and to enhance the status of Massachusetts as a world leader in the medical industry.

MBI's recently renovated Winthrop St facility totals 20,000 SF of fully outfitted and equipped wet laboratories and support office space. The $2.8 million construction funding was provided by a U.S. Department of Commerce, Economic Development Administration, Public Works Economic Development (PWED) grant and matched by MBI private fundraising and MassDevelopment. Partial operating assistance is received from the Commonwealth of Massachusetts. The Winthrop St tenants include: Avatar Pharmaceuticals, Inc., Bioinformatics.org, Blue Sky Biotech, Inc., Gene-IT, GlycoSolutions, Corp., Informatics Center and Computing Resources, Mass Micro Laboratories, Inc., New World Laboratories, Performance Indicator, and Welgen, Inc. This facility is located three miles off of the Massachusetts Turnpike (east/west) and off Interstates 495, 290 and 190 (north/south.) MBIdeas Barber Ave facility is located at the intersection of Interstates 190 and 290, and is home to Antigen Express, Inc., DXA Resource Group, Inc., Technical Innovation Center, Hypromatrix, Inc., and Polygenyx, Inc.

Investment of new dollars into the Worcester area economy through these newly created and expanded MBIdeas companies drive new regional biomedical technology. As a result, the Worcester county biomedical industry has currently grown to 111 companies with approximately 7,500 employees that generate over $976 million in annual revenue. When compared to last year's figures, the 2004 report can boast of 22 new companies, 3,400 new jobs and $476 million more dollars generated than in 2003. In 2001 there were 58 biomedical companies in the region and in 2002 there were 68 companies, with 3,287 and 3,650 employees respectively, generating approximately $330 million annually in each year.

MBI manages and operates these MBIdeas Innovation / Research facilities which "graduate" new companies into larger space while creating start-ups on an ongoing basis. A yearly evaluation tool has also been established to measure the growth of this sector in

terms of numbers of jobs created, square footage occupied, and investment dollars raised and spent within the economy.

The MBI Biocomputing Center was launched in May of 2003 in partnership with IBM Life Sciences. The Informatics Center is an engineering and educational initiative between MBI, industry, and regional academic institutions. The Center acts as a catalyst for collaborative research leading to new computational tools and techniques for the life sciences.

MBI science, academic, business, and government resource partners include UMass Medical School, Tufts Veterinary School, WPI, UMass Memorial HealthCare, Tenet St Vincent Hospital, Mass Biotechnology Research Park, Worcester Business Development Corp, Worcester Regional Chamber of Commerce, the City of Worcester and Commonwealth of Massachusetts.

Worcester InfoTech Corporation

The Worcester InfoTech Corporation was established to market the benefits of the Worcester region as fertile ground for the technology industry and stimulate the development of technology sectors in our region. The mission of the Worcester InfoTech Corporation is to create an environment that is conducive to the development of the technology sector in the Worcester region, creating quality jobs and generating new tax revenues. This is accomplished through the promotion of the Worcester region as an attractive location for such industry sectors, educating the public and the dissemination of information regarding the benefits of locating a business to this region, the recruitment of new technology companies to the area, and the provision of assistance in the facilitation of those technology companies seeking to establish, relocate or retain their operations.

In order to successfully carry out its mission, the Worcester InfoTech Corp. is developing the tools needed to attract and retain technology companies. The corporation recently launched its new web site, which contains valuable information on locating a business to the Worcester region and links to nearly fifty agencies and organizations that are helpful to business owners. The corporation also developed collateral materials to be used in the attraction and recruitment of technology companies to the region.

The City of Worcester's multi-million dollar f*iber optic network* is a valuable infrastructure system that will enable the City top attract office space users needing high speed internet access. Worcester is wired with close to 15,000 miles of optical fiber with the latest technology from Verizon and NEES Communications, Inc (NEESCom). Almost every major office park and building in the city can access this fiber network.

Verizon is the largest telecommunications provider in the city. Verizon has seven fiber rings in or around the city, which equate to over 11,000 fiber miles. Services offered range from voice grade lines, DSL, T1 and ATM connections. This network is constantly expanding to provide the latest technology and reach the most customers in the area.

Verizon maintains an entirely digital network with ATM service, point-to-point T1/T3 service, frame relay and SONET ring availability. Verizon is both a retail and wholesale service provider.

NEESCom has installed more than 4000 fiber miles of dark optical fiber. Dark fiber is fiber that has been installed but not yet "lit" by the special equipment at both ends. Dark fiber provides the underlying infrastructure necessary for emerging carriers, service providers and large enterprises to deliver the bandwidth at a fixed cost. This dark fiber offers carrier-neutral, non-exclusive access, which means that multiple providers can lease fiber from NEESCom. This infrastructure is expanding quickly to meet New England's rapidly changing and growing data communications demand.

NEESCom has also laid a strong foundation of fiber optic cable, with three major rings within the Worcester city limits. These rings have been strategically routed past prime office buildings, industrial office parks, IXC POP's, ISP POP's and educational institutions. NEESCom has already secured several hundred easements or rights-of-way to buildings reducing the time needed to hook up a building and get a customer connected. NEESCom also offers full service collocation facilities and regeneration sites. These facilities offer maximum interconnection and future expansion.

The three NEESCom rings are designed to give maximum connection for major office spaces, industrial office parks and educational institutions. The Worcester Hub Ring is located in the main business district and downtown Worcester. The WPI ring passes 104 buildings and over 11,000 telephone users. The BioMed ring covers most of Worcester's medical community, passing over 19,000 data users. These rings also tie into the NEESCom, Metro West rings, which then connect into the Boston rings and finally connect to tier 2 cities like Springfield, Providence and Albany.

Internet2 is also part of the NEESCom local rings. Internet2 is a second generation of the Internet specifically designed for universities and corporations conducting cutting edge research and development. The Goddard GigaPOP is a joint venture between NEESCom and WPI and serves as one of two major Internet2 access nodes in New England.

Lincoln Plaza Development

The redevelopment of Lincoln Plaza into a modern 45-acre shopping center in the northeast quadrant of Worcester continued to progress. Staples, Barnes & Noble Booksellers, and A.C. Moore Arts and Crafts completed construction this past year and joined Target, Lowe's Home Improvement, Dick's Sporting Goods, and a Stop & Shop supermarket as anchor tenants. Future plans include the construction of an additional building that will house Radio Shack, Papa Gino's, and Payless Shoes, as well as the development of additional retail and restaurant sites. The developer of the project estimates that in addition to his investment of $45 million in the project, retailers have invested another $25 million to $30 million in their stores. The elimination of the

blighted strip center has provided a powerful economic stimulus to the Lincoln Street area and has had a positive impact on the appearance of the area.

South Worcester Industrial Park

The City of Worcester continued to make progress on the redevelopment of the 11-acre South Worcester Industrial Park (SWIP). This project involves the acquisition, environmental remediation and redevelopment of a brownfield site containing mostly blighted, abandoned and underutilized former industrial properties. The goal is the creation of new pad-ready industrial development sites for sale to private businesses interested in developing new industrial facilities that will generate new tax revenues and create new job opportunities for the City of Worcester and its residents.

The first phase of public infrastructure improvements was completed in an effort to make the park more accessible and developable. This phase of the project centered on the lowering of Southgate Street (the main access road to and from the Park site) about 2 feet as it passes under a bridge owned by the Providence & Worcester Railroad. This increased clearance under the bridge is necessary to accommodate the anticipated truck traffic to and from the Park. Consequently all of the existing and new public utilities in that portion of the road were also lowered, i.e. the storm drains, water and sewer services, as well as, the private utility services. Additional public infrastructure improvements included new streetlights, sidewalks services, i.e. electric, telephone and gas, curbs, and a looping of the water system for better fire protection. The improvements were funded through a U.S. Department of Commerce, Economic Development Administration, Public Works Economic Development (PWED) grant for $1.3 million, which was matched by a $1 million PWED grant from the Executive Office of Transportation and Construction of the Commonwealth of Massachusetts. The appraisals of and the taking of easements on private property for the realignment and reconstruction of the roadway and sidewalks have also been completed.

Appraisals, environmental site assessments and cost estimates for environmental remediation of the SWIP, demolition of all existing buildings, and asbestos removal from all existing buildings were completed and a preliminary project development pro forma was prepared. The estimated total project cost has been refined and currently stands at approximately $11 million. The majority of the project cost consists of demolition, asbestos removal, and environmental cleanup.

The City of Worcester identified a development strategy that proposes a phased development based upon successes in obtaining funding commitments. The first phase involves the City gaining substantial site control, some asbestos removal and some demolition, as well as the design and construction of the second phase of infrastructure improvements. Later phases will include the acquisition of the remaining parcels to be included in the park site, the remainder of the asbestos removal and demolition work, the environmental remediation of the site to a standard to allow new industrial development, and site preparation for new construction. The City continued to hold preliminary

discussions with private property owners regarding the acquisition of former industrial sites for inclusion in the SWIP, pursue state and federal funding opportunities through discussions and meetings with both state and federal officials, and plan for the second phase of the infrastructure improvements.

Gardner, Kilby and Hammond Initiative

The Gardner-Kilby-Hammond Initiative project partners, through the KGH LLC, which consists of the Main South CDC, the Boys & Girls Club and Clark University, intend to develop a new athletic facility and a new Boys & Girls Club facility on a 7.8 acre brownfield site. Through acquisition, remediation, and assembly, the LLC eventually will convey a clean, cleared site to Clark University and the Boys & Girls Club. In return, they will build their new facilities on the land: athletic fields and new athletic facility on approximately 5 acres for Clark and 2.8 for a newly constructed Boys & Girls Club. The total project cost is estimated at $30 million. Phase II will involve the development of affordable housing opportunities on 22 acres, included the selective demolition, construction, and rehabilitation of existing units. Demolition and remediation work is underway and is expected to be completed in the fall of 2004.

Former Wyman- Gordon Company Property

The project involves the redevelopment of an approximately 17-acre brownfield site that formerly housed the Worcester offices and manufacturing facilities of the Wyman-Gordon Company. The Company demolished approximately 367,000 square feet of the building space and is aggressively advertising the site for sale. The City met with officials of the Wyman-Gordon Company to discuss potential development opportunities and stress their desire for a mixed-use project. The Wyman-Gordon Company is currently in negotiations with two potential developers for the site who are proposing a mixed-use project that will include retail, office, and housing.

Hilton Garden Inn Hotel

Plans for the construction of a $22 million Hilton Garden Inn Hotel in downtown Worcester continued to progress. The ten-story, 200-room Hilton will be located on a 36,000 square foot city-owned parcel that formerly housed the Central Street Fire Station. The site will have a Worcester Center Boulevard address and is located directly across the street from the Worcester Centrum Center Convention Hall facility. The developer, Fargo Management LLC, demolished the Fire Station this past spring. The Hilton Garden Inn Hotel, which will include a 100-seat national restaurant chain operation on the first floor, a pool and 7,000 square feet of meeting rooms, will be connected to both the City-owned parking garage and Worcester Centrum Center Convention Hall via pedestrian skywalks. Fargo Management LLC paid the City $1 million to acquire the site. The proposed Hilton Garden Inn will have tremendous economic impact on the City and the region by increasing the number of available hotel rooms in support of business travel, tourism and entertainment events; creating jobs; and generating new tax revenues

for the City of Worcester on a parcel that currently is tax-exempt. The hotel is located adjacent to the City's signature $35 million convention center, the state-of-the-art $200 million Worcester Medical Center complex, and the proposed new state courthouse, and within a block of the Worcester Common Outlets as well as the Massachusetts College of Pharmacy and Health Sciences. Construction is expected to begin in the fall of 2004.

Union Station/Washington Square Project

The City of Worcester continues to make progress on the Union Station/Washington Square Project. The $32 million renovation of the historic Union Station was completed a few years ago and it now serves as a fully functioning transportation center. During the past year, the City advertised the approximately 27,000 square feet of commercial space in the Station through a Request for Proposal. A new entertainment venue called "Union Blues" opened for business in February 2004. Construction of a Customer Service Center began in the fall and is expected to be completed this summer. The Center will house business amenities and be located on the first floor of Union Station.

Demolition of the Worcester Common Outlets parking garage ramps that extend into Washington Square was completed in the spring. Design plans for the proposed bus ports were completed and the construction of the bus ports is expected to begin in the summer of 2004. The City also worked with the Mass Highway Department and all other pertinent agencies/community groups on the design plan for the Washington Square roundabout. Construction on this project is expected to begin in 2005. Finally, the City continued to negotiate the sale and environmental remediation of the Parcel Post building in the rear of Union Station. The building is to be demolished for the construction of a new 500-space parking garage for the Station. The City selected a design firm for the parking garage and contract negotiations are underway.

Arts District

The recently established Arts District in Worcester's Main South area continued to evolve through the implementation of the Master Plan, which was created two years ago. Funds provided by the U.S. Department of Commerce, Economic Development Administration, helped to support the development and publication of the Master Plan for the Worcester Arts District. The purpose of the Plan is to offer a creative, tangible approach to stimulate cultural activity for the blighted Main Street neighborhood in the District. The Plan is also intended to provide a home for artists and provide for the cultural needs of the city's residents as well as serve as a catalyst for the economic development of the Main South neighborhood and the city as a whole.

Plans for the renovation of the Showcase Cinema, a movie house that closed in 1988, continued to progress. The complex originally opened in 1903 as a burlesque house, and was converted nine years later into a movie house that seated 2,500 people. The building was renovated into a multi-screen theater in 1968. The City met several times with the Worcester Center for the Performing Arts, a private group that plans to restore the

complex to its original state and create a performing arts center, regarding a $2 million HUD Section 108 Loan Guarantee for the proposed $5 million project. Discussions with the private group are ongoing. The center will stage various entertainment events, including large-scale Broadway productions by national touring companies.

The City also worked with two developers for housing in the Arts District. Planning is ongoing for redevelopment of the former David Burwick Furniture Co. building on Main Street. This five-story former furniture store sits as a reminder of the Downtown's former role as the area's major retail center. However, today plans are being prepared to convert it into a residential facility with one- and two-bedroom apartments and some studio units. Eighty percent of the units will be market rate and the rest will be affordable units. The City also worked with the developer on an abutting vacant building.

The second developer, Community Builders, completed the $4.3 million renovation of the former Odd Fellows Building on Main Street across from the Burwick building. This building, which has been vacant since 1980, includes 24 units of mixed-income housing as well as commercial space.

Route 146/Massachusetts Turnpike Interchange Project

According to a report issued by the Worcester Regional Research Bureau in May, 2003 the Route 146 Connector Project will probably not be completed until 2007. Begun in 1995, estimates for construction of the Route 146/MassPike Interchange project have risen to $280 million. The interchange with Routes 20, 146, and I-90 opened in the fall of 1998 and now provides the City of Worcester with three access/egress points to the Mass. Turnpike. Highway construction has been completed in the Millbury portion of the corridor, including a new interchange with Route 122A. Construction began in the summer of 2002 in a new 1,100-foot bridge that will carry Route 20 traffic over Route 146, the Blackstone River and the P&W railroad tracks. The Kane Square "A" phase is complete. The $33 million, three-phase reconstruction of a segment of Route 20 is two-thirds complete. Final completion is estimated for the summer of 2005. The $39.3 million Hurley Square phase of the project began in January 2004 and is expected to take three years to complete. Design is complete on the Brosnihan Square interchange between Route 146 and I-290, a key link in improving access to the Region's interstate network. It is expected to be advertised during the summer of 2004 and have a three-year construction period. The project also includes a bikeway along the Blackstone River in Worcester that will be part of a Worcester to Providence bi-state bicycle trail. City officials hope the bikeway and other recreational improvements, a new visitor's center, and restoration of part of the Blackstone Canal will lead to an increase in tourism. Design on the Millbury Street reconstruction phase, anticipated to cost $635,000, is 100% complete. Construction will take about one year to complete; work will begin once the Hurley Square and Kane "A" projects are complete.

The Route 146 Project will create significant improvements to the regional highway network. This, combined with other transportation improvement projects, will further

enhance the region's excellent highway network. Another major highway improvement project is the Interstate 290 re-decking project, which is currently underway and involves construction between exits 13 and 16. The re-decking project is estimated to cost $16 million and expected to take three to four years to complete.

Tufts Science Park

Tufts University is developing a $100 million science park on a 100-acre site at its veterinary school campus in North Grafton, near the Grafton MBTA commuter rail station. The park will be developed in two phases over the next 20 years – Phase I, located off Route 30 south of CenTech Park, is being built on 35 acres and will contain up to seven buildings with 348,000 square feet of space. Tufts envisions multi-tenanted research and development, and manufacturing facilities. In 1999, the town approved the park's master plan, and Mass. Secretary of Environmental Affairs approved the Environmental Impact Report (EIR) for the project. In the spring of 2002, Grafton received a $990,000 Public Works and Economic Development (PWED) grant from MassHighway to fund new roadway improvements for Phase I. In addition, the town has received two Community Development Action Grants (CDAG) from the Department of Housing and Community Development. The first award of $1 million was used to upgrade the water distribution system in North Grafton, and the second award of $895,000 is being used to extend water and sewer lines to Phase I of the park. Substantial completion of Phase I infrastructure is expected in the summer of 2004. At build-out of Phase I, Tufts estimates 940 jobs will be created. Marketing to corporate prospects is ongoing, with Tufts Biotechnology Corporation (TBC), the for-profit subsidiary of Tufts, offering to long-term ground lease parcels in Phase I to companies. At the present time, about 20 health sciences companies use the Tufts University of Veterinary Medicine for research and another 45 for testing.

Worcester Corporate Center

Development of the Worcester Corporate Center, an office/industrial park located in West Boylston and Worcester, continues. *FedEx Corp* constructed an 88,500-square foot building in the Worcester Corporate Center in West Boylston which is now completed. Thanks to both a Community Development Action Grant (CDAG) and a state Public Works and Economic Development (PWED) the Town was able to build a new industrial road with all utilities into the Worcester Corporate Center. The building is expected to replace a sorting and distributing center in Auburn later this year. The new facility will hold up to 120 vans and will distribute and pick up packages in Worcester market. The American Red Cross of Central Massachusetts broke ground in June for the Remillard Building, its new chapter headquarters. The new 24,845-square-foot headquarters will be at 2000 Century Drive at the Worcester Corporate Center. A purchase and sales agreement for the chapter's current 15,695 square foot location at 61 Harvard Street was just signed.

UMass Medical School and UMass Memorial Health Care Lake Avenue Campus

The UMass Medical School and UMass Memorial Health Care campus on Lake Avenue in Worcester is undergoing a four-year, $58 million renovation. The Campus Modernization Project will involve the redesign of the building's entrances and lobbies, façade renovation, new electrical vault, roadway relocation, and will add 15,000 square feet of usable space to the Medical School. An additional $15 million will be used to fund the construction of a six-story, 1,600-space parking garage, which is currently underway. The project will be completed in 2006.

Worcester Vocational School

Construction of a 392,423 square-foot state-of-the-art Worcester Vocational High School at Green Hill Park continued. The cost of the project is estimated at $89.9 million and the school will accommodate 1,450 students. The relocation of the Vocational High School from its present location will provide the City of Worcester with an excellent redevelopment opportunity at the Lincoln Square area of downtown Worcester, which abuts the Gateway Park Development. With the City's consent, the group developing the Gateway Park project studied the Vocational High School site and integrated the area into its master plan. The site's size, location, and existing buildings and vacant lots, and present infrastructure, make it appealing for a mixed-use development of offices, retail, and market-rate housing.

Workforce Development

A number of workforce development initiatives were undertaken in the region during the past year. Recognizing that workforce development is of critical importance to successful economic development, particularly the retention of existing businesses and the attraction of new companies to the region, many organizations in the region have taken an active role in workforce development issues. The issue has been the focus of a number of conferences and forums designed to identify the issues surrounding workforce development and develop strategies to address those issues. Many regional organizations and agencies have collaborated over the past year to address workforce development issues, including organizing and holding a President's Breakfast, designed to bring CEOs and college presidents together to identify potential partnerships and ways to better meet the needs of today's workplace. Workforce Central has played a leading role in defining the needs of local industry and developing and funding programs to meet those needs. Workforce Central, a unique partnership between the City of Worcester's Office of Employment and Training and the state's Department of Employment and Training, funds numerous training programs throughout the region and serves as the area's One Stop Career Center. New training programs have been developed by other agencies and organizations as well, adding to the quality training opportunities available in the region's vast network of employment and training organizations. The Worcester Regional Chamber of Commerce is a strong supporter of workforce development initiatives, and was one of 77 select chambers across the country to participate in a national workforce

development survey conducted by the U.S. Chamber of Commerce's Center for Workforce Preparation. The resulting report provides valuable information on both a national and regional level on publicly-funded workforce development systems. The region's economic development and workforce development network acknowledges that in order to build and sustain a healthy, vibrant economy and to support successful industry sectors, the region needs to focus on strengthening its labor force, producing skilled workers, and creating valuable public-private partnerships to link business, education, and training.

Since July 1, 2003, the Central Massachusetts Regional Employment Board (REB) has continued to lead workforce development initiatives within the Central Massachusetts region (Worcester and 37 surrounding communities) in order to undertake new workforce development programs, placement and job training. Specifically, these federal and state funds allowed the REB to contribute financial, operational, and human resources to the activities outlined in the various contracts, i.e. providing both private and corporate citizens with a full array of employment, education and training programs in support of overall economic development, career centers, school-to-careers, welfare-to-work and incumbent worker training.

The REB applied for and successfully received a $2,999,000 award from the U.S. Department of Labor under its H1B Technical Skills Training Grant Program. Due to the shortage of domestic workers with the necessary skills for certain high technology jobs, many U.S. employers temporarily import foreign workers using H1B visas. This award is a statewide grant to retrain 400 degreed engineers, scientists and technicians by upgrading their skills through customized training. A feature of the grant is technology transfer using national laboratories to enhance the economic viability and growth of the region.

The Extended Care Career Ladder Initiative (ECCLI) is state sponsored. Funded by the Health Care Quality Improvement Trust Fund, ECCLI is a part of the Nursing Home Quality Initiative, which provides financial and other support to licensed skilled nursing facilities to help improve the skills, knowledge, and retention of their certified nursing assistants, (CNAs) and other entry-level director care workers.

The ECCLI grant is in three (3) parts, i.e. Round V for new facilities, Round VI for previously funded projects and Round VII for Home-Based Care Providers. Four (4) ECCLI grants were rewarded for a total of $588,526. The Central Massachusetts Regional Employment Board (REB), charged with performance management of the grants, is working with consortia of sixteen (16) nursing facilities and one (1) home health care provider.

The Nursing Career Ladder Initiative funded by the U.S. Department of Labor, is a response to the critical and growing shortage of nurses practicing in Massachusetts. The intent of this project in Central Massachusetts is to address the lack of students, student attrition, lack of clinical and classroom facilities available, backlog of applicants, and

shortage of teachers. Central Massachusetts received a grant award of $227,273 and is working with a community college, a state college, and collaborating medical centers.

The REB is also a partner with a consortia of statewide organizations who will receive $14,500,000 over the next 5 years to advise development of a comprehensive workforce policy agenda to guide statewide planning and legislative action, help carry out comprehensive advocacy campaign, and develop plans for marketing the policy agenda to the general public, business, and political leaders. The intent is to meet employers' skill needs and drive economic growth by helping low-wage workers advance to self-sufficiency.

The REB is also a partner in the Central Massachusetts Pipeline Network that received a $10,000 planning grant to later submit for additional funding. The state's Economic Stimulus Trust Fund legislation includes this provision to (1) increase the number of students who participate in programs that support careers in fields related to science, technology, engineering, and mathematics, (2) increase the numbers of teachers in those fields, (3) improve educational offerings, and (4) pilot a high school internship program for students pursuing post-secondary education in these areas.

The REB, in collaboration with the Manufacturing Advancement Center and Massachusetts Manufacturing Extension Partnership, will participate in the "Manufacturing Our Future" Summit, an annual event to feature critical and emerging technologies in manufacturing. It will be held simultaneously with the Worcester Regional Chamber of Commerce's New England Business Expo 2004, and the local AD Club competition featuring all forms of advertising and marketing media campaigns. The focus will be on the 7 regional vocational school systems, especially the new $90,000,000 vocational school in Worcester. Various industry clusters will be featured, student scholarships will be awarded, and a keynote luncheon will be presented. This also coincides with a REB program to link manufacturers with schools to provide Workforce Investment Act (WIA) outcomes, career counseling, and an awareness of all aspects of industry.

Workforce Central Career Ladder continues to provide re-entry employment services for individuals returning to the area after incarceration in the county, state or federal prison systems. Services are provided in conjunction with the Massachusetts Department of Corrections' Community Resources Center, operated by Spectrum House, one of five (5) such centers in the state. Training funds are also included in the grant to enable individuals to pursue skills training at local providers to increase marketability and retention in the labor force. The grant is now in its second year.

SABES (System for Adult Basic Education Support) Employment Network, ADA Regional Network and statewide Advisory Board, the Worcester adult basic education and ESOL community planners and education providers continue to advise the Department of Education with comprehensive "Assessment of Community Assets and

Needs." This is being used as a community profile to determine future funding and local programming.

Continued with distance learning study as part of the state's "Anytime, Anywhere" project at UMass-Boston, the research supports adult learners and the costs associated with them. This research project is being conducted by only 10 states.

Worcester Center Renovation Project

Berkeley Investments Inc. purchased the Worcester Common Outlets in downtown Worcester. Berkeley, in cooperation with the City of Worcester, plans to redevelop the 20-acre site into an urban village. The project includes demolition of retail areas and parking garage space, renovation of the two existing office buildings, reconfiguring Front St. to connect to Washington Sq. and an addition of a new road from Foster St. to Front St. The plan is to open Worcester's central business district to its east side. The project also includes the development of a 225,000 square foot medical office building, approximately 300,000 square feet of first floor retail space, 400 – 700 units of housing, and entertainment venues. The development is expected to create 250 new jobs, will be a 5-7 year project starting in the spring of 2005 and will consist of 3 phases of development. The estimated project cost is $300 million.

Regional Justice Center

Construction of a new five-story, 430,000 square foot Regional Justice Center on Main Street in Worcester began in the spring of 2004. The Center will house superior, district, and housing courts. The estimated total project cost is $180 million and the project is expected to be completed in the fall of 2006.

Significant Development Highlights

Construction of the $6.2 million ***Worcester Common Renovation Project*** began in the spring of 2004. Renovation plans include a skating rink, event space, restored monuments, administration building, and new benches, fencing, and lighting. Funding will be provided through a combination of sources, including $1 million in federal Land and Water Conservation Fund allocations and two $500,000 appropriations from the City, as well as private donations.

The Town of Sutton plans to develop the ***Central Pike Center*** at the intersection of Rt. 146 and the Central Turnpike. The project, which will include restaurants, small stores, a bank and office space, is in the preliminary stages of development.

Charter One Financial opened a 70,000 sq. ft. ***Price Chopper*** at 50 Cambridge St. in Worcester. The bank also announced that this is the first step in a series of new openings within the Greater Central Massachusetts region.

The $20 million ***Wal-Mart Supercenter*** in Northbridge just off of Main St. by Rt. 146 is planning to open twenty-four hours a day, seven days a week. The new 24-hour a day Wal-Mart will be one of a handful of supercenters on the east coast that will be open all day long. The all night business will create a large-undisclosed number of jobs for the Northbridge region.

Shaw's Supermarkets began demolition of the Woodbury and Co. building in Worcester. Construction of the new supermarket is expected to begin in the summer of 2004 and be completed in the winter of 2005. The property was bought for $4.7 million. *Shaw's Supermarket* is also constructing a supermarket on Grafton St. in Worcester. The project is expected to be completed in the summer of 2004.

The ***Webster Five Cents Savings Bank*** has opened an operating center in the Auburn Industrial Park. The 20,000 sq. ft. facility centralizes support services for the banks eight branches and will create approximately 35-40 new jobs.

Preventative Medicine Associates have opened another multi-disciplinary medical practice office in Worcester. Their practice involves drug therapy treatment, stress and anxiety related disorders, depression, addiction and other types of psychological and physiological illnesses. This is the company's seventh office in the region that will serve all of northern Connecticut, upstate New York and Central Massachusetts.

The developer of the ***Atlantic Bag Co. Building*** in Worcester began converting the three story 17,000 sq. ft. building into a mixed-use development complex that will house a restaurant, café, retail, and housing.

A 160-unit apartment building complex is to be built on the former ***Worcester Driving Range and Learning Center*** at Shrewsbury and Franklin Streets in Worcester. The new building will include a four level 327 space parking garage. Two of the three structures will be razed and a 19th century building will be renovated into a leasing office and recreational facility for the complex's tenants.

The Town of Princeton plans to rebuild Mountain Rd., which flanks the ***Wachusett Mountain State Reservation***. Construction is to start in the spring and will require $3 million in state funding.

National Development began construction on ***Arbor Point Apartments***, Worcester's first significant luxury rental development to be built within the last decade. The 300-unit apartment complex will be located at Routes 290 and 9 and include a clubhouse, fitness center, pool, cable and high-speed Internet access.

Avalon Bay Communities plans to build a 283 unit apartment complex in Shrewsbury. It will include 15,000 sq. ft. of retail space, 20% affordable housing and 70% reserved for residents of Shrewsbury. The complex will occupy 25 acres of land off of Rt. 20.

The ***Rutland Heights Hospital*** is to be redeveloped into mixed elderly housing, commercial and industrial space, and a municipal area. The site will require $10 million in demolition and hazardous material clean up.

Polar Beverages has bought the adjacent American Pressed Metal Building in Worcester in order to expand their business. The 45,000 square foot building will be renovated and the project is expected to create 10 new jobs.

WPI plans to redevelop a $5 million admissions and financial aid center that would include a 500 car underground parking garage. The project is to coincide with an effort to attract liberal arts students to the school in order to draw a broader range of students.

Highland Commons is proposing to build a $90 million mall on 161 acres of land off of Rt. 62 and 495. The proposal includes 800,000 sq. ft. of retail space, including access roads and traffic signals. 40% of the area is to remain as open space to preserve natural aesthetics.

Nichols College of Dudley plans to construct a $1.4 million Athletic Complex complete with a football and multipurpose stadium. It is expected to seat 1,200 and will be completed by the end of the fall in 2004.

Renovation of the ***Wright Steel and Wire Facility*** on Stafford Street in Worcester is undergoing a $2 million renovation, which includes installation of new concrete floors, painting and clean up.

The ***Town of Douglas*** intends to re-zone 400 acres for industrial space. Utilities and additional infrastructure are required and are expected to cost $10 million.

Cover Technologies plans to buy the Fisherville Mill in Grafton to restore it for commercial use. Cleanup costs are expected to cost $4 million.

A $1.2 million project to widen ***Worcester's Airport Drive*** is being overseen by the Massachusetts Highway Department. New guardrails, drainage and water mains will rehabilitate the road.

NY based ***Liberty Properties*** seeks to convert the former St. Vincent's Hospital Building into a 550,000 sq. ft. housing facility off of Vernon Street in Worcester. Apartments would be constructed in the seven story main building, which would remain a mixed residential, medical and biotechnological complex.

The City of Worcester is in the process of selling the G.A.R. Memorial Hall to Sherman March LLC. The LLC plans to relocate the popular ***Tiano's Restaurant*** to this historic building, which is located in the downtown. Tiano's will include seating for 300 guests and a banquet facility. The estimated $2.1 million project will create new jobs, retain existing jobs, generate new taxes, increase pedestrian activity in downtown Worcester during weeknights and weekends, and, most importantly, utilize a historic building that has been underutilized for many years.

Educational Facilities and Other Institutions

One of the Region's economic strengths is its abundance of undergraduate and graduate institutions. Not only is this sector a major employer, but also the large number of graduating students each year helps to fill employers' needs for a skilled and educated workforce.

Worcester County colleges are reported to have a $2.6 billion effect on the Worcester area economy. A report entitled "Discover the Intellectual Capital of Central Massachusetts" highlights the colleges' roles in developing a well-trained work force as well as providing faculty experts, economic partnerships, community programs and cultural opportunities for the region. The total enrollment of the area's 16 schools is 36,168 students, and the schools employ 10,740 people. Due to the ripple effect of campus spending, an additional 10,920 jobs are created that support the educational mission of the schools. The total budget of all the colleges is equal to $850.6 million. Students spent $259 million off-campus on goods and services, and guests of the students spent $50 million. The colleges contribute over 7,000 graduates per year to the Worcester County area. The Colleges of Worcester Consortium is a total of 16 schools, including: Assumption College, Atlantic Union College, Becker College, Clark University, Fitchburg State College, Holy Cross, Nichols College, Massachusetts College of Pharmacy and Health Sciences, Quinsigamond Community College, Tufts University School of Veterinary Medicine, University of Massachusetts Medical School, Worcester State College, and WPI.

Maintaining and improving the physical facilities, athletic and recreational fields, and information technology resources at independent, special needs, and higher education schools of learning is essential to the economic vitality of the greater Worcester area. During the past year, the region's colleges and trade schools continued to invest in their facilities.

During the past year, numerous education institutions completed major capital projects. The following is a brief summary of these projects.

Since its founding in the late 1860's, the ***Worcester Polytechnic Institute (WPI)*** has been a leading community member and vital resource in the City of Worcester. During the summer of 2003, WPI initiated a $12 million campus improvement project that included construction of a new heating plant and capital improvements to various campus buildings.

The WPI Bioengineering Institute (BEI) officially opened on April 24, 2003. The WPI Bioengineering Institute will capture the best ideas from the area's academic and corporate bio-research laboratories to design and manufacture products in central Massachusetts aimed at improving health and healthcare delivery worldwide. It provides crucial links between the growing life science sector and the region's historically strong manufacturing community. BEI will create partnerships with area universities, hospitals,

corporations and entrepreneurs to form an economic cluster focused on the creation and manufacture of bioengineered products such as medical devices; innovative approaches to improving healthcare delivery systems; and the development of new manufacturing processes for medical products. As a part of WPI, it draws from the university's expertise in areas such as biosensors, wireless communication, information technology, bioinformatics, medical imaging and visualization systems. The institute has established four centers: the Center for Bioprocessing and Tissue Engineering, the Center for Comparative Neuroimaging, the Center for Molecular Engineering and the Center for Untethered Healthcare. Currently, 25 research scientists, postgraduate and graduate-level researchers, and support staff work at BEI. The institute has already been awarded more than $3 million in research funding. Located at 60 Prescott Street in Worcester, the Bioengineering Institute is an anchor tenant in Gateway Park, a 15-acre, master-planned redevelopment of former brownfield parcels and vacant properties under development by Gateway LLC, a public-private venture between WPI and the Worcester Business Development Corporation.

Eagle Hill School is an internationally known boarding school located in Hardwick. The school serves a co-educational population of young men and women who have special academic and social needs arising from learning disabilities and related challenges such as attention deficit disorder. Eagle Hill School is an innovative and respected educational institution that is recognized for its ability to foster a community and climate that honors individual learning styles. To improve its school campus and student services in July 2003, Eagle Hill School initiated a $10 million construction project to build a new dormitory and athletic field.

Clark University is constructing a new 50,000 square foot biological science building and a 30,000 square foot athletic field house, renovating its 32,000 square foot biophysics building, expanding its parking facility with 300 new spaces, and refinancing existing debt. The total project cost is $34.5 million, financed with a $30 million MassDevelopment 501 (c)(3) Tax-Exempt Bond. Eight new jobs will be created as a result of the project.

Anna Maria College is constructing a 6,600 square foot arts building to include painting and sculpture studios, a graphic design classroom, a kiln room and a darkroom. The construction cost is estimated at $1.8 million. The college plans to construct a new sewer at a cost of $3.5 million, and will acquire new software for $250,000, as well refinance existing debt. The total project cost is financed by a $7 million Tax-Exempt Bond issued by MassDevelopment.

Bay Path College opened a 12,000 square foot satellite campus in Southbridge. The college offers a Saturday program targeted specifically to women seeking to gain an education while juggling full-time jobs and families. This unique program will enhance the area's labor force by increasing the number of skilled an educated workers prepared for today's employer demands.

Quinsigamond Community College completed a $15 million library and learning resource center. The 54,000 square foot, three-story building includes a 23,000 square foot library, an interactive student lounge, study areas, reading rooms, a tutorial center, and classrooms. The center serves as one of the Commonwealth's educational test sites for introducing advanced technology into other colleges and universities statewide. It also accommodates Internet and Intranet access and is flexible in adapting to emerging technologies.

Worcester State College (WSC) has nearly finished construction on two new six-story residence halls and the renovation of the student apartments in its Chandler Village complex. The project will cost approximately $32.0 million and is expected to be completed in the fall of 2004. The addition will accommodate approximately 348 new students. Work also includes a loop access road around the south and west portions of the campus and additional parking. The college received approval on a $14 million bond issue from the MA Health and Educational Facilities Authority in December of 2002.

Assumption College completed construction of its $18 million 63,000-square foot story science building in the fall of 2003. The building contains teaching laboratories, research space for biology, chemistry, and physics departments, as well as a lecture hall, classrooms, a computer lab and numerous computer workstations. This building replaces the old science building, which will be renovated for classroom use.

College of the Holy Cross completed construction on an 85,523-square foot, 244-bed, apartment-style residence hall. Holy Cross also added a new 450 space parking garage to replace a surface parking lot. The college has also developed a Master Plan for its campus to guide future expansion and address concerns raised by neighbors in recent years.

Blackstone Valley Regional Vocational Technical High School: All member towns of the regional school district approved an expansion plan for the vocational school. A contract for $26.9 million was awarded to add 46,500 square feet and renovate the existing floor area of 226,000 square feet. With a current enrollment of 900 students, the expansion will add capacity for 300 students and allow the district to meet the growing interest in vocational education throughout the Blackstone Valley. The expansion will add 14 new classrooms and 4 new vocational programs.

The ***American Red Cross of Central Massachusetts*** purchased 5 acres in the Worcester Corporate Center in West Boylston and constructed a 25,000 square foot headquarters. The building will house Red Cross's disaster relief and life-saving training programs.

Job Loss

TranXenoGen Inc. a biotech company in Shrewsbury, laid off six full time workers, leaving the company with a staff of 14. TranXenoGen is developing genetically altered hens capable of producing human therapeutics in the whites of their eggs. The company lost $4.4 million in 2003.

J-QUE Biologics, Inc., a privately held company that manufactures antibodies in chickens filed a Chapter 7 bankruptcy petition to liquidate its business. The company started operations in 2001 and moved to the Mass. Biomedical Initiatives incubator in St. Vincent Hospital in 2002.

Bioreliance Corp. of Rockville Maryland closed its drug-testing facility in Worcester after deciding to consolidate its operations; 44 employees were affected, some of who were offered jobs in Rockville. The company offers drug-testing services to biopharmaceutical companies aimed at determining the toxicity, stability and shelf life of drugs.

GTC Biotherapeutics, Inc. formerly Genzyme Transgenics, which has operations in Charlton, cut its staff by 24 employees in the fall of 2003, and shed another 32 jobs in the spring of 2004. The moves will allow the company to focus on the commercialization of its vaccines and other products. Reductions occurred in the areas of farm operations, molecular biology, and administration.

WPI laid off 45 employees in November 2003. Most of the employees were clerical and secretarial. A $4 million budget shortfall, primarily due to increased financial aid costs, low returns on endowment investments, and reductions in revenue from reduced enrollment in continuing education programs were the cause of the staff cuts.

Fiber Core, Inc., once a promising manufacturer of telecommunications fiber with a plant in Charlton, filed for Chapter 11 bankruptcy, ceased operations, laid off all of its employees, and is liquidating its assets. The demise of the company was a result of a severe drop in demand for the company's fiber. About 8 workers were employed in Charlton.

In the fall of 2003, ***3Com Corp.***, the country's fourth largest manufacturer of computer networking equipment decided to close manufacturing plants in the U.S. and eliminate about 1,000 jobs. 3Com has its headquarters in Marlborough, but it was unclear how many local jobs would be lost. Most of the jobs eliminated were in manufacturing and supply chain operations. In addition, 3Com laid off an undisclosed number of employees in the spring of 2004. This time, the company decided to outsource several of its administrative functions, including human resources, accounting and engineering to further reduce operating costs.

The Brookfield Group, LLC, with a plant in West Brookfield, filed for Chapter 11 bankruptcy during the winter. The company operates plastics injection-molding business from seven locations and employs more that 400. It was not disclosed how many local workers were let go.

EPresence, Inc. in Westboro dissolved in the fall of 2003, sold off its security and identity services business to Unisys Corp., and liquidated its other assets. Many of the company's 115 employees were expected to be retained by Unisys Corp. The company was a designer of online security features that enable access to secure business-related web sites.

Fabric Networks, Inc., the former InfiniSwitch Corp., ceased operations and laid off most of its 30 Westboro-based employees. The company made software used in high-performance computing. Because of its narrow field of specialization, it was unable to find enough customers for its advanced technology.

Twelve employees in ***UnumProvident Corp's*** benefits center in Worcester lost their jobs during the year. Unum employs about 900 workers in Worcester. Local operations handle much of the company's individual disability income claims.

Allmerica Financial Corp. decided to close its last remaining life insurance operation and to concentrate its focus on being a regional property and casualty insurer. The company closed down its broker-dealer operation and eliminated 335 jobs, about 165 of who were employed in Worcester. The unit sold non-proprietary insurance and retirement-savings products and services to individuals.

Tyco International Ltd. of Westminster is moving 80 jobs from its Safety Products division to other locations in the U.S. The move is in line with the company's ongoing restructuring efforts. Tyco Safety Products manufactures electronic security systems, fire protection detection and suppression systems, sprinklers and fire extinguishers. The cuts were in all sectors of the division, including administration, manufacturing, and distribution.

Citing weakness in the markets it serves, ***Saint Gobain Abrasives, Inc.*** in Worcester reduced its workforce by 35 salaried employees in its bonded abrasives and super-abrasives units. The company hoped enough volunteers would accept the cuts to prevent forced lay-offs.

UMass Memorial Medical Center in Worcester laid off 44 employees to counter rapidly escalating costs of care for the uninsured. The cuts occurred in administration and information technology, and some registered nurses who work in outpatient positions also lost their jobs.

Rockbestos Suprenant Cable Corp. closed an aging manufacturing plant in Clinton and transferred work to facilities in other communities, resulting in the loss of about 130 jobs. The company makes cables used in the automotive and oil industries. The plant was closed due to high operating costs and industry competition.

JAM Plastics, Inc. a custom plastics molder in Worcester laid off 8 of its 31 workers. The plastics company cited increased competition from China where wages are much lower and difficult to match by American workers.

Corning Inc. closed its glass fiber plant (the former Optovac facility) in North Brookfield, eliminating 45 jobs. Locally, Corning Inc. manufactured pure optical glass primarily used in the semi-conductor industry

Ralphco Inc., a manufacturer of molded plastic materials in Worcester, filed for Chapter 11 bankruptcy protection in the fall of 2003. Between 5 and 15 employees were let go. It is hoped reorganization will eliminate unprofitable products and decrease its cost structure. The company is best known for its coin banks in the shape of crayons.

Reed-Rico, a long-time tenant in the Holden Industrial Park, decided to reduce its work force from 120 to 40 in the spring of 2004. The company manufactures equipment to make screws and other fasteners for the aerospace and automotive industries. Its parent company, Precision Castparts has two other plants in Ireland and India that perform similar work. As recently as 1998, Reed-Rico employed more than 300 people, but steady reductions to improve margins proved unsuccessful. Again, cheaper Asian labor was cited as one of the principal causes of the demise.

Wyman-Gordon Co., another division of Precision Castparts Corp. laid off approximately 50 employees in the fall of 2003. Wyman-Gordon forges aerospace parts for military and commercial use and products for the energy industry.

Spags 19, a landmark retailer in Shrewsbury for many years, trimmed its workforce by 25 in a cost-cutting move. Declining sales and increased competition were the principal causes of the layoffs.

Tax Increment Financing Agreements

Fargo Management LLC received a 20-year Tax Increment Financing package. The $22 million project includes the construction and operation of a ten-story, 200-room Hilton Garden Inn Hotel in downtown Worcester. The hotel will include a 100-seat national restaurant chain operation on the first floor, a pool and 7,000 square feet of meeting rooms and will be connected to both the City-owned parking garage and Worcester Centrum Center Convention Hall via pedestrian skywalks. The project is expected to create 100 new permanent full time positions.

15 Hope Ave. Realty, LLC and Polar Corporation received a 10-year Tax Increment Financing package. The company purchased 76,639 square feet of land in Worcester that contained two abandoned buildings. Polar Corporation plans to demolish one building, remediate the site, and renovate one building into a warehouse facility. The project is expected to create 10 new jobs. The total project cost is estimated at $750,000.

AC Technology, Inc. in Uxbridge received a 15-year Tax Increment Financing package. The company, which is in the process of expanding their operations, is constructing a 70,000 square foot building. The total project cost is estimated at $4.8 million. The project is expected to create 30 jobs.

Additional companies that received Tax Increment Financing packages include:

Wilson Language Training in Oxford. 20-Year TIF, 50 jobs created, 50 jobs retained, $2.5 million private investment

Radius Product Development in Clinton. 10-Year TIF, 20 jobs created, 26 jobs retained, $1.8 million private investment

Riverdale Mills in Northbridge. 10-Year TIF, 24 jobs created, 94 jobs retained, $3 million private investment

Grants and Awards

The ***Main South Community Development Corporation*** received a $200,000 grant from the EPA to clean up five parcels of the 7.8 acre Gardner Kilby Hammond St. Neighborhood Revitalization Project. The EPA received 1,200 applications for the funding and this was one of 28 accepted on July 7th, 2003. The land will be used to build a new boys and girls club and Clark University athletic fields. It is part of a total $1.8 million aid to the Main South area of Worcester.

The ***City of Worcester*** received an Economic Development Administration Section 203 Planning Assistance Grant in the amount of $75,000 for a twelve-month period from May 1, 2004 through April 30, 2005. The City undertook a planning program consisting of the following elements with the overall goal of planning for the revitalization of targeted pockets of distress and underutilized properties in Worcester: 1) Planning for the creation of new industrial space, 2) Planning for the revitalization of existing underutilized industrial space and brownfield sites, 3) Planning for the revitalization of Downtown Worcester, 4) Co-Staffing the Greater Worcester Area Comprehensive Economic Development Strategy Committee and Regional Economic Conditions and Prospectus Study, and 5) Expanding and Extending Worcester's Business Assistance Programs and the Brownfields Revolving Loan Fund.

The ***City of Worcester*** and its co-applicant, the ***Martin Luther King, Jr. Business Empowerment Center (MLKJ-BEC),*** received a $1,200,500 grant from the U.S. Department of Commerce's Economic Development Administration under its Public Works Program to fund a rehabilitation project referred to as the MLKJ-BEC Renovation Project. The estimated cost of the project is $1,715,500 and involves the rehabilitation and modernization of approximately 27,131 square feet of new incubator space within the MLKJ-BEC's 42,224 square foot facility at 237 Chandler Street to house several more small businesses and those aspiring to be entrepreneurs. The project is expected to create about 25 new small businesses and about 60 new jobs, as well as assist in the revitalization of the distressed Piedmont-Main Neighborhood. The MLKJ-BEC anticipates the completion of this project will allow for approximately 45 small businesses that employ approximately 140 people to be incubated at their facility at 237 Chandler Street.

Workforce Training Fund and Express Grants
FY'04

The following is a list of awards made by the Department of Employment and Training to communities in the region in FY '04 under the Massachusetts Workforce Training Fund and Express Grant programs.

Massachusetts Workforce Training Fund

Approved Training Applications

Grant Type : Training

Recommendation Type : All Approved Applications

Region : Central

Applicant	Grant Amount	# Trainees	City	Industry	Training Description
Archer Rubber Company	$125,305	65	Milford	Manufacturing	Supervisory Leadership to improve managerial and leadership based skills including managing conflict and employee motivation/retention. Business process Documentation to properly document work processes and procedures, work instructions, job description.
Barker Steel Company, Inc.	$4,081	13	Milford	Manufacturing	Classroom training to increase working knowledge of AutoCad skills.
Clariant Corporation Masterbatch Division	$69,000	37	Holden	Manufacturing	Management/Leadership Development and Plastics Manufacturing Technologies training.
Cranston Print Works	$242,000	240	Webster	Manufacturing	A continuous improvement process utilizing Dr. Deming's Quality approach, lean manufacturing techniques of 5-S Housekeeping and total production maintenance, and leadership training for both union and management employees.
Flexcon Company Inc.	$51,000	660	Spencer	Manufacturing	The focus is on Lean Manufacturing: 1) Lean Concepts, 2) Value Stream Mapping, and, 3) Kaizen Workshops. The goal is to reduce waste and increase productivity.
Saint Gobain Containers Inc.	$77,140	43	Milford	Manufacturing	Continuous process improvement- focus on team building and problem solving; supervisory leadership training- enhance leadership and communication skills; and business process documentation- provide employees with skills to improve problem solving.
Slideways, Inc.	$30,400	12	Worcester	Manufacturing	Document and improve business processes, implement lean tools and techniques and enhance internal and external customer satisfaction while reducing non-value added activities.

Spectro Coating Corporation	$25,000	80	Leominster	Manufacturing	ISO 9001:2000 certification.
Workers Credit Union	$60,375	181	Fitchburg	Financing	The requested funds will be used for Customer Service Training, Professional Skills Development and in support if a computer systems up-grade.

Applicant	Grant Amount	# Trainees
Total no of grants for CEDS District Region = 9	**$684,301**	**1331**

MassDevelopment Assistance

During fiscal year 2004, programs of MassDevelopment provided financial assistance for the following economic development initiatives, programs and projects located within the Greater Worcester Area CEDS district:

Fiscal Year 2004 (11 months through 5/31/2004)

	Company/Institution/Project	Location	Program	Amount	Date
1	Stafford LLC	Worcester	Brownfields Redevelopment Fund Loan	$ 250,000	May-04
2	Gateway Park, LLC (renewal / extension)	Worcester	Brownfields Redevelopment Fund Loan	$ 350,000	Oct-03
3	Upton Development Goup, Ltd.	Upton	Brownfields Site Assessment	$ 50,000	Jul-03
4	Stafford, LLC	Worcester	Brownfields Site Assessment	$ 50,000	Feb-04
5	Biomedical Research Models, Inc.	Worcester	Loan Guarantee	$ 125,000	Mar-04
6	Gateway Park, LLC (renewal / extension)	Worcester	Mortgage Insurance Guarantee	$ 500,000	Oct-03
7	Stafford LLC	Worcester	Real Estate Loan	$ 250,000	May-04
8	Gateway Park, LLC (renewal / extension)	Worcester	Real Estate Loan	$ 750,000	Oct-03
9	Gateway Park, LLC (renewal / extension)	Worcester	Real Estate Loan	$ 1,650,000	Oct-03
10	Eagle Hill Foundation of Massachusetts, Inc.	Hardwick	Tax-Exempt 501 (c)(3) Bond	$ 8,000,000	Jul-03
11	Worcester Polytechnic Institute	Worcester	Tax-Exempt 501 (c)(3) Bond	$ 15,000,000	Jul-03
12	Atlas Box & Crating Company	Sutton	Tax-Exempt Industrial Development Bond	$ 4,050,000	Dec-03
12	**Total Projects**			**$ 31,025,000**	

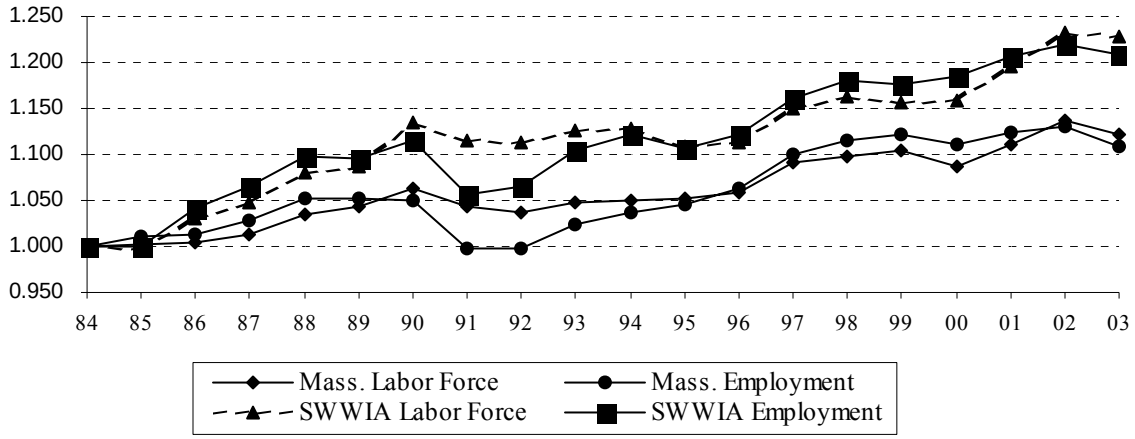
Worcester Business Development Corporation SBA 504 Program Activity:
FY 2004

Company	Location	Loan Amount	Private Investment Leveraged	Total Jobs
Dudley Diesel Services, Inc.	Dudley, MA	$144,000	$206,000	7
Incase, Inc.	Hopedale, MA	$617,000	$883,000	17
Ross Express, Inc.	Sutton, MA	$646,000	$924,200	30
Harding Allen Estate	Barre, MA	$710,000	$1,247,000	6
TOTALS		**$2,117,000**	**$3,260,000**	**60**

CHANGES IN THE AREA'S ECONOMY

Presented on the following pages are a series of charts and graphs indicating changes that have occurred in the economy of the Southern Worcester Workforce Investment Area (WIA) during the past year. The graphics were originally prepared for the *Economic Conditions and Prospects Study* (based upon 1994 data), but have been updated for this report. You are referred to the original study prepared by the Central Massachusetts Regional Planning Commission for a more complete analysis of the area's economic characteristics.

Labor Force and Employment
1984-2003



- From 1984 to 2003, the Southern Worcester WIA's employed labor force grew 10% faster than the state as a whole: 20.8% versus 10.9%.

- During the period, nearly 45,070 additional jobs were provided for residents of the WIA, bringing the total employed labor force to 261,860.

- From the end of the recession in 1991 to 2003, over 32,800 jobs were added to the WIA's employed labor force.

- As a result of the recent recession, the unemployed labor force in the WIA increased from 7,211 in 2000 to 17,835 in 2003. The WIA labor force in 2003 was 279,695, down from a 2002 peak of 280,668.

- The unemployment rate in the WIA peaked in 1991 at 9.8%, higher than the national and state rates of 6.8% and 9.1% respectively.

- The national and state unemployment rates declined to 4.0% and 2.6% respectively in 2000. Since 2000, however, the national rate increased to 6.0%, and the state rate increased to 5.8%.

- From 2001 to 2003, the unemployment rate for the WIA increased from 3.9% to 6.4%. In 2003, the WIA unemployment rate was higher than the state's unemployment rate at 5.8%.

- The WIA unemployment rate in 2000 reached a 17-year low of 2.7% but has risen dramatically to 6.4% in 2003.

Employment by Sector
2001-2003

The Standard Industrial Classification (SIC) code has been replaced by the North American Industry Classification System (NAICS) code. Many of the new NAICS employment sectors reflect portions of the previous SIC divisions. For example, the Utilities and Transportation sectors were formally parts of the SIC division Transportation, Communications and Utilities. The SIC division for Service Industries has been subdivided into several additional sectors. Other NAICS sectors represent portions from several former SIC divisions. The new Information sector includes components from Transportation, Communications and Utilities (broadcasting and telecommunications), Manufacturing (publishing), and Service Industries (software publishing, data processing, information services, motion picture and sound recording). The Accommodation and Food Services sector combines hotels and other lodging places from Service Industries and eating and drinking places from Retail Trade.

As a result of the lack of comparability between the two codes, a separate comparison of Employment by Sector has been prepared for the period 2001-2003. Data for 2003 is through the 3rd quarter. Refer to the table Employment by Sector that follows for detailed employment by sectors and sub-sectors.

In addition, the Local Workforce Investment Board (LWIB) has been renamed the Workforce Investment Area (WIA).

- Southern Worcester WIA total employment decreased 5,399 from 243,184 in 2001 to 237,785 in 2003.
- The *Manufacturing* sector experienced the largest decrease, from 35,358 in 2001 to 30,061 in 2003, a loss of 5,297.
- In 2003, other major sectors and their employment totals included *Education and Health Services* (62,837), *Trade, Transportation and Utilities* (47,663), *Leisure and Hospitality* (20,759) and *Construction* (11,052).
- Among individual employment categories, *Educational Services* and *Accommodation and Food Services* increased 1,637 and 1,245 respectively.
- The larger employment losers included *Professional and Business Services* (-1,601), *Health Care and Social Assistance* (-761), *Retail Trade* (-735) and *Information* (-481).

Employment by Sector

Southern Worcester Workforce Investment Area
Years: 2001-2003

Description	Average Monthly Employ. 2001	Average Monthly Employ. 2002	Average Monthly Employ. 2003*	Change in Employ. 2001-2003
Total, all industries	**243,184**	**239,812**	**237,785**	**-5,399**
Natural Resources and Mining	**394**	**373**	**397**	**3**
Construction	**11,248**	**10,912**	**11,052**	**-196**
Manufacturing	**35,358**	**31,748**	**30,061**	**-5,297**
Food Manufacturing	785	765	772	-13
Textile Mills	1,049	989	869	-180
Textile Product Mills	117	103	89	-28
Wood Product Manufacturing	267	221	249	-18
Paper Manufacturing	1,234	1,231	1,206	-28
Printing and Related Support Activities	1,360	1,193	1,114	-246
Petroleum & Coal Products Manufacturing	48	51	40	-8
Chemical Manufacturing	1,486	1,442	1,618	132
Plastics & Rubber Products Manufacturing	2,768	2,528	2,466	-302
Nonmetallic Mineral Product Mfg	3,601	3,189	2,612	-989
Primary Metal Manufacturing	993	750	685	-308
Fabricated Metal Product Manufacturing	5,882	5,405	5,134	-748
Machinery Manufacturing	3,781	3,262	2,907	-874
Computer and Electronic Product Mfg	7,036	5,892	5,484	-1,552
Electrical Equipment and Appliances	1,016	876	1,004	-12
Transportation Equipment Manufacturing	329	309	284	-45
Furniture and Related Product Mfg	829	886	743	-86
Miscellaneous Manufacturing	1,529	1,434	1,452	-77
Trade, Transportation and Utilities	**48,333**	**47,926**	**47,662**	**-671**
Utilities	1,597	1,628	1,553	-44
Wholesale Trade	10,361	10,235	10,468	107
Retail Trade	28,793	28,405	28,058	-735
Transportation and Warehousing	7,582	7,658	7,584	2
Information	**4,947**	**4,836**	**4,466**	**-481**
Financial Activities	**13,933**	**14,233**	**14,174**	**241**
Finance and Insurance	11,555	11,817	11,761	206
Real Estate and Rental and Leasing	2,378	2,416	2,413	35
Professional and Business Services	**30,321**	**29,473**	**28,720**	**-1,601**
Professional and Technical Services	11,516	11,587	10,865	-651
Management of Companies and Enterprises	6,600	6,635	5,934	-666
Administrative and Waste Services	12,205	11,251	11,921	-284
Education and Health Services	**61,960**	**62,103**	**62,837**	**877**
Educational Services	23,645	24,416	25,282	1,637

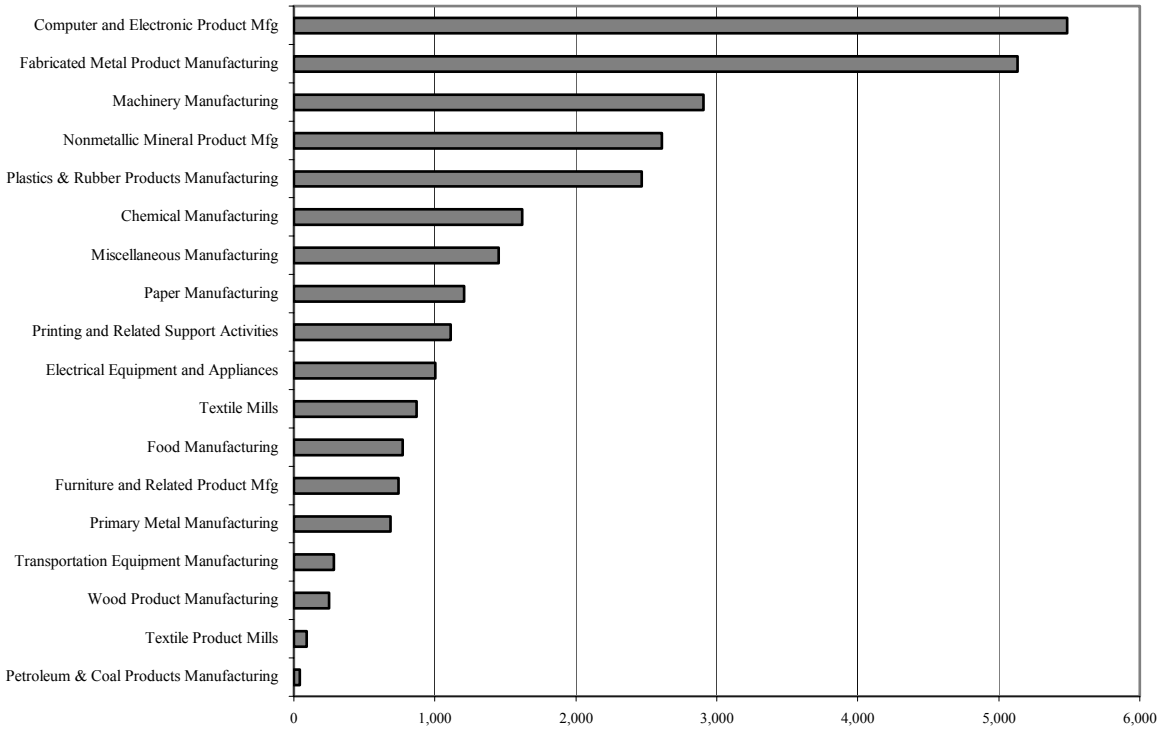
Employment by Sector

Southern Worcester Workforce Investment Area
Years: 2001-2003

Description	Average Monthly Employ.	Average Monthly Employ.	Average Monthly Employ.	Change in Employ.
	2001	**2002**	**2003***	**2001-2003**
Health Care and Social Assistance	38,316	37,687	37,555	-761
Leisure and Hospitality	**19,183**	**20,200**	**20,759**	**1,576**
Arts, Entertainment, and Recreation	3,280	3,517	3,611	331
Accommodation and Food Services	15,903	16,683	17,148	1,245
Other Services (except Public Administration)	**8,479**	**8,855**	**8,626**	**147**
Public Administration	**9,026**	**9,153**	**9,031**	**5**

* Employment through 3rd Quarter of 2003
Source: Mass. Division of Unemployment Assistance

2003 Manufacturing Employment



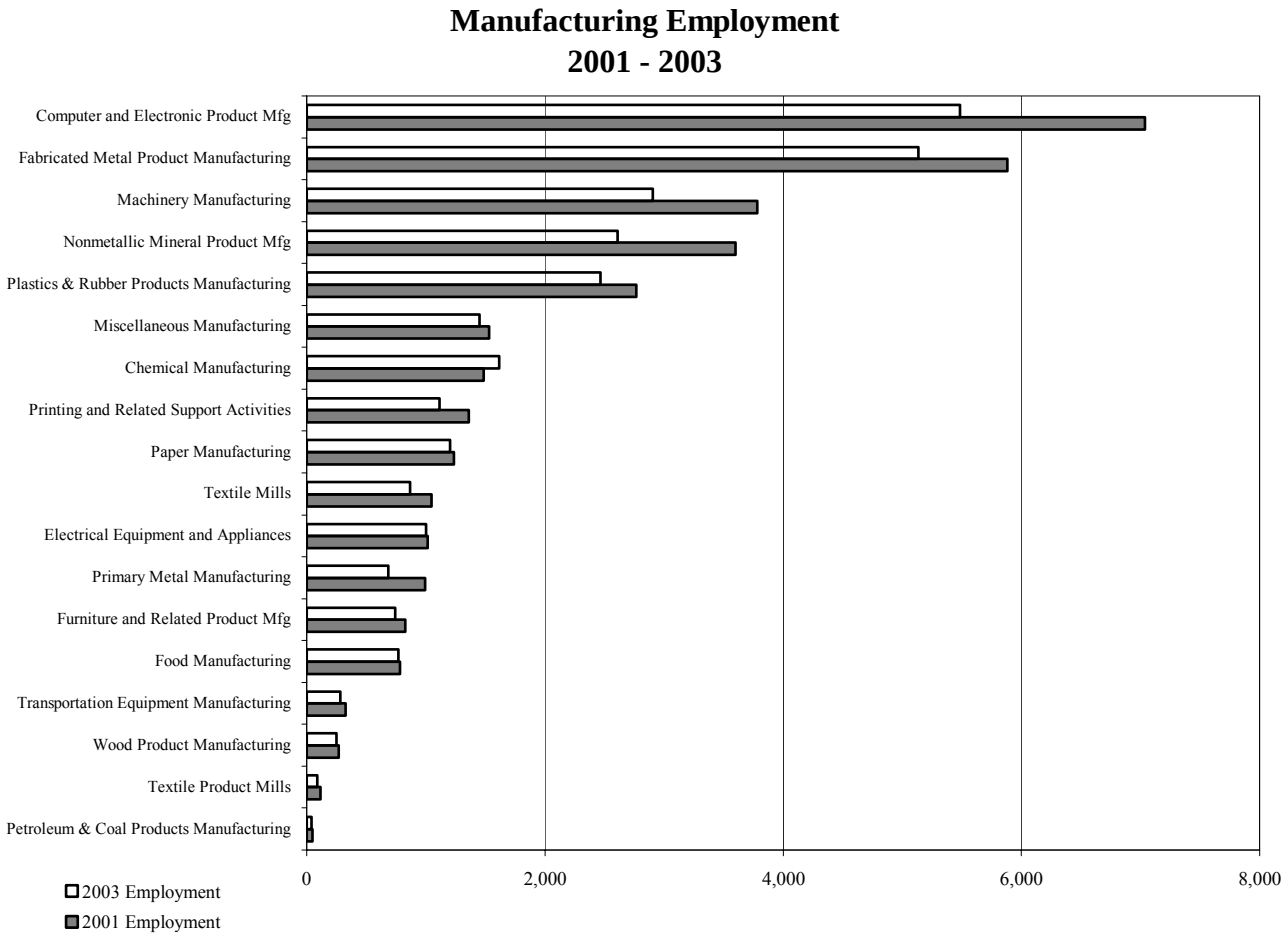
In the *manufacturing* sector, the largest employment categories (based on three-digit NAICS codes) and their percentage of total *manufacturing* employment in the WIA are:

Total Manufacturing Employment	30,061	(100%)
Computer and Electronic Product Mfg	5,484	(18.2%)
Fabricated Metal Product Manufacturing	5,134	(17.1%)
Machinery Manufacturing	2,907	(9.7%)
Nonmetallic Mineral Product Mfg	2,612	(8.7%)
Plastics & Rubber Products Manufacturing	2,466	(8.2%)
Chemical Manufacturing	1,618	(5.4%)
Miscellaneous Manufacturing	1,452	(4.8%)
Paper Manufacturing	1,206	(4.0%)
Printing and Related Support Activities	1,114	(3.7%)
Electrical Equipment and Appliances	1,004	(3.3%)
Textile Mills	869	(2.9%)
Food Manufacturing	772	(2.6%)

- Employment categories within *manufacturing* that experienced significant drops in employment in 2003 were nonmetallic mineral product manufacturing (-577),

computer and electronic product manufacturing (-408), machinery manufacturing (-355), fabricated metal product manufacturing (-271), and furniture and related product manufacturing (-143).

♦



♦ The only *manufacturing* industry that gained employment in the WIA between 2001 and 2003 was chemical manufacturing with 132 additional workers.

♦ The *manufacturing* categories experiencing the largest losses in employment during the period included:

computer and electronic product manufacturing	-1,552	(-22.1%)
nonmetallic mineral product manufacturing	-989	(-27.5%)
machinery manufacturing	-874	(-23.1%)
fabricated metal product manufacturing	-748	(-12.7%)
primary metal manufacturing	-308	(-31.0%)
plastics & rubber products manufacturing	-302	(-10.9%)
printing and related support activities	-246	(-18.1%)

♦ Overall, between 2001 and 2003, *manufacturing* employment in the WIA decreased by 5,300 jobs.

PRIORITY GOALS, OBJECTIVES AND STRATEGIES OF THE

CEDS COMMITTEE AND ITS MEMBER AGENCIES

2004

GOALS AND DEVELOPMENT STRATEGIES

The regional *Economic Conditions and Prospects Study* completed by the Greater Worcester Area CEDS Committee in 1996 contains thirty-five strategies developed through an extensive public participation process. The goals, objectives and strategies found below were formulated in the report.

This year's CEDS Committee reviewed the goals and objectives and voted to retain these goals throughout the entire CEDS fiscal year.

GOAL 1: **Manufacturing: Strengthen the existing manufacturing base in the region.**

Objectives:

Short Term - 1. Establish contacts and relationships with those private enterprises interested in expanding in the near future or in need of technical expertise.

Short Term - 2. Identify and involve key players within the college community to work on integrating academic expertise into the regional economy.

Short Term - 3. Start the process of expanding lending options for financing businesses.

Long Term - 4. Promote the development of a balanced, diversified industrial base.

Long Term - 5. Maintain and support existing industrial sectors and promote the development of local ancillary industries in support of emerging growth sectors.

Strategies:

1. Growth and Expansion

a. Contact the firms that will be introducing new products in the next 2-5 years and identify: I) what those products are likely to be; II) what needs companies have in getting those products from the design stage to the marketplace; and III) how the Central Massachusetts Manufacturing Partnership (CMMP) and area universities like

Worcester Polytechnic Institute (WPI) can provide support and technical assistance. (Note: the CMMP is now known as the Manufacturing Assistance Center, or MAC).

b. Contact the firms planning to expand in the near future and identify the technical and financial help they will require, as well as the kind of space and facilities they will need.

c. Capitalize on expertise at area universities, particularly Clark and WPI, to conduct additional research on growth industries in the region. Research should include basic data like number and size of firms, products made etc., and should focus on emerging trends at regional, state, national and global levels. Product development, expertise required, and training needs should also be addressed. Create and maintain a database containing this information. Both manufacturing and services should be examined.

2. Modernization

a. Provide lending support from both the public and private sectors to companies who wish to expand or upgrade physical plants. Consider loan pools targeted to local industry.

b. Stimulate the demand for manufacturing support services by initiating a Manufacturing Modernization Program that includes industry CEOs and upper level managers as teachers for area companies that have not modernized. If successful, this effort could help generate more demand for manufacturing services.

3. Technical Assistance

a. Work with the MAC to expand outreach activities, by increasing the number of contacts made and improving marketing materials and approach. Improve MAC's database of area companies using information from the database discussed above.

b. Work with area manufacturers, MAC, schools, colleges and community organizations to supply both foreign language manufacturing instructors to area training organizations and trained bilingual supervisors to area manufacturers.

c. Establish relationships between Clark University and area industries, similar to those established by WPI, where MBA candidates would do internships and provide technical assistance to area manufacturing companies.

d. Establish an energy cost reduction program in the region, modeled after a similar program for manufacturers in Maine. Make use of services of engineering faculty at area universities. (UMass Amherst, for example, has a no-cost technical assistance program to help companies reduce energy costs.)

GOAL 2: **Start up and small businesses: Foster the creation and expansion of start up and small businesses in manufacturing, service and retail sectors.**

Objectives:

Short Term - 1. Identify small and start up business issues that could be addressed with public resources.

Short Term - 2. Make assets available such as financing, equipment and expertise to small and start up businesses to assist in their long-term viability and job creation potential.

Short Term - 3. Increase financing programs for small and start up businesses.

Long Term - 4. Promote entrepreneurship in the region to facilitate the continued vibrancy of the economy. Focus both on under-served populations and regionally developed cutting edge technology

Strategies:

1. Incubator

a. Test the feasibility of starting 2 or 3 incubators focused on manufactured products. Locations to consider include Worcester, the Blackstone Valley, Webster and Southbridge in order to take advantage of I) existing labor pool; II) local energy/enthusiasm for such operations; III) availability of land/buildings; and IV) interest from local development agencies and banks.

   These incubators could focus specifically on key manufacturing sectors that already exist: plastics, fabricated metal products, electronic components. The MAC may be able to foster connections with existing manufacturers in these businesses. With help from MAC, incubator tenants could contract directly with larger, existing manufacturers for sub-assemblies/sub-components.

b. Consider two incubators, one in Worcester and the other in Southbridge that would specifically focus on members of the minority community. Businesses would likely focus on retail and services as opposed to manufacturing. Common services provided would include help in: obtaining financing; writing business plans; marketing research; marketing; and product development. Clerical support would be provided as well. Partnerships, particularly in Southbridge, would be established with Clark's Small Business Development Center, and area community based agencies.

2. Finance

a. Small capital loans. Currently banks find it difficult to make commercial loans for less than $10,000. Banks consider these "microloans". Often banks tell potential borrowers to use personal resources for loans less than this amount. However, Unibank has established a consortium which successfully makes loans in the $2,000-$10,000 range. This model should be made even more visible and replicated elsewhere in the region. Further, as an added incentive, grants could be obtained to use toward covering underwriting costs.

b. Microloans in the range of $500 to $2,000 and sometimes even smaller are provided by Working Capital based in the Boston area. The City of Worcester, through The Executive Office of Economic Development (EOED) provides microloans in the range of $1,000 - $30,000. These programs expand the availability of microloans particularly to minorities and immigrants.

c. Provide additional assistance to increase small business loan readiness.

d. Inventory small business financing and technical assistance resources.

e. Start up community development corporations in areas other than the city of Worcester.

f. Utilize the City's Community Development Block Grant program, the Massachusetts Economic development Incentive Program (EDIP), and the HUD Section 108 Loan Guarantee Program to assist with commercial and industrial business expansion and start up.

GOAL 3: **Workforce Development: Provide a well-trained workforce with up-to-date skills.**

Objectives:

Short Term - 1. Increase outreach to new immigrants to the area to assimilate them into the workforce.

Short Term - 2. Identify, profile, and target areas of unemployment and underemployment and link these populations to appropriate placement and training programs.

Short Term - 3. Increase the provision of targeted work force training opportunities.

Short Term - 4. Make the School-to-Work initiative a central approach to workforce development at all levels of the economy.

Long Term - 5. Insure a sufficient supply of technically knowledgeable workers with advanced skills.

Long Term - 6. Establish cooperation among training organizations, schools, and private businesses and the public sector as the norm for workforce development.

Strategies:

1. Existing education and training organizations

a. Establish programs with the regional vocational/technical schools for continual curriculum evaluations directly by production supervisors and production managers from regional businesses. This program would supplement the role of the existing advisory councils.

b. Establish a network connecting vocational/technical high schools with area manufacturing businesses to supply students directly to firms. Further the connections required as part of the School-to-Work initiative.

c. Education and training organization directors should establish a regular dialogue group to coordinate programs offered and to collaborate on meeting training needs. Equipment purchases, in conjunction with area community colleges, could also be coordinated.

d. Expand the City's Biotechnology Employment Training and Placement Strategy to meet the needs of other industrial sectors.

2. Basic Skills

a. Work with the city of Worcester, the Regional Employment Board, and area community organizations to expand both the reach and breadth of English as a Second Language (ESL) programs.

b. Identify people and organizations in the region's immigrant and minority communities, particularly the Asian community, to carry out work force training programs in basic skills.

c. Work with area state and community colleges and Worcester Technical Institute to provide basic math, reading and writing programs for adults in both classroom and workplace settings.

3. Advanced Skills

a. Establish a focus group, network or working group on advanced skill development. Group would include members of business and education communities and would be

charged with the creation of classes at area community and state colleges for the development of advanced skills such as: computer literacy, complex problem solving, and team building. Group would also work with the principles of continuous learning.

GOAL 4: **Industrial Space Availability: Insure an adequate supply of industrial land/space with appropriate infrastructure.**

Objectives:

Short Term - 1. Make information available so that private enterprise and business recruitment agencies can easily locate appropriate space.

Short Term - 2. Bring 21E sites needing remediation into the real estate market by expediting their clean up and reuse.

Long Term - 3. Insure a sufficient supply of a variety of commercial and industrial buildings and land to readily meet the needs of new and expanding companies.

Strategies:

1. Infrastructure Support

a. Support investments in road, water and sewer systems to serve commercial and industrial districts. Support would include developing database of both proposed improvements and land zoned for industrial use. Establish outreach programs with towns, and work with Blackstone Valley Economic Development Director to promote construction of infrastructure improvements.

b. Support upgrades to sewage treatment plants so that public facilities have sufficient capacity to accommodate new industry. Support would include written letters of support and lobbying at the town level by CMRPC staff.

2. Industrial Land

a. Create an inventory of vacant, industrially zoned land in the region using CMRPC's geographic information systems. Include attributes such as property lines, water and sewer mains, adjacent highways, amount of land available, permitted uses, etc. EOED will continue efforts to inventory industrial land in the city.

b. With a limited amount of land in the region available for industrial development with adequate infrastructure, work with communities to identify suitable land for re-zoning and construction of improvements.

c. Create a methodology to determine demand for industrial land in the region. Become quarterly publisher of results of the methodology and other relevant information including recent sales, tenants, absorption rates, and costs per acre.

d. Create a regional task force to address permitting process-streamlining issues chaired by CMRPC. Research and disseminate information to towns on how other communities and regions that have successfully implemented streamlining.

3. Hazardous Waste/Brownfields/21E

a. Analyze 21E sites in the region to develop list of sites with economic development potential "but for" the presence of hazardous waste. Collect and analyze data on location, square footage, zoning, preliminary environmental assessment, building value, availability of water and sewer systems, existing tenants, adjacent land uses, etc.

b. The Worcester Executive Office of Economic Development completed its inventory of 21E sites and will continue to promote their reuse for industrial purposes.

c. Work with CMRPC and other organizations to insure that a complete and up-to-date regional list of 21E sites is regularly available.

GOAL 5: **Looking Forward: Establish a systematic approach to supporting and developing new and emerging industries.**

Objectives:

Short Term - 1. Examine key industries in the region to understand more fully their potential impact on the health of the economy.

Long Term - 2. Continually seek to provide the best information to regional economic decision-makers.

Long Term - 3. Insure the appropriate institutions and relationships are in place to facilitate cross-fertilization of ideas that could further regional industry.

Strategies:

1. Industries

a. Create a center for disseminating information on research being conducted at area colleges and universities. The center can encourage communication among researchers perhaps leading to cross fertilization of ideas. The center (if no one else is already doing it) can seek to privatize research by linking entrepreneurs with researchers to adopt new technologies or products. Showcase the research being conducted as a way of linking colleges with industry.

b. Undertake a detailed study focusing on the health care industry. This should be done as a partnership among area colleges and universities, professor, students and administration. Health care has been the fastest growing regional industry, and employment trends will have strong impacts on area training organizations as well as the economy in general. Emphasis should be given to employment trends, skill needs, salaries, shifting patterns in delivery, and underlying economic drivers. Identify concentrations in medical research and medical procedures/ services that can be harnessed to promote health care as a traded sector service.

2. Subregions

a. Replicate, as best as possible, CMRPC's *Regional Economic Conditions and Prospects Study* for some of the area's distinct subregions e.g. the Blackstone Valley, the Tri-Community/Quaboag area; the Wachusett towns, and the City and its first ring suburbs.

b. Provide assistance to both the Blackstone Valley and the South Central Economic Target Areas to identify and create Economic Opportunity Areas. Assistance will include identifying potential development sites, identifying industry clusters, lobbying town governments, and seeking infrastructure improvements.

GOAL 6: Intercommunity Cooperation: Promote community and regional cooperation in Land Use Planning and Zoning, Utility Development, Transportation Network Development, Environmental Regulation and Housing.

Objectives:

Short Term - 1. Promote cooperation among all CEDS communities in furthering physical development, social responsibilities, and public and private resource allocation and planning.

Long Term - 2. Promote the expansion of a regional public transportation system including ground, air, and rail transit modes to enhance access to employment, entertainment, and regional service opportunities.

Long Term - 3. Identify and implement regional capital budget planning to maximize the impact of public expenditures in meeting public demands for goods and services.

Long Term - 4. Assist in maintaining older neighborhood commercial areas in promoting neighborhood revitalization.

Strategies:

1. Promote the development of regional facilities for industrial re-use, recycling, and resource recovery.

2. Identify opportunities for regional intermodal transportation center development.

3. Promote regional cooperation in procuring community goods and services for cost efficiency and effectiveness.

4. Work with the Providence and Worcester Rail Company and Consolidated Rail (CONRAIL) Company in developing rail served regional distribution, manufacturing, and recycling facilities.

PROJECTS TO ATTAIN GOALS
2004 CEDS PROJECT LIST

I. MAJOR CONTINUING REGIONAL PROJECTS

1. Central Massachusetts Economic Development Authority

2. Biotechnology Development and Expansion:

   A. Massachusetts Biotechnology Research Park - Worcester (Expansion of 35-acre parcel on Plantation Street)
   B. CenTech Park - Grafton
   C. Tufts Science Park - Grafton

3. Route 146/Massachusetts Turnpike Interchange Project

4. Blackstone River Valley National Heritage Corridor

   A. Blackstone Valley Bikeway
   B. Northern Gateway Visitor Center
   C. Worcester's Historic Blackstone River Canal District

5. Commuter Rail Extension Project

6. Worcester Airport/Airport Access Road

7. Gateway Park - Worcester

8. Greenwood Street Landfill Development - Worcester

9. South Worcester Industrial Park - Worcester

10. Arts District - Worcester

II. PROPOSED PROJECTS

NO.	RANK	PROJECT
		REHABILITATION / REUSE OF UNDERUTILIZED PROPERTIES
1.	High	Redevelopment of Underutilized Contaminated Properties - Worcester 1. Heald Property Development & Expansion 2. Route 146 Corridor Parcels 4. Institutional Linens - Mason Street
2.	High	Fisherville Mill Redevelopment – Grafton, CMEDA
3.	High	Stanley Woolen Mill Redevelopment – Uxbridge
4.	Low	Draper Property Redevelopment – Hopedale
5.	Low	Jefferson Mill Redevelopment – Holden
6.	High	Washington Square Master Plan Redevelopment Area – Worcester
7.	High	Ballard Street – Worcester
8.	High	Chestnut Street Church Re-use Proposal – Worcester
9.	High	89 Shrewsbury Street Mixed-Use Development – Worcester
10.	High	The Mill at West River Pond (Waucantuck Mill) – Uxbridge
11.	High	Worcester Common Outlet Renovation Project – Worcester
		TRANSPORTATION RELATED PROJECTS
1.	High	Gateway Projects – Worcester A. Quinsigamond Avenue B. Lincoln Square/Grove Street/Concord Street C. Washington Square
		TRAINING AND WORKFORCE DEVELOPMENT
1.	High	Martin Luther King, Jr. Business Empowerment Center expansion – Worcester
		PLANNING ACTIVITIES
1.	High	CEDS Economic Conditions and Prospects Study Strategy Implementation

INDUSTRIAL DEVELOPMENT

1.	High	Hood Industrial Park – Uxbridge (formerly W.S. Mixed Use Development)
2.	High	Southbridge Industrial Park & Access Roads – Southbridge
3.	High	Route 122 Industrial Park – Northbridge
4.	High	Route 16 / Route 146 Consortium - Uxbridge
5.	High	Allen Farm – Shrewsbury
6.	High	Route 140 / I-290 Interchange Park – Shrewsbury
7.	High	South Sutton / Manchaug Infrastructure Enhancement Project – Sutton
8.	High	Douglas Woods Industrial Park - Douglas
9.	Low	Depot Road Corporate Park – North Oxford
10.	Low	Foundation Park – Shrewsbury
11.	Low	Boylston Industrial Park – Boylston
12.	High	Gutierrez Project – Northborough
13.	High	Charlton Technology Park - Charlton
14.	High	Gardner Business Enterprise Park

MANUFACTURING ASSISTANCE / INCUBATORS

1.	High	Manufacturing Advancement Center Incubator – Worcester (Gateway Park)

III. PROJECTS IN IMPLEMENTATION STAGE

1. Intermodal Transportation Center/Union Station – Worcester
2. Lincoln Plaza Reconstruction – Worcester
3. Route 131 Relocation - Southbridge
4. Gardner, Kilby and Hammond Initiative – Worcester
5. Pullman Street Industrial Park - Worcester
6. Worcester Common District - Worcester
7. Uxbridge Inn/Commercial Center – Uxbridge
8. Boston Hill – Shrewsbury, Westborough, Northborough
9. Worcester Corporate Center Industrial Park – West Boylston
10. Regional Justice Center – Worcester
11. Pythian Building Redevelopment – Northbridge
12. Hilton Garden Inn Hotel – Worcester
13. Whitinsville Downtown Revitalization – Northbridge
14. Route 20 Connector Road – Grafton and Shrewsbury
15. Blackstone Valley Regional Vocational Technical High School, Workforce Training Addition – Upton
16. Construction of a new Worcester Vocational High School – Worcester
17. WPI Bioengineering Institute at Gateway Park - Worcester

CHANGES IN THE PROJECT LIST FROM 2003

Presented below is a summary of the changes that were made during the course of Committee deliberations.

Projects Added to the List:

1. Gardner Business Enterprise Park Project – Charlton

3. The Mill at West River Pond – Uxbridge

4. Worcester Common Outlet Renovation Project – Worcester

Projects Removed from the List Due to Completion:

1. Main Street Improvements – Holden
2. Valley Falls Redevelopment Plan – Leicester
3. Wyman-Gordon Demolition – Worcester
4. Reed & Prince Site Redevelopment (Price Chopper) – Worcester

Projects Moved from Proposed to Implementation:

1.	High	Regional Justice Center – Worcester
2.	High	Hilton Garden Inn Hotel – Worcester
3.	High	Whitinsville Downtown Revitalization – Northbridge
4.	High	Route 20 Connector Road – Grafton and Shrewsbury
5.	High	Blackstone Valley Regional Vocational Technical High School, Workforce Training Addition – Upton
6.	High	Construction of a new Worcester Vocational High School – Worcester
7.	High	WPI Bioengineering Institute at Gateway Park
8.	High	Pythian Building Redevelopment - Northbridge

EVALUATION PROCESS

The Greater Worcester Area CEDS process is guided by the vision statement and the goals and development strategies established in the Greater Worcester Area CEDS's action strategies (pages 56 - 64 of this 2004 Annual Report). An evaluation process has been created to outline the criteria (goals) that will be used to evaluate the progress of these action strategies and the effectiveness of the Area's CEDS planning process. The process will identify evaluation criteria and performance measures that have been established by staff for the CEDS Committee to evaluate *How we are Doing* and determine the effectiveness of the CEDS process that will be used. The evaluation process for the progress of the Greater Worcester Area's action strategies is based on six prioritized goals that were formulated in the Economic Conditions and Prospectus Study completed by the Greater Worcester Area CEDS Committee in 1996. The evaluation process for the effectiveness of the Area's CEDS planning process is based on meeting attendance and the number of guest speakers. Qualitative and quantitative measures will be used to evaluate the Greater Worcester Area CEDS Committee's performance in implementing its action strategies and conducting an effective CEDS planning process.

Part I: Evaluation of the CEDS Planning Process

The Greater Worcester Area CEDS Committee realizes that representation from the 39 surrounding communities that make up the Committee is crucial to the success of the Area's planning process. Increasing the participation in the CEDS program and distribution of CEDS information is an on-going goal of the Committee. Staff continuously review the CEDS Committee membership list to ensure that all major interests of the 39 surrounding communities are represented and receive beneficial information. In addition, the Greater Worcester Area CEDS Committee invites guest speakers to discuss regional economic development projects and programs that could benefit the communities in the Greater Worcester Area.

GOAL – Increase the meeting attendance of the Greater Worcester Area CEDS Committee.

a. Quantitative Measure – What was the average meeting attendance of the Greater Worcester Area CEDS Committee?
b. Qualitative Measure – Increase the participation in the CEDS program through the distribution of CEDS information and guest speakers.
c. Evaluation Criteria - 20-25 average attendees {Outstanding}
   15-19 average attendees {Good}
   10-14 average attendees {Poor}

Part II. Evaluation of Action Strategies

The following goals were developed through the regional *Economic Conditions and Prospectus Study,* which was completed by the Greater Worcester Area CEDS Committee in 1996. They were developed through a synthesis of data analysis, interviews with prominent economic leaders, and substantial public input. These six priority goals build upon the Worcester region's economic strengths to sustain positive economic momentum and withstand economic downturns.

GOAL 1 – Manufacturing: Strengthen the existing manufacturing base in the region.

a. Quantitative Measure – How many existing manufacturing companies expanded or new facilities were established in your community or service area since July 1, 2003?
b. Qualitative Measure – Start the process of expanding lending options for financing businesses and the availability of technical expertise.
c. Evaluation Criteria – 5 – 10 Companies {Outstanding}
   1 – 4 Companies {Good}
   0 Companies {Poor}

GOAL 2 – Start up and small businesses: Foster the creation and expansion of start up and small businesses in the manufacturing, service, and retail sectors.

a. Quantitative Measure – How many small and start up businesses have been established or have expanded in your community since July 1, 2003?
b. Qualitative Measure – Increase financing programs for small and start up businesses and the availability of equipment and expertise.
c. Evaluation Criteria - 5 – 10 Companies {Outstanding}
   1 – 4 Companies {Good}
   0 Companies {Poor}

GOAL 3 – Workforce Development: Provide a well-trained workforce with up-to-date skills.

a. Quantitative Measure – Have any new job training and placement programs been established or other workforce development initiatives undertaken in your community since July 1, 2003?
b. Qualitative Measure – Increase the provision of targeted work force training opportunities.
c. Evaluation Criteria - 4 – 6 Programs {Outstanding}
   1 – 3 Programs {Good}
   0 Programs {Poor}

Goal 4 – Industrial Space Availability: Insure an adequate supply of industrial land/space with appropriate infrastructure.

a. Quantitative Measure – How many new industrial parks have been created (or are in the planning stages) in your community since July 1, 2003?
b. Qualitative Measure – Insure a sufficient supply of commercial and industrial buildings and land to meet the needs of new and expanding companies.
c. Evaluation Criteria - 4 –6 Industrial Parks {Outstanding}
   1 –3 Industrial Parks {Good}
   0 Industrial Parks {Poor}

Goal 5 – Looking Forward: Establish a systematic approach to supporting and developing new and emerging industries:

a. Quantitative Measure – Which new and/or emerging industries (i.e. biotechnology, pharmaceuticals, etc.) were supported and assisted in their development in your community since July 1, 2003?
b. Qualitative Measure – Examine key industries in the region to understand more fully their potential impact on the health of the economy.
c. Evaluation Criteria - 4 – 6 Industries {Outstanding}
   1 – 3 Industries {Good}
   0 Industries {Poor}

Goal 6 – Intercommunity Cooperation: Promote community and regional cooperation in Land Use Planning and Zoning, Utility Development, Transportation Network Development, Environmental Regulation and Housing.

a. Quantitative Measure – Did your community participate in any community and regional planning efforts since July 1, 2003?
b. Qualitative Measure – Promote cooperation among all CEDS communities in furthering physical development, social responsibilities, and public and private resource allocation and planning.
c. Evaluation Criteria - 10 – 15 Cities and Towns {Outstanding}
   4 – 9 Cities and Towns {Good}
   1 – 3 Cities and Towns {Poor}

GREATER WORCESTER AREA
COMPREHENSIVE ECONOMIC DEVELOPMENT STRATEGY COMMITTEE
2004 EVALUATION PROCESS SURVEY

Evaluation of Action Strategies:

GOAL 1 – Manufacturing: Strengthen the existing manufacturing base in the region.

How many existing manufacturing companies have expanded in your community or service area since July 1, 2003? _____ Please list.

_____
_____
_____

GOAL 2 – Start up and small businesses: Foster the creation and expansion of start up and small businesses in the manufacturing, service, and retail sectors.

How many small and start-up businesses have been established in your community since July 1, 2003? ___ Please list.

_____
_____
_____

GOAL 3 – Workforce Development: Provide a well-trained workforce with up-to-date skills.

Have any new job training and placement programs been established, or other workforce development initiatives undertaken, in your community since July 1, 2003? If so, please list.

_____
_____
_____

Goal 4 – Industrial Space Availability: Insure an adequate supply of industrial land/space with appropriate infrastructure.

How many new industrial parks have been created (or are in the planning stages) in your community since July 1, 2003? ___ Please list.

_____
_____
_____

Goal 5 – Looking Forward: Establish a systematic approach to supporting and developing new and emerging industries:

Which new and/or emerging industries (i.e. biotechnology, pharmaceuticals, etc.) were supported and assisted in their development in your community since July 1, 2003?

_____

_____

_____

Goal 6 – Intercommunity Cooperation: Promote community and regional cooperation in Land Use Planning and Zoning, Utility Development, Transportation Network Development, Environmental Regulation and Housing.

Did your community participate in any community and regional planning efforts since July 1, 2003? If so, briefly list.

_____

_____

_____

EVALUATION PROCESS RESULTS

Part I: Evaluation of the CEDS Planning Process:

GOAL – Increase the meeting attendance of the Greater Worcester Area CEDS Committee.

Quantitative Measure – What was the average meeting attendance of the Greater Worcester Area CEDS Committee?
Result: 19 {Good}

Wednesday, October 15th	18 attendees
Tuesday, March 30th	19 attendees
Tuesday, May 25th	20 attendees
Tuesday, June 22nd	17 attendees

Part II. Evaluation of Action Strategies:

GOAL 1 – Manufacturing: Strengthen the existing manufacturing base in the region.

Quantitative Measure: How many existing manufacturing companies expanded or new facilities were established in your community or service area since July 1, 2003?
Result: 7 {Outstanding}

1. Primary Colors – Centech Park (Moving from Westborough to Grafton)
2. Information Management Corp. – Centech Park Expansion (Grafton)
3. Haul – Store Endovision (Charlton)
4. Miller Products (Charlton)
5. Abbott BioResearch Center – Worcester (expansion)
6. Polar Beverages - Worcester (expansion)
7. Stonebridge Corp's – (Worcester)

GOAL 2 – Start up and small businesses: Foster the creation and expansion of start up and small businesses in the manufacturing, service, and retail sectors.

Quantitative Measure: How many small and start-up businesses have been established or have expanded in your community since July 1, 2003?
Result: 140 {Outstanding}

1. Blue Horizon Life Management Systems (Southbridge)
2. Dreamline (Southbridge)
3. Breen's Landscaping (Southbridge)
4. Mapleshade Farm (Southbridge)
5. Soundz Like Fun Disc Jockey Service (Southbridge)
6. Finer Things (Southbridge)
7. Alexa Productions (Southbridge)

8. Arelli, Inc. (Southbridge)
9. Salon 769 (Southbridge)
10. Access IV Professionals of New England (Southbridge)
11. H System Homes (Southbridge)
12. Accurate Metal Sales (Southbridge)
13. Tunegocioenboston.com (Southbridge)
14. M & M Cleaning (Southbridge)
15. Tunegoyoenboston.com (Southbridge)
16. Time Enterprises (Southbridge)
17. Designare Collectium (Southbridge)
18. Christian Music Store (Southbridge)
19. Four Eyes Joke Shop (Southbridge)
20. The Design Factory (Southbridge)
21. JO-AD Realty, LLC (Southbridge)
22. DBA Dunkin Donuts (Southbridge)
23. Len's Clock Clinic (Southbridge)
24. Palm Breeze Travel and Tours (Southbridge)
25. Treasured Memories (Southbridge)
26. Worcester Wellness Associates (Southbridge)
27. Central Mass Communications (Southbridge)
28. The Domestic Diva, LLC (Southbridge)
29. Healthy Tymes (Southbridge)
30. All American Pools Spas and More (Southbridge)
31. Tri-Fecta Solutions (Southbridge)
32. Rockland Properties (Southbridge)
33. Teresa Manufacturing (Southbridge)
34. Applied Fire Research Eng. (Grafton)
35. You Can Feel Better (Grafton)
36. The Rose Ankh (Grafton)
37. Poulin Cleaning Service (Grafton)
38. Errands-R-Us (Grafton)
39. MACZ Distributors (Grafton)
40. Christine's Bracelets & Beyond (Grafton)
41. Tech Lite Designs (Grafton)
42. ADA Tech Group (Grafton)
43. Studio 99 Hair Design (Grafton)
44. Hillside Woodworks (Grafton)
45. J & J Construction/Remodeling (Grafton)
46. Advance Cleaning & Restoration (Grafton)
47. Redline Interiors (Grafton)
48. D S Services (Grafton)
49. Dogfather Bakery (Grafton)
50. S.G. 85 Consulting (Grafton)
51. Summit Ski and Snowboard/Ski Shop,The Inc (Grafton)
52. Complete Care Vinyl Siding (Grafton)

53. Fitzy's Car Wash (Grafton)
54. Anima Mundi Prof. Pet Grooming (Grafton)
56. Radon, Inc. (Grafton)
57. Hot Dog Heaven & Ice Cream Too (Grafton)
58. Rent-a-Retiree (Grafton)
59. Vegatran, LLC (Grafton)
60. Sarah M. Getz, HR/Finance Admin. (Grafton)
61. Fitzy's Car Wash (Grafton)
62. White House Media (Grafton)
63. Saundersville Sign Co. (Grafton)
64. Neways Independent Dist. (Grafton)
65. Omega Fitness Center, LLC (Grafton)
66. Ewing Associates (Grafton)
67. Chilz, Inc., dba Kablooms (Grafton)
68. DEH Engerprises (Grafton)
69. Acme Explosive Marketing (Grafton)
70. Joy Cleaners and Tailors (Grafton)
71. It's All About Me (Grafton)
72. Louisiana Cartoon Service (Grafton)
73. Janice Levenson (Grafton)
74. Andre Legardyes Boutique (Grafton)
75. Revolving Recoveries (Grafton)
76. J.T.M. Building/Remodeling (Grafton)
77. Martin DiBello dba Netspace (Grafton)
78. Sovereign Bank of New England (Grafton)
79. Chocoholicks (Grafton)
80. Tina Theroux DMD (Grafton)
81. Studio 1088 (Grafton)
82. Lebo Soundworks (Grafton)
83. GHE Executive Protection (Grafton)
84. Marj Gallagher (Grafton)
85. Silver Spruce Montessori School (Grafton)
86. Lori's Floral Bouquet (Grafton)
87. Dewey Gardens (Grafton)
88. Elite Landscaping (Grafton)
89. Iichi Ban Transport Co. (Grafton)
90. Classic Yarns of Grafton (Grafton)
91. "Carry It Off" (Grafton)
92. Web Image Designs (Grafton)
93. Industial Component Development Co. (Grafton)
94. Groomin' Grass (Grafton)
95. Seal Appeal (Grafton)
96. M C B Marketing (Grafton)
97. Head to Toe Designs (Grafton)
98. Western World (Grafton)

99. Proof is in the Pudding, The (Grafton)
100. LaborMatch, Inc. (Grafton)
101. Alchemist Group, The (Grafton)
102. Budget Blinds Of Westboro (Grafton)
103. Quantek Instruments (Grafton)
104. Presentation Unlimited (Grafton)
105. Our Glass Studio (Grafton)
106. Miltiverse Entertainment (Grafton)
107. Natural Health and Harmony (Grafton)
108. Blackstone Valley Electrolysis (Grafton)
109. B & B Marketing (Grafton)
110. Broadcast Systems (Grafton)
111. Monkey Works (Grafton)
112. Bay State Productions (Grafton)
113. Country Bank [Branch] (Charlton)
114. Camosse Masonry Supply (Charlton)
115. Grinders-to-GO (Charlton)
116. Patriot Motors (Charlton)
117. Raz's Auto Barn (Charlton)
118. Plante's Heating (Charlton)
119. Sheds 'N' More (Charlton)
120. Tile 'N' Carpet (Charlton)
121. Independent Herbalife Distributors (Charlton)
122. White Hen Pantry (Worcester)
123. Bob's Furniture (Worcester)
124. Rock of Ages (Worcester)
125. Subway (Worcester)
126. Plumb Crazy (Worcester)
127. Ladies Workout Express (Worcester)
128. Two Cousin's Pasta & Grill (Worcester)
129. Union Blues (Worcester)
130. Octaine (Worcester)
131. Barnes & Noble Booksellers (Worcester)
132. Vicca Design (Worcester)
133. Family Kitchen (Worcester)
134. Final Touch Beauty Salon (Worcester)
135. Zain Financial (Worcester)
136. Central MA Computer (Worcester)
137. Heshima Cleaning Co. (Worcester)
138. Fresia's Flowers & Gifts (Worcester)
139. VEEDUB Design (Worcester)
140. DTS (Worcester)

GOAL 3 – Workforce Development: Provide a well-trained workforce with up-to-date skills.

Quantitative Measure: Have any new job training and placement programs been established, or other workforce development initiatives undertaken, in your community since July 1, 2003? If so, please list:
Result: 10 {Outstanding}

- Continued to lead workforce development initiatives within the Central Massachusetts region (Worcester and 37 surrounding communities). Specifically these federal and state funds allowed the Central Massachusetts Regional Employment Board (REB) to contribute financial, operational, and human resources to the activities outlined in the various contracts, i.e. providing both private and corporate citizens with a full array of employment, education and training programs in support of overall economic development, career centers, school-to-careers, welfare-to-work and incumbent worker training.

- The REB applied for and successfully received a $2,999,000 award from the U.S. Department of Labor under its H1B Technical Skills Training Grant Program. Due to the shortage of domestic workers with the necessary skills for certain high technology jobs, many U.S. employers temporarily import foreign workers using H1B visas. This award is a statewide grant to retrain 400 degreed engineers, scientists and technicians by upgrading their skills through customized training. A feature of the grant is technology transfer using national laboratories to enhance the economic viability and growth of the region.

- The Extended Care Career Ladder Initiative (ECCLI) is state sponsored. Funded by the Health Care Quality Improvement Trust Fund, ECCLI is a part of the Nursing Home Quality Initiative, which provides financial and other support to licensed skilled nursing facilities to help improve the skills, knowledge, and retention of their certified nursing assistants, (CNAs) and other entry-level director care workers.

  The ECCLI grant is in three (3) parts, i.e. Round V for new facilities, Round VI for previously funded projects and Round VII for Home-Based Care Providers. Four (4) ECCLI grants were rewarded for a total of $588,526. The Central Massachusetts Regional Employment Board (REB), charged with performance management of the grants, is working with consortia of sixteen (16) nursing facilities and one (1) home health care provider.

- The Nursing Career Ladder Initiative funded by the U.S. Department of Labor, is a response to the critical and growing shortage of nurses practicing in Massachusetts. The intent of this project in Central Massachusetts is to address the lack of students, student attrition, lack of clinical and classroom facilities available, backlog of applicants, and shortage of teachers. Central Massachusetts

received a grant award of $227,273 and is working with a community college, a state college, and collaborating medical centers.

- The REB is also a partner with a consortia of statewide organizations who will receive $14,500,000 over the next 5 years to advise development of a comprehensive workforce policy agenda to guide statewide planning and legislative action, help carry out comprehensive advocacy campaign, and develop plans for marketing the policy agenda to the general public, business, and political leaders. The intent is to meet employers' skill needs and drive economic growth by helping low-wage workers advance to self-sufficiency.

- The REB is also a partner in the Central Massachusetts Pipeline Network that received a $10,000 planning grant to later submit for additional funding. The state's Economic Stimulus Trust Fund legislation includes this provision to (1) increase the number of students who participate in programs that support careers in fields related to science, technology, engineering, and mathematics, (2) increase the numbers of teachers in those fields, (3) improve educational offerings, and (4) pilot a high school internship program for students pursuing post-secondary education in these areas.

- The REB, in collaboration with the Manufacturing Advancement Center and Massachusetts Manufacturing Extension Partnership, will be cover "Manufacturing Our Future" Summit, an annual event to feature critical and emerging technologies in manufacturing. It will be held simultaneously with the Worcester Regional Chamber of Commerce's New England Business Expo 2004, and the local AD Club competition featuring all forms of advertising and marketing media campaigns. The focus will be on the 7 regional vocational school systems, especially the new $90,000,000 vocational school in Worcester. Various industry clusters will be featured, student scholarships will be awarded, and a keynote luncheon will be presented. This also coincides with a REB program to link manufacturers with schools to provide Workforce Investment Act (WIA) outcomes, career counseling, and an awareness of all aspects of industry.

- Workforce Central Career Ladder continues to provide re-entry employment services for individuals returning to the area after incarceration in the county, state or federal prison systems. Services are provided in conjunction with the Massachusetts Department of Corrections' Community Resources Center, operated by Spectrum House, one of five (5) such centers in the state. Training funds are also included in the grant to enable individuals to pursue skills training at local providers to increase marketability and retention in the labor force. The grant is now in its second year.

- Continued with SABES (System for Adult Basic Education Support) Employment Network, ADA Regional Network, and statewide Advisory Board. Continued with the Worcester adult basic education and ESOL community planners and

education providers to advise the Department of Education with comprehensive "Assessment of Community Assets and Needs." This is being used as a community profile to determine future funding and local programming.

- Continued with distance learning study as part of the state's "Anytime, Anywhere" project at UMass-Boston, studying supports for adult learners and the cosst associated with them. This research project is being conducted by only 10 states.

Goal 4 – Industrial Space Availability: Insure an adequate supply of industrial land/space with appropriate infrastructure.

Quantitative Measure: How many new industrial parks have been created (or are in the planning stages) in your community since July 1, 2003?
Result: 17 {Outstanding}

1. Gateway Park, Worcester
2. CenTech Park, Grafton
3. Tufts Science Park, Grafton
4. Pullman Street Industrial Park, Worcester
5. Greenwood Street Landfill Redevelopment, Worcester
6. Airport Industrial Park Expansion, Worcester
7. South Worcester Industrial Park, Worcester
8. Boston Hill, Northborough
9. South Sutton Commerce Park, Sutton
10. Oxford Crossing, Oxford
11. Worcester Corporate Center, West Boylston
12. Charlton Technology Park, Charlton
13. Gardner Business Enterprise Park, Charlton
14. Allen Farm, Shrewsbury
15. Boulder Industrial Park, Oxford
16. Hillside at 495 Center, Guttierez Company, Northborough
17. Nichols Industrial Park (Charlton)

Goal 5 – Looking Forward: Establish a systematic approach to supporting and developing new and emerging industries:

Quantitative Measure: Which new and/or emerging industries (i.e. biotechnology, pharmaceuticals, etc.) were supported and assisted in their development in your community since July 1, 2003?
Result: 9 {Outstanding}

1. Medical Research & Instrumentation
2. Biotechnology Research & Development
3. Fiber Optics

4. Manufacturing
5. Medical Devices and Instrumentation
6. Health Care
7. Pharmaceuticals
8. Information Technology
9. Retail

Goal 6 – Intercommunity Cooperation: Promote community and regional cooperation in Land Use Planning and Zoning, Utility Development, Transportation Network Development, Environmental Regulation and Housing.

Quantitative Measure: Did your community participate in any community and regional planning efforts since July 1, 2003? If so, briefly list.
Result: 19 {Outstanding}

1. Southbridge:
    a. Executive Order 418 Long Term Planning Program
    b. Downtown Parking Study

2. Grafton:
    a. Update of Comprehensive Plan for Economic Development and Housing (CMRPC)
    b. WBDC sponsored rail transit district
    c. Submission of Blackstone River Corridor Grant

3. Charlton:
    a. Rt. 168 Corridor Planning Analysis E. O. 418
    b. Community Planning Project
    c. CEDS Committee Activities
    d. Quinbay-Sketucket National Heritage Corridor Planning Programs
    e. Charlton Greenways/Open Space/Trails GIS Mapping Project

4. Worcester:
    a. Executive Order 418 Long Term Planning Program
    b. Downtown Parking Study
    c. Envisioning Worcester's Future – City/WPI
    d. Planning for Worcester's Neighborhood's – City/WPI
    e. Worcester's Historic Canal District Master Plan
    f. Arts District Master Plan
    g. South Worcester Industrial Park Master Plan
    h. Worcester Economic Development Action Agenda
    i. No More Magic Bullets: Devising a Realistic Approach to Downtown Revitalization

Infrastructure Projects Underway:

1. Sutton: The Town is building a new sewage treatment plant
2. Leicester: Route 9 west reconstruction with water and sewer lines
3. Upper Blackstone Water Pollution Abatement District: planning for sewage treatment plant
4. Charlton: Route 20 reconstruction with water and sewer lines
5. Auburn: Route 12 reconstruction
6. Millbury: Connecting to Upper Blackstone Water Pollution Abatement District plant
7. Northbridge Streetscape improvements are underway in Rockdale and Whitinsville
8. Northbridge: Received a CDAG grant to construct an 80-space surface parking lot in Whitinsville.
9. Paxton: Anna Maria College will construct a sewer line from its campus to the MDC sewer trunk line in Holden to alleviate an on-going septic system problem.
10. Holden and West Boylston: The major sewer project is continuing to install sewer lines to alleviate septic contamination of the Wachusett Reservoir.
11. Douglas: The Town is upgrading its sewer treatment plant.
12. Grafton is constructing a new water filtration plant.
13. Northbridge: The Town has agreed to provide an emergency water connection to neighboring Upton.
14. Charlton: The Town is constructing a water line along Route 20 with water supplied from Oxford's private water company.

GREATER WORCESTER AREA 2004
COMPREHENSIVE ECONOMIC DEVELOPMENT STRATEGY COMMITTEE
INVITEES

First Name	Last Name	Job Title	Affiliation	City
Cassandra	Acly	Executive Development Director	Town of Southbridge	Southbridge
Lawrence	Adams	Town Planner	Town of Sturbridge	Sturbridge
Roy	Angel	V.P./Commercial Loan Officer	MassDevelopment	Worcester
Steve	Antinelli	Town Planner	Town of Auburn	Auburn
Frank	Ascoli	Chairman	Industrial Development Commission	Uxbridge
James	Bates, Sr.	Administrative Assistant	Town of Upton	Upton
Jodi	Beckett	President	Webster/Dudley/Oxford Chamber	Webster
Diana	Biancheria	Occupational Education	Worcester Public Schools	Worcester
Frederick	Baus	Executive Director	Colleges of Worcester Consortium	Worcester
Gary	Bechtholdt	Town Planner	Town of Northbridge	Northbridge
Craig	Blais	Vice President	Worcester Business Development Corp.	Worcester
Barry	Brenner	Town Administrator	Town of Northborough	Northborough
Michelle	Buck	Town Planner	Town of Leicester	Leicester
Nancy	Carlson	President	Corridor Nine Area Chamber of Commerce	Westborough
Robert	Chartier	Executive Director	Tri-Community Chamber of Commerce	Sturbridge
George	Ciccone	Director of Economic Development	City of Worcester	Worcester
Russell	Connor, Jr.	Town Administrator	Town of Grafton	Grafton
Jim	Cruickshank	Director	Oak Hill Community Development Corp.	Worcester
Carol	Cyr	Director	Office of Community Development	Webster
Bruce	Dahlquist	Associate Director	Central Mass. Regional Employment Board	Worcester
Henry	Danis, Jr.	Town Coordinator	Town of Westborough	Westborough
Hal	Davis	Chairman	Economic Development Commission	Douglas
Eric	Denoncourt	Town Planner	Town of Shrewsbury	Shrewsbury
Megan	DiPrete	Town Planner	Town of Millbury	Millbury
Jen	Dulmaine	CDBG Program Director	Town of Northbridge	Northbridge
Ellen	Dunlop	Vice Chair	Worcester Cultural Commission	Worcester
Walter	Dwyer	V.P. Commercial Lending	Bay State Savings Bank	Worcester
Peter	Fellenz	Executive Director	Worc. Community Housing Resources, Inc	Worcester
Dennis	Ferrante	Director Occupational Education	Worcester Public Schools	Worcester
Michael	Fitzpatrick	Director	Blackstone Valley Regional Vocational Technical High School	Upton
Jack	Foley	Executive Assistant to the President	Clark University	Worcester
Floyd	Forman	Town Planner	Town of Uxbridge	Uxbridge
Matteo	Gentile	President	Auburn Chamber of Commerce	Auburn
Al	Gordon	Town Planner	Town of Charlton	Charlton
Marty	Green	Executive Director	Blackstone Valley Chamber of Commerce	Whitinsville
Paul	Guida	Town Administrator	Town of West Boylston	West Boylston

Jack	Hamilton	Vice President – Loans	Bay State Savings Bank	Worcester
Phil	Hammond	Project Manager	Cullinan Engineering Co., Inc.	Auburn
Pamela	Harding	Town Planner	Town of Holden	Holden
John	Healy	Director	Manufacturing Advancement Center	Worcester
Raymond	Houle, Jr.	Town Manager	Town of Millbury	Millbury
Julie	Jacobson	Director of Regional Economic Development	Worcester Regional Chamber of Commerce	Worcester
Allan	Klepper	Town Coordinator	Town of Hopedale	Hopedale
John	LaPoint	Planner	Town of Grafton	Grafton
Lorraine	Leno	Town Administrator	Town of Barre	Barre
Patsy	Lewis	Executive Director	Worcester Community Action Council, Inc.	Worcester
Robert J.	Lewis	President and CEO	Bay State Savings Bank	Worcester
Dennis	Lipka	Director of Growth Management	Town of Holden	Holden
Debra	Lockwood	Executive Director	Green Island Community Development Corporation	Worcester
Mark	Love	President and CEO	Worcester Regional Chamber of Commerce	Worcester
Katherine	Mahoney	Operations Manager	Manufacturing Advancement Center	Worcester
Ken	Mahoney	Executive Administrator	Town of Douglas	Douglas
James	Malloy	Town Administrator	Town of Sturbridge	Sturbridge
Blain	Marchand	Vice President	UniBank	Whitinsville
Dominick	Marcigliano	Executive Director	East Side Community Development Corp.	Worcester
Larry	Marsh	Director	Small Business Development Center @ Clark University	Worcester
Karen	Matt	President	Holden Area Chamber of Commerce	Holden
Robert	Matthews	Regional Director	Central Mass. Office of Business Development	Worcester
Paul	Morano	Business Assistance Administrator	City Manager's Exec. Office of Economic Development	Worcester
Jill	Myers	Town Administrator	Town of Charlton	Charlton
Patricia	Nedoroscik	Town Administrator	Town of Sutton	Sutton
Wayne	Nicholas	Town Planner	Town of Grafton	Grafton
Philip	Niddrie	Chief Development Officer	City of Worcester	Worcester
Isidore	Nosike	Facilities Manager	Martin Luther King, Jr. Business Empowerment Center	Worcester
Claire	O'Neill	Executive Director	MassDevelopment	Worcester
Jean	Poteete	Development Consultant	Tufts University School of Veterinary Medicine	Grafton
Rick	Prouty	Executive Director	Quabog Valley Chamber of Commerce	Palmer
John	Rainey	Management Counselor	Small Business Development Center @ Clark University	Worcester
Dennis	Rindone	Executive Secretary	Town of Princeton	Princeton
Christopher	Robbins	Dean, Center for Continuing Education	Quinsigamond Community College	Worcester
James	Robbins	Town Planner	Town of Westborough	Westborough
Katherine	Robertson	Director	Central Mass Economic Development Authority (CMEDA)	Worcester
Susan	Rutherford	Executive Director	Quaboag Valley Community Development Corporation	Palmer
Ron	Sanda	Town Administrator	Town of Dudley	Dudley
William	Scanlan	Community Development Manager	Central Mass. Regional Planning Commission	Worcester
Bonnie	Sullivan	Regional Vice President	MassDevelopment	Worcester
J.S.	Teasdale	Executive Director	Main South CDC	Worcester
Carter	Terenzini	Town Administrator	Town of Spencer	Spencer

Robert	Thomas	Director	Martin Luther King, Jr. Business Empowerment Center, Inc.	Worcester
Stephen	Willand,PhD	Director	Central Mass Regional Employment Board	Worcester
Erin	Williams	Cultural Development Officer	City of Worcester	Worcester
Jennifer	Williams	Manager	Center for Women & Enterprise	Worcester
Joseph	Zeneski, PE	Town Engineer/Planner	Town of Oxford	Oxford

CHAIR

Stephen R. Willand, Ph.D.
Director
Central Massachusetts Regional Employment Board
44 Front Street
Worcester, MA 01608
Tel: 508-799-1600

SUPPORT STAFF

Ms. Julie A. Jacobson
Director of Regional Economic Development
Worcester Regional Chamber of Commerce
339 Main Street
Worcester, MA 01608
Tel: 508-753-2924

Mr. Paul Morano
Business Assistance Administrator
City Manager's Executive Office of Economic Development
455 Main Street
Worcester, MA 01608
Tel: 508-799-1523

Mr. William Scanlan, AICP
Community Development Manager
Central Mass. Regional Planning Commission
35 Harvard St.
Worcester, MA 01609
Tel: 508-756-7717

Mr. Marco V. Charamella
Chamber of Commerce Intern
Worcester Regional Chamber of Commerce
339 Main Street
Worcester, MA 01608
Tel: 508-450-9848

Note: All efforts are made by CEDS staff to maintain a current listing of regional representatives. However, the attached 2004 CEDS Committee list may not reflect all changes in personnel since the 2004 CEDS Committee began in September of 2003. Representatives to the CEDS Committee who held the listed positions in September but who have since left their positions are still listed if replacement names were not provided. The 2005 CEDS Committee will reflect recent staff changes.

ATTACHMENTS

I. PROJECT INFORMATION FORM FOR NEW SUBMISSIONS TO 2004 PROJECT LIST

II. MEETING AGENDAS

ATTACHMENT I

PROJECT INFORMATION FORM FOR NEW SUBMISSIONS TO 2004 PROJECT LIST

Greater Worcester Area Comprehensive Economic Development Strategy
Project Information Form

Project Name:_____
_____

Project Location:_____
_____

Project Description:_____
_____
_____
_____

Project Sponsor(s):_____
_____

Funding Sources	$ Amounts
Federal_____	
State_____	
Local_____	
Private_____	
Other_____	
Total	

Estimated number of jobs to be created:
Total:_____ Type of Jobs:_____

Other Benefits, e.g. infrastructure improvements:
_____
_____
_____

Environmental Issues:_____
_____
_____

Estimated Start/Completion Dates:_____

Other Information (use back of form or attach additional sheets):

ATTACHMENT II

MEETING AGENDAS

WORCESTER REGIONAL
Chamber of Commerce

Comprehensive Economic Development Strategy Committee Meeting
October 15, 2003
3:00 p.m.
Worcester's Centrum Centre
Meeting Room D

AGENDA

1. Welcome and introductions
2. Nominate and vote for Chairperson
3. Overview of CEDS Process
4. 2003 CEDS Annual Report
5. Participation requirements for 2004 Project List
6. New Project Submission Request for 2004 Annual Report
7. ***Guest Speaker – Susan Houston****, Executive Director, Massachusetts Alliance for Economic Development (MAED)*
8. Schedule of annual meetings
9. Adjourn

WORCESTER REGIONAL
Chamber of Commerce

Comprehensive Economic Development Strategy Committee Meeting
March 30, 2004
12:00 noon
Fuller Conference Center
Worcester Regional Chamber of Commerce
339 Main Street
Worcester, MA 01608

AGENDA

1. Welcome and introductions
2. Participation requirements for 2004 CEDS Project List
3. Hand Out blank Project Information Forms for Project Submission to 2004 Project List
4. CEDS evaluation process
    - Review evaluation process
    - Review evaluation survey
    - Discuss goals and objectives and amend if necessary
    - Select goals to focus on during 2004
5. *Guest Speaker – Rich Rydant, Principal Planner, CMRPC* to discuss the Transportation Improvement Program (TIP) and Process
6. Adjourn

WORCESTER REGIONAL
Chamber of Commerce

Comprehensive Economic Development Strategy Committee Meeting
Tuesday, May 25, 2004
12:00 – 1:30 p.m.
Fuller Conference Center
Worcester Regional Chamber of Commerce
339 Main Street
Worcester, MA 01608

AGENDA

1. Welcome and Introductions
2. New Project Submissions for 2004 Project List
3. 2004 CEDS Annual Report
   - -Intern
   - -Submit Information
   - -Write-Ups for Projects
4. ***Guest Speaker Michael Creasey*** Executive Director of the John H. Chafee Blackstone River Valley National Heritage Corridor Commission
5. Next Meeting Date June 22, 2004
6. Adjourn

WORCESTER REGIONAL
Chamber of Commerce

Comprehensive Economic Development Strategy Committee Meeting
June 22, 2004
12:00 noon
Fuller Conference Center
Worcester Regional Chamber of Commerce
339 Main Street
Worcester, MA 01608

AGENDA

1. Welcome and introductions
2. New Project Submissions for 2004 Project List
3. 2004 CEDS Annual Report – information still needed
4. 2004 Project List Review
5. ***Guest Speaker* –Eric H. Schultz,** President and CEO of Fallon Community Health Plan, and Chair of the Central Mass Regional Competitiveness Council (RCC)
6. Adjourn

THE CITY OF WORCESTER

DOWNTOWN CARD PLAN

RENEWAL APPLICATION

PREPARED BY THE
CITY MANAGER'S OFFICE OF
ECONOMIC DEVELOPMENT
SEPTEMBER, 2003

THE DOWNTOWN CARD RENEWAL

1. The CARD is a predominately commercial geographic area, as shown on the attached map (see Attachment IV). The zoning for the Central Business District is BG-6.0 (General Business), for the Pleasant/Chandler Street corridors it is BG-3.0 (General Business use). The zoning for the Prescott Street area is BG-6.0 and MG-2.0 (General Manufacturing). The zoning of the Green Island district is BG-3.0 and BG-4.0 (General Business use), and the South Main Street area is zoned BG-2.0, BG-3.0, BG-4.0 and BL 1.0 (Business Limited use) Also attached please find photos of sections of the CARD. This map identifies the 5 distinct areas in the CARD, Central Business District, Green Island District, Prescott Street area, Pleasant/Chandler Streets corridors and the South Main Street area. The comprehensive Downtown CARD boundaries are delineated on this attached map.

The continuation of the CARD designation, although limited in providing direct benefits to the Downtown area, will enable the City to utilize this designation as an additional planning tool in future economic development plans. In addition, it will enable the City to utilize certain programs that are HUD funded through the Community Development Block Grant Program, and provide a vehicle for funding for the construction of future public parking garages.

The area's major land use characteristics are:

- Downtown office buildings containing first floor retail space, commercial office space and multi-use buildings and 3 family residential properties, which often have a first floor store-fronts. In some areas commercial and mixed-use industrial areas are included with small owner occupied retail/commercial and industrial use properties.
- These five areas of the CARD are distinct and unique in their own way. The Central Business District (CDB) contains the downtown "heart" of the City. In the CDB are City Hall, the Worcester Medical Center, the Worcester Centrum Centre, the recently restored Union Station, the Worcester Common Outlet and many multiple story office buildings.
- The Green Island District contains a mix use of manufacturing, commercial/retail and residential properties. Most of the residential properties in this area are 2 and 3 story houses with many first floor mom and pop businesses.
- The Prescott Street area is an older manufacturing/commercial area. Many buildings are in a deteriorated condition, environmentally contaminated, vandalized and vacant, which does not promote private investment or new businesses.
- The Pleasant Street/Chandler Street corridor consists primarily of commercial businesses and mixed-use properties under multiple ownership. Many properties are obsolete, in need of rehabilitation and revitalization. Several small businesses have opened on this street over the past several years, and most have failed, leaving vacant and abandoned store fronts.

- The South Main Street area contains mixed-use properties, primarily single-story commercial buildings and small businesses located on the first floor of 3 decker structures. A leading proponent of neighborhood self-help is Clark University, located in the heart of this section.

2. The CARD has experienced disinvestment demonstrated by the loss of commercial enterprises, by commercial buildings with high vacancy rates, and by physically deteriorating buildings. The CARD has an overall average vacancy rate of 33%, but this does not give an accurate representation of the problems experienced in each section of the Downtown CARD.
   - Over 21 storefronts are vacant in the Central Business District, 10 of which are on Main Street, indicating that there is still a great amount of disinvestment in this area.
   - Other sections, such as the Pleasant/Chandler Street corridor have a 32% vacancy rate and a 40% rate of deterioration as determined by the Worcester Community Housing Resources, an agency which provides economic development and housing assistance in this neighborhood of the City. This area has been the victim of disinvestment and has suffered from a general decline, resulting in the relocation or closing of businesses along these corridors.
   - The Green Island area has significant deterioration and a 31% vacancy rate of commercial properties. This area, once a bustling hub of activity, was severely impacted when Interstate 290 was built through the middle of this neighborhood, and the aesthetic appeal of the area has been diminished by years of neglect contributing to disinvestment by business owners.
   - The Prescott Street area is plagued with environmental contamination. Many of the sites located in this area are cost prohibitive at this time to re-develop. Vacancy rates in this area have been extremely high for several years, sometimes approaching 90%. Most of the properties are physically deteriorated, in need of major repairs and have been vandalized. A proposal to redevelop certain properties in the area has resulted in the Gateway Park LLC receiving a $43,400 award from MassDevelopment for site assessment of three parcels of land in the Prescott Street corridor.
   - The South Main Street corridor is characterized by older mixed-use buildings, which are in need of rehabilitation and repair, non-owner occupied residential properties and rapidly changing demographics. Although the area has a vacancy rate of 12% the turnover rate among businesses is consistently high, which tends to work against neighborhood stabilization efforts.
   - According to a recent study in 2003 there are 249 environmentally contaminated sites in the City. These sites are located in nearly every area listed above. These sites add to the redevelopment costs and dissuade private investment on these sites and promote further disinvestment in the CARD.
   - Please see Attachment III for list of 21 E sites.

3. Plans and specific strategies designed to prevent or to arrest and reverse disinvestment, including public action and incentives to promote private investment in the Downtown CARD.

- The strategies outlined in the CARD Plan submitted in 2000 continue to be valid and remain essentially the same at this time. Therefore, the City maintains that the original rationale for CARD designation for the Downtown CARD area still applies to our current revitalization goals.
- In April of 1994 the City of Worcester made application and received approval from the Economic Assistance Coordinating Council for designation as an Economic Target Area, by which the City could identify and designate certain areas of the City as Economic Opportunity Areas. These designated EOAs would then allow the City to offer Tax Incentive Financing plans to industrial/ commercial property owners. The designated EOAs included the Central Business District and South Business District which encompass all five areas of the Downtown CARD. In 2001 the City expressed the mission of the City of Worcester's Economic Development plans for the future of the City in its Strategic Plan 2001 for the City of Worcester. This plan provided updated goals which were the basis for the goals of the "Consolidated Plan" that were developed for the U. S. Department of Housing and Urban Development in 2000.
- The specific goals outlined in the Strategic Plan targeted the downtown central business district, and included the other four areas of the CARD as well. Please see Attachment VI for the Strategic Priorities of the City of Worcester.
- In the spring of 1999 the City instituted the Center City Development Council (CCDC). This is an entity which includes public and private sector leaders who are striving to build on the City of Worcester's strengths toward a desired end of creating an attractive, safe and economically vibrant Centre City.
- The CCDC produced "A Vision Plan for the 21St Century." This plan has identified 58 specific objectives to be achieved for the re-vitalization of the Downtown "Centre City." These objectives focus on marketing, infrastructure improvements, economic development, a Cultural Corridor, health and human services, housing and business.
- The City, through the City Manager's Office of Planning and Community Development's Economic Development section, administers and monitors the following business assistance programs within the CARD: Microloan Program, HUD Section 108 Loan Guarantee Program, the state's Economic Development Incentive Program, which provides state and local tax incentives to qualified businesses, the Façade & Awning Incentive Grant Program and the Environmental Remediation Fund, which encourages the re-development of vacant or under-utilized environmentally contaminated commercial and industrial properties in the City.

3. Contd.

- The strategy of the CARD Plan submitted in 2000 continues to be valid and remains essentially the same at this time. Therefore, the City maintains that the original rational for CARD designation of the Downtown CARD still applies to our current revitalization goals.

- Since the last submission of the CARD designation of 2000, there has been over $389 million in completed and planned Public Investment and over $687 million invested or planned by the private sector within the downtown CARD. The following is a list of some of these investments:

PUBLIC		PRIVATE	
City Hall completed	$740,000	Airport revitalization Planned	$209 MM
Parking Garage underway	$2.4 MM	Arts District Planned	$20MM
Gateway II Central St.	$21MM	Bancroft Building	$8 MM
Gateway III Lincoln Sq.	$2.2MM	Marriott hotel	$20 MM
Main So. Initiative underway	$30MM	NEESCOM	$ 25MM
SWIP Main So. planned	$57 MM	Mass College Pharmacy	$29.5MM
Medical Center Garage	$16MM	Prescott St. on-going	$145 MM
State Court House on-going	$125 MM	Primedica	$5MM
Worcester Common Planned	$66 MM	Protocol USA	$3MM
Union Station planned	$46.2MM	Worcester Medical Ctr.	$215MM
Worcester Public Library	$22.5MM	Preservation Worcester	$200,000
		Proposed new Hotel	$20 MM

- Many of the private investment projects were assisted by the City in the form of loans/grants/planning and Certified Projects (the state's Economic Development Incentive Program), which were all part of the City's Strategic Plan for the Downtown CARD.

- Further more the City has instituted a Brownfields Revolving Loan fund with the use of a $1,000,000 grant from the EPA and is currently involved with two Brownfield sites.

- The City granted two Certified projects this past year, one in the Downtown CARD and one in the Shrewsbury Street CARD. The downtown project involved site remediation and construction of a new business. That in the Shrewsbury Street CARD was for the re-construction of a manufacturing facility destroyed in a fire. Since the last renewal of the Downtown CARD, the City has approved 11 Certified Projects, of which 2 were in the Shrewsbury Street CARD and 3 in the Downtown CARD, reflecting over $8 million in private investment in the downtown and $3 million in the Shrewsbury Street CARD.

3 contd.

- While there were many projects completed or underway in the Downtown CARD, the City has not yet benefited in the area of commercial/retail space filled by an overflow from these projects. For example within a block of the Worcester Medical Center there is still much vacant retail and commercial space.
  There is nearly 200,000 square feet of vacant office space and approximately 10 vacant store fronts on Main Street alone, and 230 of 317 buildings which are deteriorated or in poor condition.

- There are 33 Health and Code cited violations within the Downtown CARD.

4. The CARD plan was given a public hearing at the City Council meeting, providing an opportunity for residents and businesses to comment. Agencies such as the Greater Worcester Area Chamber of Commerce, the Worcester Business Development Corporation and the Worcester East Side Community Development Corporation have expressed their support and endorsement of the CARD designation for the Downtown CARD. Please see Attachment V, letters of support.

5. The CARD plan for the Downtown area is directly linked to the City of Worcester's Consolidated Plan 2001-2006, the Strategic Plan of the City, the Economic Development Incentive Program, designates the City of Worcester as an Economic Target Area, and has implemented “Site specific Economic Opportunity Areas, which focus on the development of specific parcels which are in need of development, remediation and physical improvement within the City. Each of these plans contain "the strategies which will be employed that are intended to address the distinct shift in the City's economic base over the past few decades that has manifested itself in a decline in its manufacturing sector, a downtown with high commercial and office vacancy rate, and a surplus of older commercial and industrial buildings characterized by outdated features, lack of parking, building code violations and environmental contamination." Please see Attachment VI which list the strategic priorities within the 2001-2006 Consolidated Plan’s, Vision Statement, Goals, Objectives and Strategies.

6. The implementing agency for the CARD plan is the City Manager's Executive Office of Economic Development (EOED). The City of Worcester's Development Office and Economic Development section have the necessary experience and technical ability to carry out the administration and oversight activities required by CARD plan. Staff from the Economic Development section that will implement and monitor this plan have over 30 years combined experience. In addition to the extensive technical expertise of the staff, the staff has the ability to successfully administer this program as evidenced by previous years experience in administering the above mentioned programs. EOED, now a part of the City of Worcester's Development Office,

has an excellent tract record in designing, establishing, and successfully implementing a wide range of economic development programs.

7. The Downtown CARD Renewal application was approved as defined by M.G.L. c. 40D, § 1, by the Worcester City Council on September 9, 2003 which was submitted to the Mass. Dept. of Housing and Community Development on September 18, 2003 and accompanied by a letter from the City Manager requesting plan approval by DHCD. Please see Attachment VII.

CARD OVERVIEW

The CARD has experienced disinvestment demonstrated by the loss of commercial buildings with high vacancy rates, and by physically deteriorating buildings.
The CARD has an overall vacancy rate of 33% +, but this does not give a fair representation of the problems experienced in each section of the Downtown CARD. The five neighborhoods that comprise the Downtown CARD, although individual and distinct, are both integral and contiguous to the Central Business District and together constitute the entire downtown area and are appropriately considered as one CARD. In addition, three of these areas are gateways to the downtown area from the west and south. Although there had been significant building projects, both public and private in the Downtown CARD since 2000, these investments have not had the impact which was anticipated in filling vacant office space and commercial/retail buildings in the CARD. Further development in the CARD is still needed and required to create a vibrant and thriving community.

ATTACHMENT I

WORCESTER IDFA BOND ACTIVITY

2000 - 2003

IRB LIST

Borrower_CNM	Program_DS	Closed_DT	Project_Title_TX	Direct_Jobs	Retained_Jobs	Financing_AM
Genesis Club, Inc.	Mortgage Insurance Guarantee	20-Mar-03	Genesis Club House	0	25	$100,000.00
The Community Builders, Inc.	Predevelopment Economic Development	12-Dec-02	Odd Fellows Building	0	0	$25,000.00
Clark University	501(c)(3) Tax-Exempt Bond	26-Nov-02	Trustees of Clark University-2002	8	575	$30,000,000.00
W.H.Y. M.E., Inc.	Mortgage Insurance Guarantee	15-Nov-02	Sherry's House Project	2	3	$210,000.00
Roman Catholic Bishop of Worcester	501(c)(3) Tax-Exempt Bond	25-Oct-02	St. Peter-Marian Central Catholic Junior-Senior H.S.	15	100	$3,300,000.00
Ralphco, Inc.	Brownfields Site Assessment	22-Oct-02	44 Grand Street	0	0	$15,915.00
Worcester Business Development Corporation	Brownfields Site Assessment	08-Aug-02	Gateway Park LLC	0	0	$49,564.00
W.H.Y. M.E., Inc.	501(c)(3) Tax-Exempt Bond	06-Aug-02	Sherry's House Project	2	3	$750,000.00
Biomedical Research Models, Inc.	Emerging Technology Fund Loan	31-May-02	Biomedical Research Models, Inc.	6	35	$140,000.00
Assumption College	501(c)(3) Tax-Exempt Bond	01-May-02	Assumption College - Series 2002	4	608	$47,005,000.00
Pernet Family Health Service, Inc.	Business Loan	10-Apr-02	Pernet Family Health Service, Inc.	0	33	$40,000.00
Seven Hills Foundation	501(c)(3) Tax-Exempt Bond	28-Mar-02	Seven Hills Foundation	200	850	$15,195,000.00
College of the Holy Cross	501(c)(3) Tax-Exempt Bond	27-Mar-02	College of the Holy Cross-2002	10	1015	$30,000,000.00
The Bridge of Central Massachusetts, Inc.	501(c)(3) Tax-Exempt Bond	21-Nov-01	The Bridge of Central Massachusetts, Inc.	10	40	$5,000,000.00
Massachusetts Biomedical Initiatives	Emerging Technology Fund Loan	27-Jun-01	Massachusetts Biomedical Initiatives	40	0	$1,000,000.00
Gateway Park LLC	Brownfields Redevelopment Fund Loan	25-Jun-01	Gateway Park LLC	50	0	$350,000.00
Joseph Capone	Brownfields Site Assessment	15-May-01	Putnam Lane	0	0	$32,600.00
Putnam Lane Realty, Inc.	Brownfields Redevelopment Fund Loan	14-May-01	Putnam Lane Realty, Inc.	10	0	$200,000.00
Bancroft School	501(c)(3) Tax-Exempt Bond	27-Apr-01	Bancroft School	1	110	$9,235,000.00
Assumption College	501(c)(3) Tax-Exempt Bond	25-Apr-01	Assumption College - Series 2001	6	577	$9,500,000.00
Charles River Labs, Inc.	Emerging Technology Fund Loan	29-Mar-01	Genzyme TransGenics Corporation	100	400	$2,004,000.00

Borrower_CNM	Program_DS	Closed_DT	Project_Title_TX	Direct_Jobs	Retained_Jobs	Financing_AM
ECM Plastics, Inc.	Tax-Exempt IDB	15-Mar-01	ECM Plastics, Inc.	32	61	$3,300,000.00
Salem Community Corporation	501(c)(3) Tax-Exempt Bond	01-Feb-01	Salem Community Corporation	27	85	$30,115,000.00
YMCA of Greater Worcester	501(c)(3) Tax-Exempt Bond	19-Jan-01	YMCA of Greater Worcester	50	28	$10,000,000.00
Clark University	501(c)(3) Tax-Exempt Bond	02-Nov-00	Clark University	3	540	$14,055,000.00
Worcester Academy	501(c)(3) Tax-Exempt Bond	18-Aug-00	Worcester Academy	0	114	$15,000,000.00
G L Synthesis	Equipment Loan Program	14-Aug-00	G L Synthesis	15	6	$150,000.00
Gateway Park LLC	Special Projects	26-Jul-00	Gateway Park LLC	0	0	$1,650,000.00
Gateway Park LLC	Mortgage Insurance Guarantee	26-Jul-00	Gateway Park LLC	0	0	$500,000.00
53 Millbrook LLC	Permanent Loan	14-Jul-00	ECM Plastics, Inc.	30	60	$756,000.00
53 Millbrook LLC	Mortgage Insurance Guarantee	14-Jul-00	ECM Plastics, Inc.	30	60	$280,000.00

ATTACHMENT II

DEVELOPMENT PROJECTS IN THE DOWNTOWN

CARD, PROPOSED ON-GOING, OR COMPLETED

DOWNTOWN DEVELOPMENTS

Completed, On-Going, Proposed

1996 - 2003

Public Investment

	Amount
Washington Square Development	$10,000,000
Urban Systems Gateways	23,700,000
Streetscape	10,000,000
Convention Center	38,000,000
Commuter Rail Extension	120,000,000
Union Station	43,000,000
City Hall Renovations	2,200,000
State Courthouse	125,000,000
Worcester Center Blvd.	3,200,000
Signage Program	2,000,000
Worcester Medical Center (site preparation)	40,000,000
Worcester Public Library	22,500,000
Worcester Common	2,000,000
W.R.A. Garage	16,800,000
Worcester Auditorium	10,000,000
Roadway Improvements	2,700,000

Private Investment

	Amount
Tuckerman Hall	1,000,000
Massachusetts College of Pharmacy	20,000,000
Worcester Art Museum	30,000,000
Stevens Block	500,000
Burnside Building	3,200,000
PresMet Corporation	8,900,000
TSI/Primedica of Worcester	5,000,000
Commerce Bank	2,000,000
Worcester Medical Center	215,000,000
Marriott Courtyard Hotel	20,000,000
Central Street Hotel (proposed)	20,000,000

ATTACHMENT III

LIST OF DEP ENVIRONMENTAL

21E HAZARDOUS WASTE PROPERTIES

IN THE DOWNTOWN CARD

21 E –LIST OF

CONTAMINATED SITES

(AS OF May 2003)

Site Location	Identifier	21E Type
Allen Court	Worcester T& G	Tier 1B
670 Cambridge St.	Gas Station	Tier 2
32 Cambridge St.	Parking lot	RAO
231 Cambridge St.	Honey Farms, Inc.	Tier 2
53 Cedar St.	Unk.	RAO
4 E. Central St.	USPS	RAO
100 Central St.	Fallon Clinic	RAO
199 Chandler St.	White Cleaners	Tier 2
30 Chandler St.	Mobile Station	RAO
15 Chestnut St.	N E Telephone	RAO
96 Dewey St.	Lanotte & Sons	RAO
Exchange & W C Blvd	Parcel 35	NFA
50 Franklin St.	Bancroft	RAO
93-95 Grand St.	Grand Ind. Park	Tier 1B
287 Grove St.	WRTA	Tier 2
75 Grove St.	Parker Affiliates	RAO
90 Harding St.	Patrick Motors	Tier 2
47 Harvard St.	Jems of New England	RAO
38 Hermon St.	Pap Realty Trust	RAO
Hermon St.	Worcester Storage	RAO
35 Hermon St.	Unk.	Tier 1B
77 Highland St.	Texaco Station	Tier 2
38 High St.	St. Pauls Cathedral	Tier 2
52 High St.	St. Joseph's Home	Tier 2
12 High St.	Unk.	RAO
5 Jaques St.	Engine Realty Trust	NFA
190 Madison St.	Build. #125 roof	RAO
105 Madison St.	Wyman Gordon	DPS
185 Madison St.	Unk.	RAO
Main Street	Webster Square Plaza	RAO
1078 Main Street	Mobile Station	Tier 2
1256 " "	Brite Cleaners	RAO
779 " "	Sunoco Station	RAO
1148 " "	Merit Gas Station	Tier 2
1013 " "	Atamian Motors	RAO
175 " "	BTWN School	RAO
1233 " "	Gas Station	Tier 2
1275 " "	Texaco Station	RTN

46-48 Mason St.	Institutional Linens	Tier 1B

Site Location	Identifier	21E Type
79 May St.	Sainsbury & O'Connell	RAO
90 May St.	Whitaker Reed Co.	Tier 1B
280 May St.	Corner of Chandler	RAO
189 May St.	Fairlawn Hosp.	RAO
9 Norwich St.	Unk.	
Preclassified		
510 Pleasant St.	Amoco Station	Tier 2
342 Pleasant St.	Cumberland Farms	RAO
333 " "	Cross St. & Marrick	RAO
38-40 Pond Street	Harding St. Realty Corp.	Tier 2
22 Portland St.	H. Glick & Sons	Tier 2
150 Prescott Street	Worcester T & G	Tier 1B
130 Prescott Street	Worcester T & G	RAO
100 Prescott Street	Ravine Beech Co.	NFA
85 Prescott Street	Parker Metal Corp.	Def Tier 1B
26 Queen Street	Worc. City Hosp.	Def Tier 1B
26 Queen Street	U-Mass Detox Ctr.	Tier 2
26 Queen Street	Worc. City Campus	RTN
15 Ripley St.	Catholic Charities	Tier 2
81 Summer St.	Gas N Go	RAO
40 Temple St.	St. John's Church	RAO
81 Thomas St.	Prime Value Market	RTN
149 Washington St.	Stanley Tool Bldg.	RAO
25 Union Street	Market St.	DPS
57 Union St.	Primedica	RAO
Winfield St.	Park Ave.	RAO
Worc. Center Blvd.	Medical City	RAO

ATTACHMENT IV

MAP AND PHOTOS

OF

VACANT, ABANDONED, OR DETERIORATED

PROPERTIES IN THE DOWNTOWN CARD

(Photos are at the end.)

ATTACHMENT V

LETTERS OF SUPPORT
Not available electronically,
hard copies available on request.

ATTACHMENT VI

STRATEGIC PRIORITIES

OF THE CITY OF WORCESTER'S

2001-2006

CONSOLIDATED PLAN

Not available in electronic form
hard copy available on request.

ATTACHMENT VII

LETTER FROM CITY MANAGER

AND

CITY COUNCIL RESOLUTION REQUESTING APPROVAL OF THE DOWNTOWN CARD

BY THE MASSACHUSETTS DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

September 18, 2003

Ms. Jane Wallis Gumble, Director
Department of Housing and Community Development
100 Cambridge Street
Boston, MA 02202-0044

Dear Ms. Gumble:

On behalf of the City of Worcester, I would like to thank you for affording us the opportunity to apply for approval of both our Shrewsbury Street Commercial Area Revitalization District (CARD) designation and that of our Downtown CARD designation.

The following report documents the City's continuing need for the re-designation of both existing CARD plans and the rational behind this request. The City received approval from your office on our previous CARD renewal applications effective October 1, 2000, which will expire on September 30 of this year. Therefore, this application includes updated economic development information relative to activities which have occurred in both CARD areas since the approval of our 2000 renewal request.

The City of Worcester, as noted in our previous renewal submissions, has experienced a significant amount of public and private investment during the past several years, with a large portion of that development taking place within the Central Business District. Many of these projects in the downtown are so-called "mega-projects," which constitute $600 million worth of development projects that have either been recently completed, are in the construction phase, or in the planning stages. Although several of these projects are expected to create additional economic benefits to the immediate area, there remain pockets of distress and dis-investment within the core of the City and in particular along the Main Street, Pleasant Street and Chandler Street corridors in the downtown area.

A significant number of vacant commercial/retail storefronts exist within the downtown CARD and the overall office vacancy percentage for the entire area (survey done in September 2002) reflects a rate of 12.6% for commercial office space alone. In the corridors of Chandler and Pleasant Street there is a 72% rate of buildings which are in poor condition or deteriorated and a total of 249 contaminated 21E sites within the City, which encompass fuel spills to underground storage tank leaks and former leachates.

The combination of new public/private investment and increasing vacancies within the downtown CARD pose a tremendous challenge to the City. The City of Worcester is not unlike many other older industrial cities in the northeast United States, that have either gone through or are going through a transition period within the downtown area. Recognizing the important economic as well as cultural contributions the City of Worcester makes to the region, the City has developed and implemented various programs and strategies during the past several years to address the important issues facing Shrewsbury Street and Downtown CARDs. In addition to several financial assistance programs offered by the City to attract and retain business, the City has also invested heavily in new infrastructure improvements including a signage program, streetscape development, roadway improvements and general beautification projects.

The City, through the state's Economic Assistance Coordinating Council, was designated as an Economic Target Area (ETA) under Chapter 23A of the state's Economic Development Incentive Program (EDIP). The City has recently implemented "site specific" Economic Opportunity Areas (EOA), and eight of the Certified Projects, which have been done by the City are or were located in the Downtown and Shrewsbury CARD areas.

The renewal of the existing CARD plans will enable the City to direct resources toward continuing revitalization in those areas and provide the City with an additional economic development tool, which can be used in conjunction with other economic development incentives and programs to both retain and attract businesses. Although there are currently no state financial incentives available to businesses located in the CARDs, the City seeks this designation as an additional planning tool.

Thank you for your consideration of this request, and if there are any questions or a need for additional information, please contact, Mr. Philip J. Niddrie, Chief Development Officer at (508) 799 - 1181 or Mr. Lanny M. Beaulieu, Economic Development Specialist at (508) 799-1523.

Sincerely,

Thomas R. Hoover,
City Manager

/lmb
attachments

RESOLUTION APPROVING THE DOWNTOWN COMMERCIAL AREA REVITALIZATION DISTRICT (CARD) PLAN

WHEREAS: In accordance with Chapters 40D, and 23D, of the Massachusetts General Laws, the Commonwealth of Massachusetts, acting by and through the Department of Housing and Community Development, may approve Commercial Area Revitalization Districts Plans and Amendments thereto; (herein referred to as CARD Plans); and

WHEREAS: Such approval is a precondition for the use of various state financial incentives for development that would be in the public interest of the citizens of Worcester; and

WHEREAS: The designation of a Downtown CARD, which is situated in the City of Worcester, would forward the community development objectives of the City of Worcester and would stimulate the physical development/redevelopment of said District and the creation of employment opportunities.

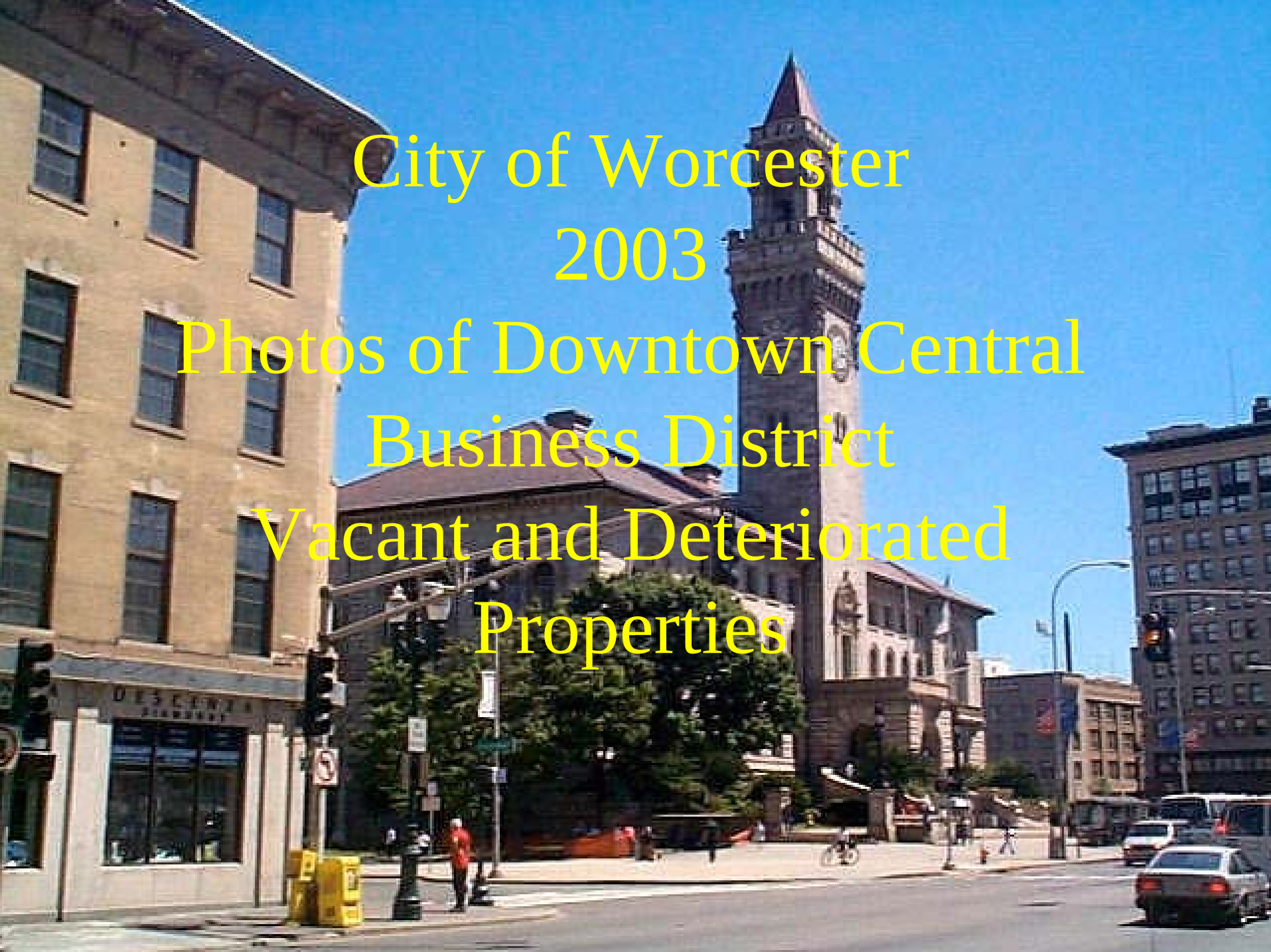
NOW, THEREFORE BE IT RESOLVED BY THE CITY COUNCIL

1. That the Downtown Commercial Area Revitalization District (CARD) is a predominately commercial geographic area;
2. That implementation of the proposed CARD Plan will serve to prevent and to avert and reverse the decay of the area covered by the plan;
3. That the Downtown CARD Plan application is hereby approved and that said Plan be submitted to the Department of Housing and Community Development for approval; and
4. The City Manager is authorized to take such action as may be necessary to carry out this resolution.

In City Council

Resolution adopted.

David J. Rushford
City Clerk



City of Worcester
2003
Photos of Downtown Central Business District
Vacant and Deteriorated Properties

422 MAIN ST.
VACANT
422

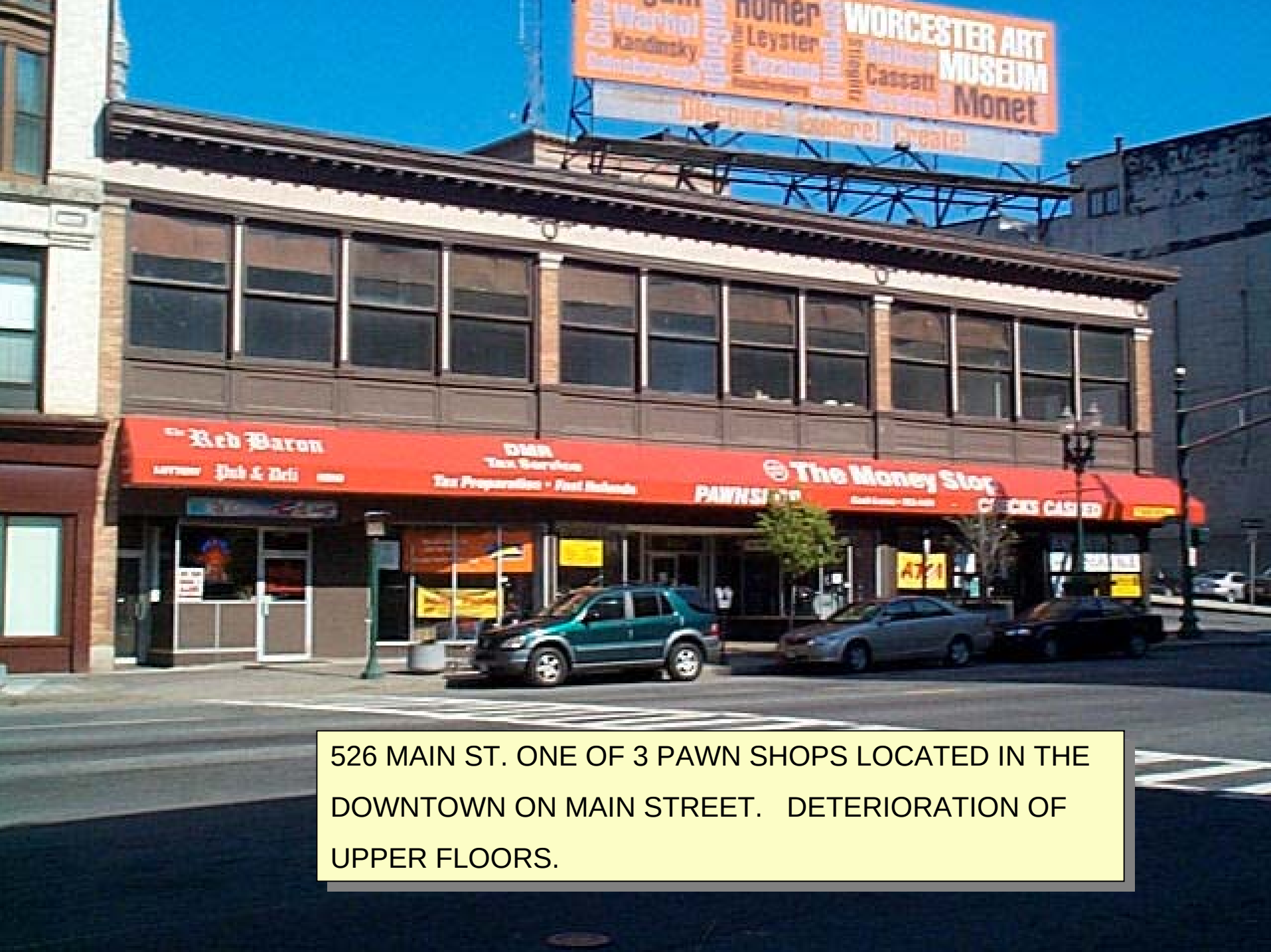
422 MAIN ST.
FREE PARKING

CORNER OF MAIN AND FRANKLIN ST

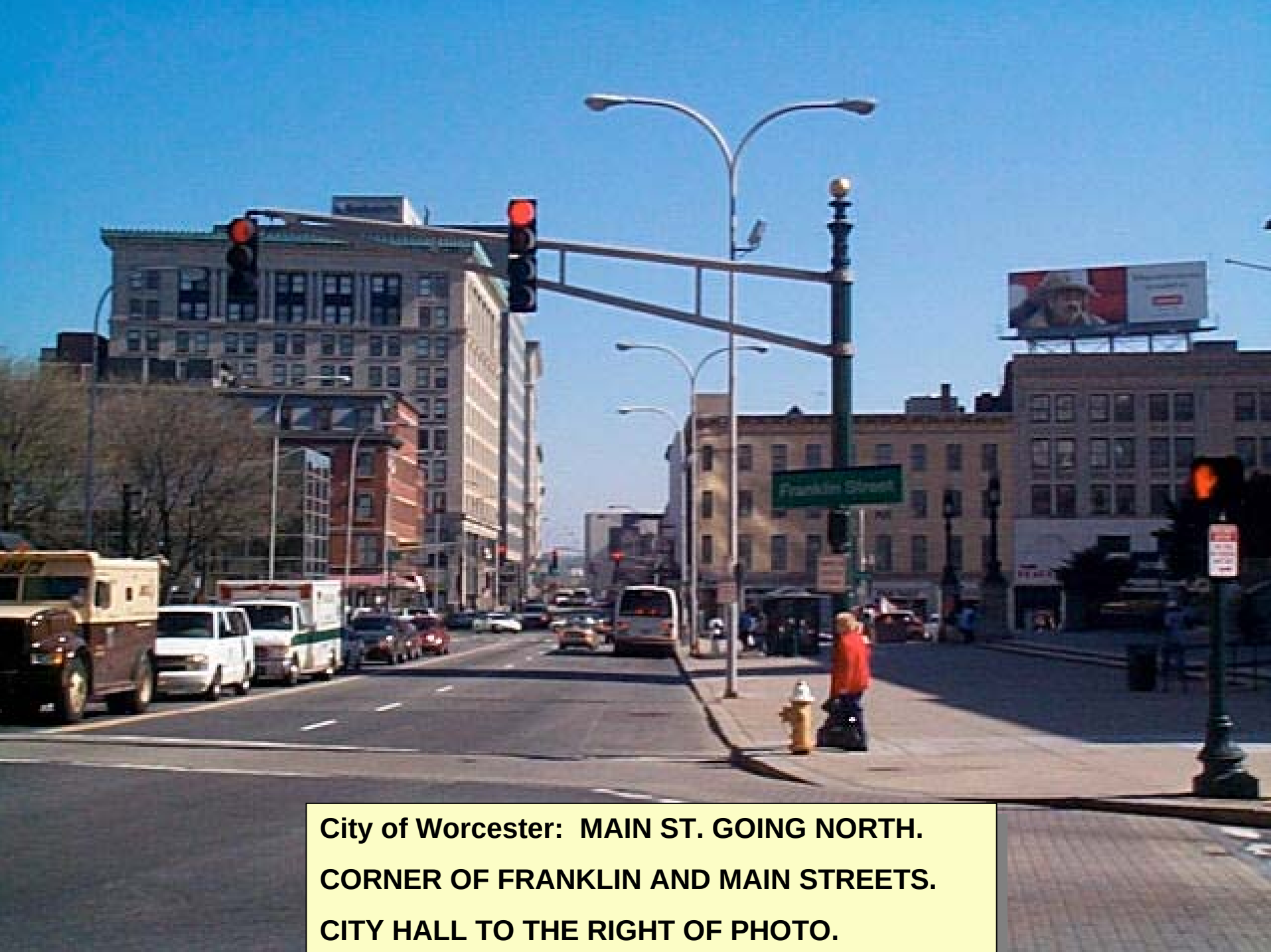
VACANT

SHOWCASE CINEMA

SOUTHBRIDGE STREET
VACANT STOREFRONT & OFFICES



526 MAIN ST. ONE OF 3 PAWN SHOPS LOCATED IN THE DOWNTOWN ON MAIN STREET. DETERIORATION OF UPPER FLOORS.



City of Worcester: MAIN ST. GOING NORTH.

CORNER OF FRANKLIN AND MAIN STREETS.

CITY HALL TO THE RIGHT OF PHOTO.

SHOWCASE CINEMAS

VACANT

FRANKLIN ST.

VACANT STOREFRONT

CONNER OF FRANKLIN AND

PORTLAND STREETS VACANT

84 FRANKLIN ST. VACANT

WORCESTER COMMON OUTLET 30% Vacancy rate

Corner of Front and Commercial Streets VACANT

50

FRONT STREET- STORE CLOSING- GOING OUT OF BUSINESS

MAIN ST. & 10 MECHANICS STREET- VACANT 1ST FLOOR AND OFFICE SPACE.

VACANT STORE FRONT - AND DETERIORATED

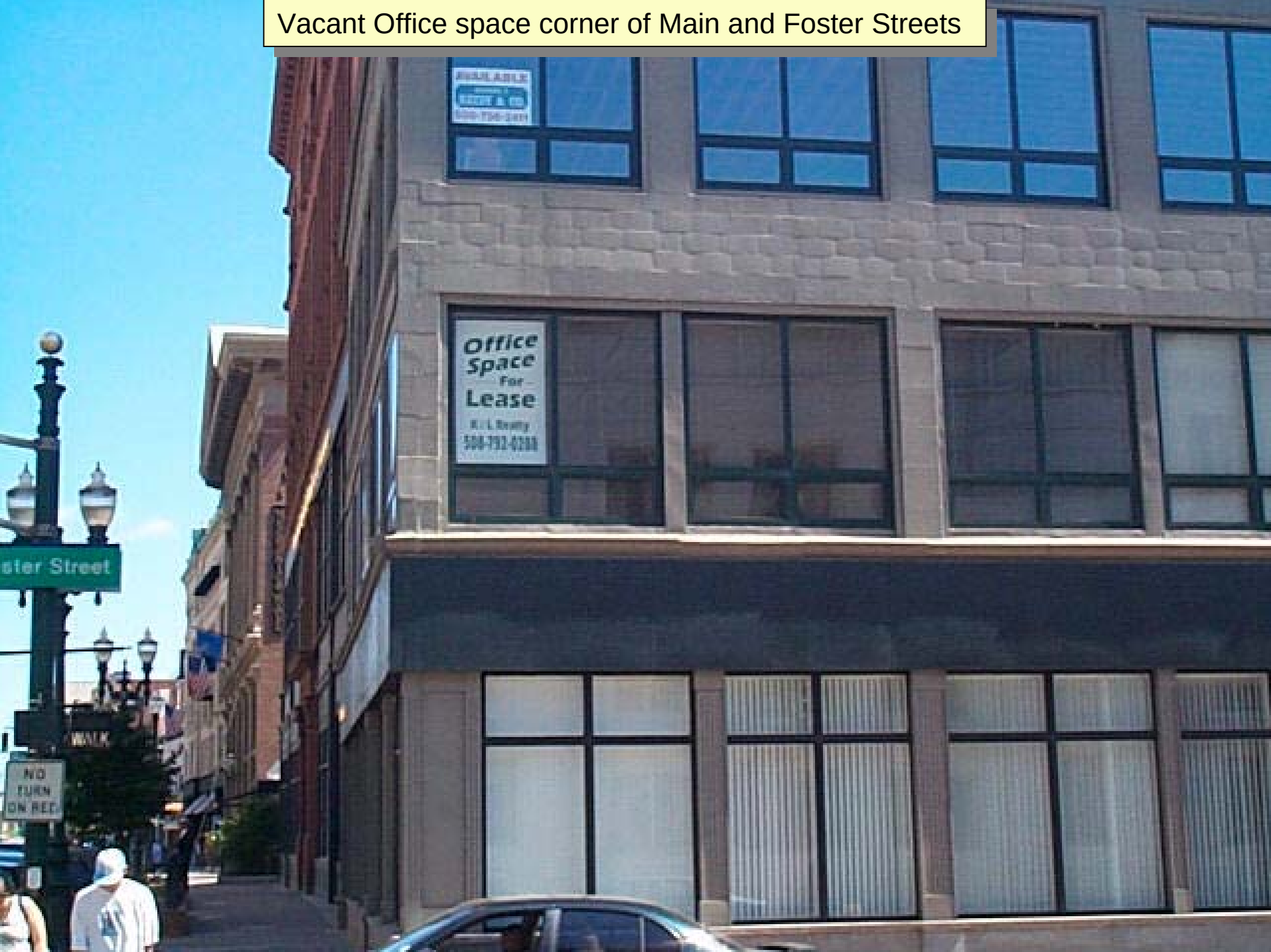
Main Street

412 Main Street
Vacant

Vacant Office Space on Main St.

Vacant Office Space on Main St.

Vacant Office space corner of Main and Foster Streets



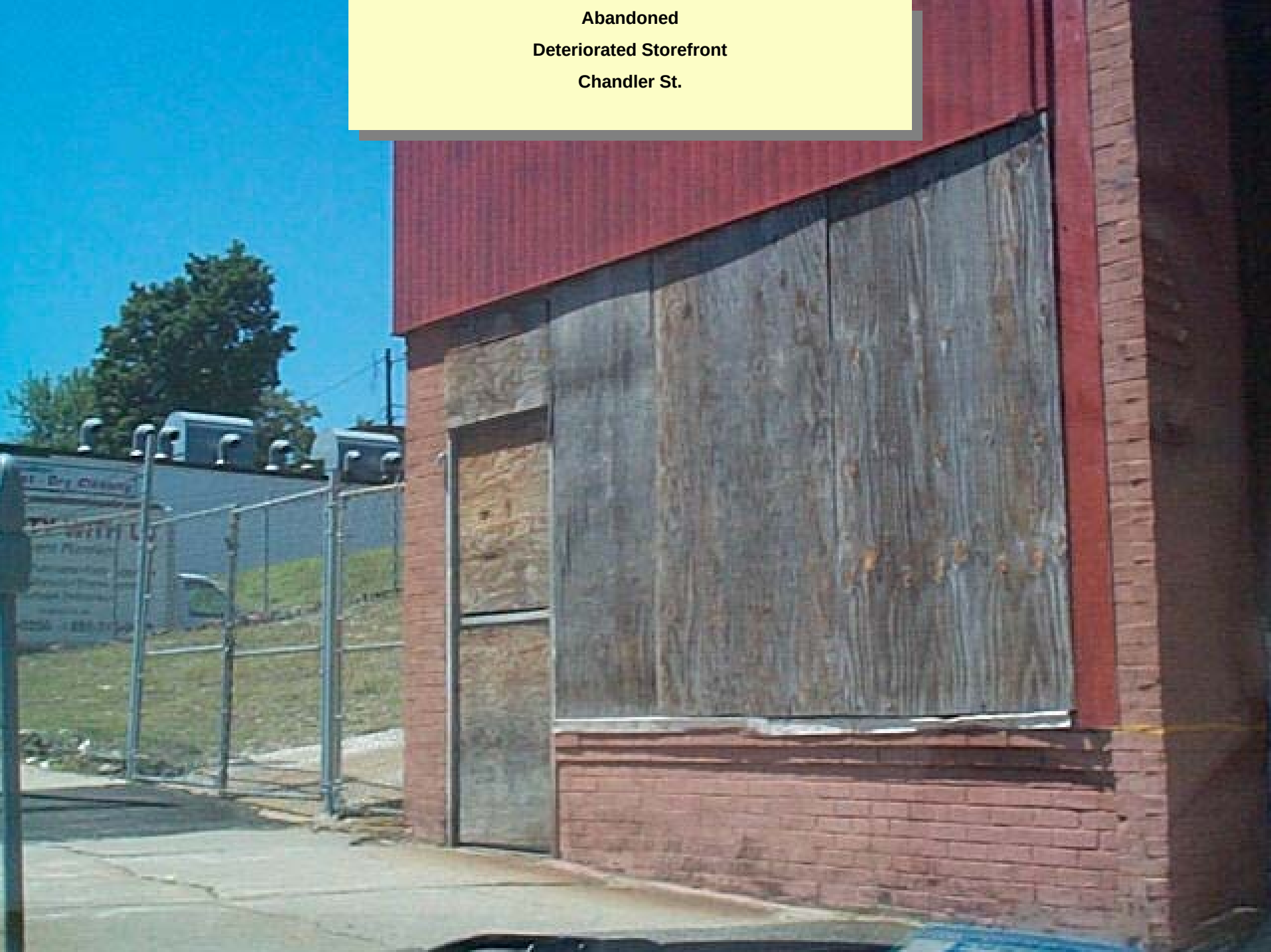
Vacant Store Front on Main Street

Vacant Store Front on Main Street

Vacant Building on Main Street

34 Chandler St.

Vacant store front



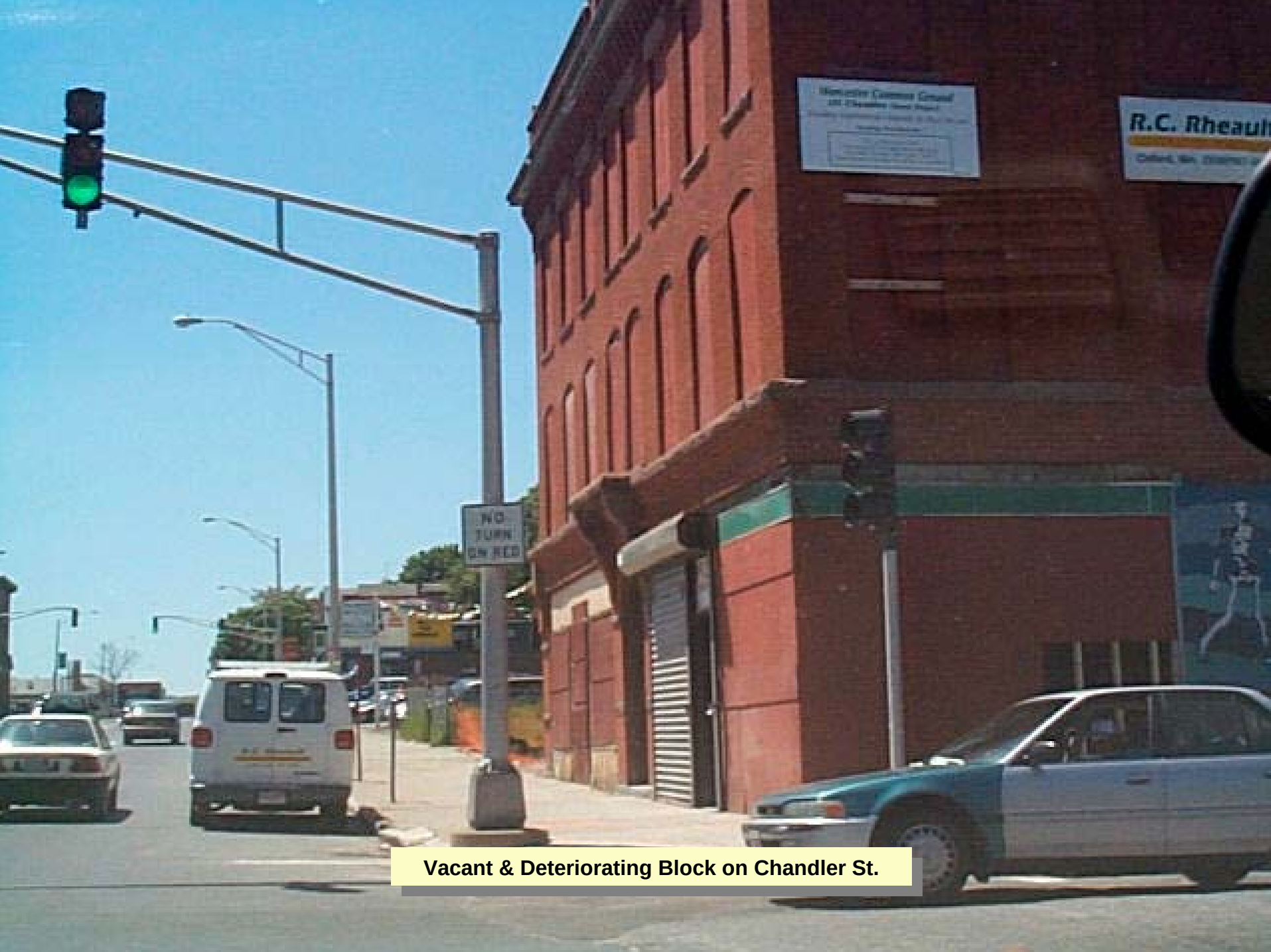
Abandoned

Deteriorated Storefront

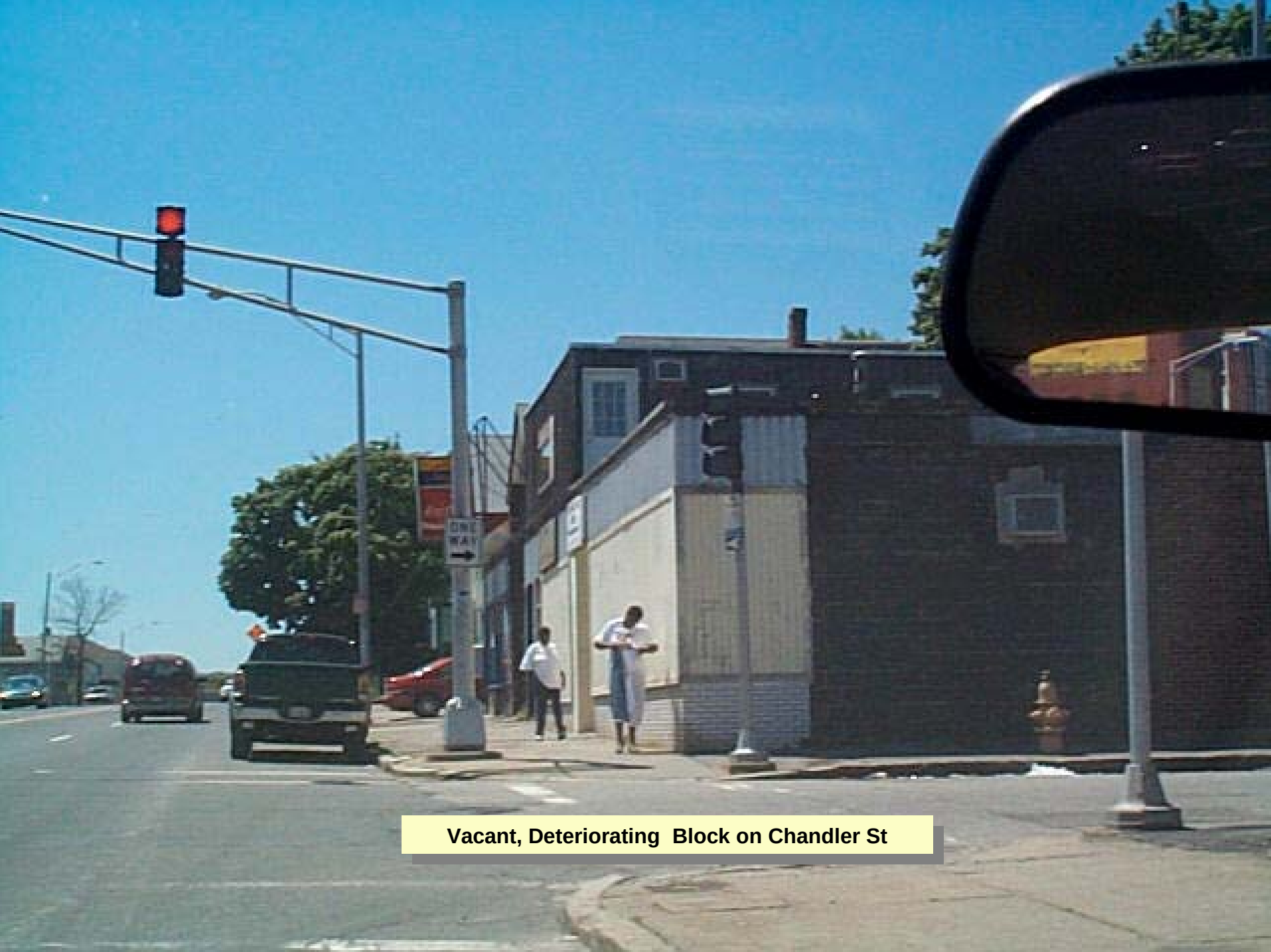
Chandler St.

Vacant & Deteriorating building on Chandler St.

Vacant & abandoned building on Chandler St.



Vacant & Deteriorating Block on Chandler St.



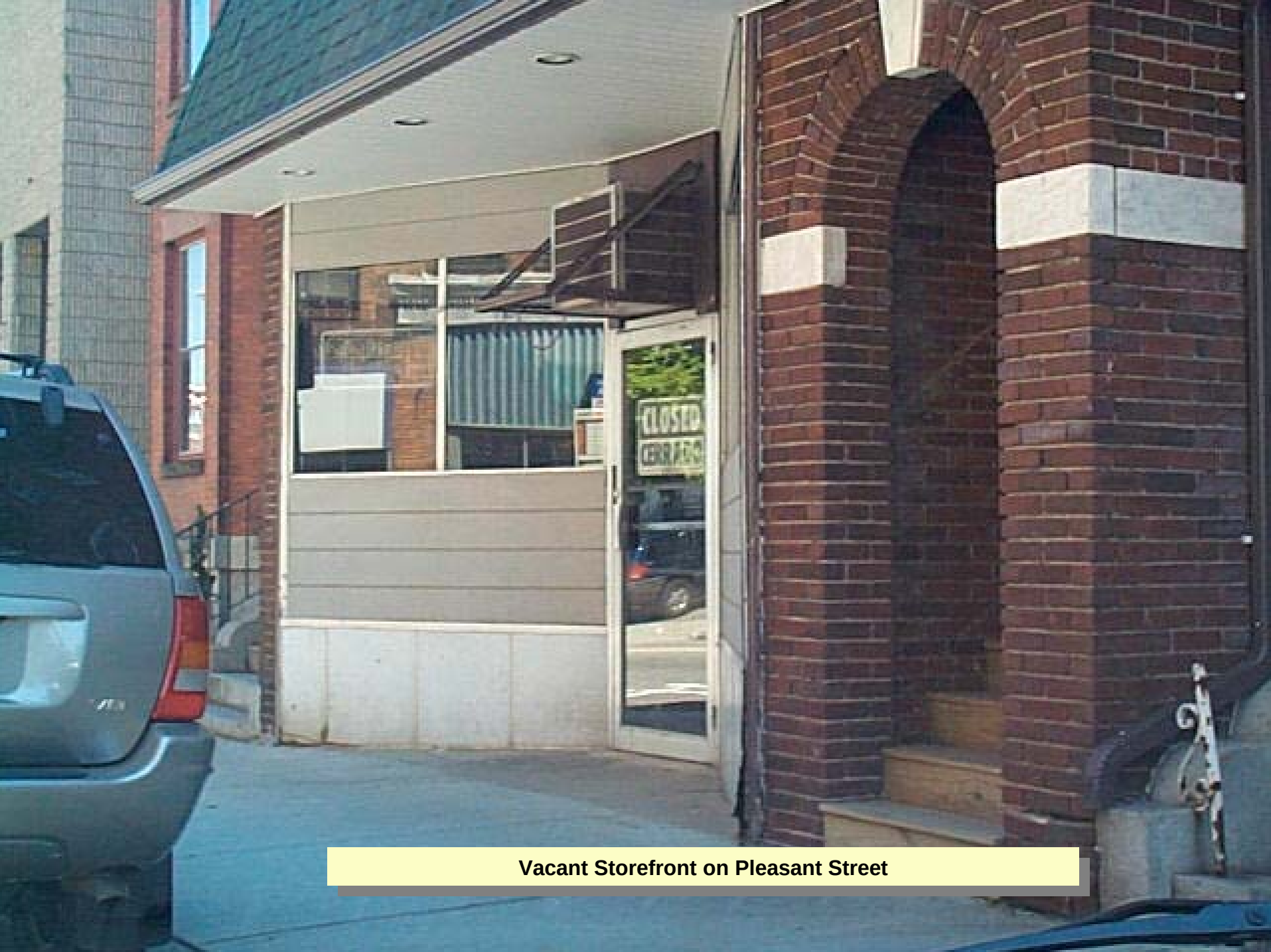
Vacant, Deteriorating Block on Chandler St

Vacant Store Front on Pleasant Street

Vacant, Deteriorating building on Pleasant St.

Deteriorating building on Pleasant Street

Vacant & Deteriorating Storefront - Pleasant St.



Vacant Storefront on Pleasant Street

EXECUTIVE ORDER 418 HOUSING CERTIFICATION
COMMONWEALTH OF MASSACHUSETTS
FY2004

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

Date of Provisional Certification: 3/9/2004 - 6/30/2004

Worcester

Addition to the EO418 Housing Supply affordable to households with a broad range of income

The housing supply in Worcester increased by 334 ownership units and 39 rental units in the period 7/1/2002 - 6/30/2003.

Affordable ownership units assessed in the range of **Below $90,000 - $285,592: 327**

Affordable rental units with monthly rent in the range of **Below $600 - $799: 39**

An additional 77 rental units were created for which rent could not be determined.

Summary of the community's housing strategy

CITY OF WORCESTER SHORT TERM HOUSING PRODUCTION GOALS:

City Fiscal Year FY July 2003-June 2004

Goals and Objectives for HOUSING

GOAL

Preserve existing and increase affordable homeownership and rental housing opportunities in addition to increasing overall housing production for all households in the community across a broad range of incomes.

OBJECTIVES --Production/Direct Assistance

1. Through partnerships with for profit and non-profit developers, complete construction of seventy five (75) HOME assisted units for affordable homeownership and rental opportunities with sixty (60) more units in construction or predevelopment pipeline.

2. Through partnerships with for profit and non-profit developers, facilitate the production of new market rate homeownership and rental opportunities in underutilized buildings and on vacant parcels in the central city core and major corridors. Move 500 to 750 units into predevelopment and production.

3. Through partnerships with state agencies, community-based agencies, and local lenders, more than one thousand (1,000) low-to moderate-income households will be trained and certified in all phases of homeownership.

4. Provide direct technical assistance to five hundred (500) private owners to access resources and assistance thus leading to better maintenance, management and rehabilitation of their homes and apartments.

5. Through partnerships with community-based agencies, continue efforts to identify and assist a minimum of sixty (60) senior homeowners to address barriers that prevent them from aging in place, maintaining their home, and leasing units they are holding "off-line".

OBJECTIVES--Planning/Administration

1. Continue updating all program literature and publish on the City's web site, and through print and electronic media.

2. Promote the Massachusetts Banking Council's Don't Borrow Trouble public awareness campaign to protect residents from unscrupulous lending that often leads to foreclosure.

3. Continue affordable housing preservation efforts, including prioritizing and exercising all leverage available to protect investment in the long-term affordability of Federal and State financed private rental properties that are at-risk of converting to market rate due to expiring use-restrictions and Section 8 contracts.

4. Provide planning and administrative housing services to include the following:

a. Update citywide housing market and needs analysis.

b. Complete an update and review of impediments to fair housing choice.

c. Complete the update in accordance with the Commonwealth of Massachusetts Executive Order 418 Housing.

d. Complete certification and an inventory of Chapter 40B affordable housing.

e. Plan and implement the Urban Housing Center Zones for Tax Increment Financing.

f. Planning and implement the HUD designated Neighborhood Revitalization Strategy Areas.

5. Provide interdepartmental policy, resource and program development work to include the following:

a. Ongoing work with the Information Services Department and Assessors Office to update and maintain an inventory of all buildings and land suitable for affordable housing development;

b. Ongoing work with the Tax Title Custodian and Law Department to dispose of tax foreclosed properties for re-use as affordable housing;

c. Ongoing work to enable the holding and assembly of city owned parcels and buildings in order to accomplish larger scale housing production in targeted neighborhoods;

d. Ongoing work to secure, and demolish unsafe structures in coordination with the Department of Public Health and the Department of Code Enforcement; and

e. Ongoing work to secure new resources for the development of affordable housing.

RKG Associates was retained by the City's Executive Office of Neighborhood Services to prepare a comprehensive housing market study of Worcester. A final report was completed and presented to over 200 residents and stakeholders in the fall of 2002. The City Council's sub-committee on Housing and Neighborhood has scheduled four public hearings to gather input and testimony prior to updating the City's housing, economic and community development policies and strategies. A build-out analysis for Worcester was also completed and presented to the community in the Fall of 2002 by the Central Massachusetts Regional Planning Commission. The following are some key findings:

1) SOCIO ECONOMIC TRENDS AND PROJECTIONS:

a) Population and Household Trends

-- Population in Worcester increased by nearly 2,900 persons or 1.7% between 1990

and 2000. Despite this gain, Worcester's population base in 2000 (172,650) remains below the level reported in 1970 (176,600), as well as below a prior peak in 1950 (203,500). The population in the nine-town region immediately surrounding Worcester increased by 13,800 or 13% for the same period.

--Worcester's population base during the 1990s became more racially and ethnically diverse. The non-white population in the City increased by 18,300 persons during the 1990s, and the Hispanic population gained 9,900 persons.

-- The population in group quarters declined by nearly 1,400 persons during the 1990s, including a loss of more than 600 students in dormitories. These students more than likely moved into housing units and became multiple-person households.

--Household growth in Worcester outpaced population growth during the 1990s, as they increased by more than 3,140 households, indicating a 4.9% gain. In comparison, households in the region increased by nearly 6,100 households during the 1990s, or a 15.9% gain.

--The number of families has remained relatively unchanged in Worcester between 1980 and 2000, suggesting that the increase in households over the last 20 years resulted from non-family groups. The region experienced a 20.3% growth in families, more than likely at the expense of the City.

b). Age and Income Characteristics

--Households either at or near their peak employment periods, ages 35 to 44 and 45 to 54, experienced the highest amount of growth (7,400) in Worcester during the 1990s. This shift is partially a result of the aging of the baby boom generation. Offsetting these increases was a loss of more than 3,300 households, mostly from elderly (65 to 74), and to a lesser extent, near elderly (55 to 64) households.

-- The region on the other hand, experienced a similar growth in the "baby boom" generation, as well as a gain in aging-elderly (75 and up).

--Median household income in the City was reported at $35,625 in 2000, which was approximately 40% lower than the median income lever reported for the region ($59,000). Household income in Worcester did not keep pace with inflation during the 1990s.

--In 2000, only 8% of Worcester households had incomes at $100,000 or more, while more than 50% of the households had incomes below $35,000, including over 22% of households with incomes below $15,000.

c) Labor Force and Employment Base

--Despite a modest increase in population during the 1990s in the City of Worcester, the resident labor force declined by 5,400 persons. In comparison, the labor force in the region gained nearly 1,650 participants. More recent information suggest that the labor force in Worcester has experienced modest gains in the two years since the census, and so has the region.

--The employment base in Worcester at the end of 2000 recovered much of the job losses that occurred during the recession of the early 1990s; however, levels remain below the historic highs experienced in the late 1980s. In comparison, the employment base in the region recovered and surpassed the previous high market experienced in the late 1980s.

--The average annual wage in Worcester increased by 45% between 1990 and 2000, outpacing the CPI. The 2000 average wage in Worcester was marginally higher than its median household income.

d) Population Forecasts

--Population forecasts to 2010 for the City of Worcester indicate potential growth of between 4,100 and 11,300 persons. These figures equated to about 1,700, to 4,700 households. Given the age of the "baby boom" generation at least 25% to as much as 40% of this potential growth could be aimed at the over-60 market.

--Based on historic tenure trends, these forecasts indicate a potential demand of between 700 and 1,900 new owner households, and between 1,000 and 2,800 new renter households.

2) HOUSING CHARACTERISTICS AND REAL ESTATE MARKET CONDITIONS

a) Housing Supply

-- The City of Worcester has a diverse, but aged, housing stock that contains 70,723 units according to Census 2000, and the supply benefited from a net increase of 2.0% during the 1990s. In comparison, the nine town-surrounding region has a more modern inventory of 45,390 units in 2000, reflecting a 14.1% gain.

--Roughly 3,630 units were build in Worcester during the 1990s, or 5.1% of the housing stock in 2000. This represents the least amount of new construction built per

decade in the City over the last sixty years. In comparison, over 6,550 units were built in the nine-town region during the 1990s, or 14.4% of its housing stock. Nearly 30,600 units in Worcester, or over 43% of the units, were built prior to 1940.

-- The percentage of owner-occupied units (43.3%) in Worcester in 2000 was nearly identical to the percentage reported in 1990. The percentage of renter-occupied units (56.7%) was nearly identical in 2000 as in 1990. The owner-occupancy rate increased in the region by about 1.5% and the renter-occupancy rate declined by 22.1%.

--The occupied housing units in Worcester experienced an increase of roughly 5,600 vehicles between 1990 and 2000. This has likely caused more street congestion along the major corridors and secondary streets in the residential neighborhoods.

b) Residential Tax Base, Undeveloped Land

--Worcester has nearly 9,740 acres categorized for residential uses, or 56.9% of the assessed land area in the City. Residential properties contribute 68.1% of the City's real estate taxes, indicating that it is a very important source of municipal revenue.

--Commercial and industrial properties contribute the remaining 32% of the real estate tax revenues, while utilizing only 17% of the assessed land area in the City.

--There is a supply of roughly 3,400 tax parcels coded as undeveloped residential land, which contain more than 1,580 acres. This suggest that nearly 8,370 acres of the residential land has been developed with 70,723 housing units, indicating a density of 8.45 units per acre citywide.

c) Real Estate Market Conditions

--Median housing values in Worcester, according to US Census, depreciated by nearly 7% between 1990 and 2000, while median values in the region increased by nearly 11%. Some of this decline in Worcester could be attributable to the age and style of the housing stock, in addition to a vacant supply of nearly 3,700 units, or 5.2% of its stock in 2000.

--The City of Worcester's residential tax base for FY-1990 had a full assessment of $5.4 billion. IN FY-2001, the value declined to 4.7 billion, reelecting a -12.7% loss.

--The 2001 median price of $140,000 for all residential sales was roughly 89.2% higher than the $74,000 value in 1995, the low point of the cycle. This median price was also 19.75 higher than the 1989 median value of $117,000, indicating that values in

Worcester have surpassed the levels of the late 1980s.

-- Preliminary indications through May 2002 suggest additional recovery in median value has occurred. In fact the May 2002 median value of $158,000 is about 36% higher than in 1989, suggesting that increases in value have recovered to a level that they have kept pace with inflation.

-- The median values in the region began to increase steadily by 1997 and over the next 4 years increased by 47.4%, surpassing the $200,000 level. Preliminary indications for May 2002 show and additional 10.5% increase. This figure is about 42% higher than the region.

-- Worcester's rental market is quite diverse in size and age, and represents the largest component of the City's housing stock. The rental stock contains roughly 41,000 rental units, and Census 2000 reported about 2,900 rental units as vacant, for a 7.1% vacancy rate in this sector. The owner-stock contains about 29,700 units and only 640 units were vacant according to Census 2000, for a vacancy factor of 2.2% in this sector.

-- A July 2002 sample of the asking rents for both newer, modern rental housing complexes and the considerable informal market of older 3 to 4 family stock (roughly 30,000 units) indicates a median rent of $875 a month for the informal market sample compared to median rents of $1,550 for the newer modern apartment complex sample.

3. AFFORDABLE HOUSING NEEDS:

a. Poverty Status and Persons with Disabilities in 2000

-- According to the U.S. Census, the poverty rate in Worcester was18.9% in 2000 as a result of 29,115 persons living below the poverty level. These figures indicate that the persons living in poverty increased by nearly 4,890 persons since 1990. The poverty rate in Worcester in 1990 was 15.3%.

-- Worcester had a higher increase in the number of persons in poverty during the 1990s than the increase in the City's population.

-- The number of persons under 18 years of age in poverty increased by nearly 750 persons during the 1990s, while those between the age of 18 and 65 increased by more than 4,660 persons. Persons 65 and over in poverty declined by nearly 520 persons during the 1990s.

-- Census 2000 also reported that about 5,600 families were below the poverty level, representing 14.1% of the families in Worcester. The number of families in poverty increased by 13.2% during the 1990s, as a result of 653 new poor families.

b) Housing Cost Burden

-- According to Census 2000, nearly 11,100 renter households were paying 35% or more of their household income to rent and apartment in Worcester. There was also about 2,300 owner households whose housing costs were 35% or more, for a total of 14,400 households, representing 24% of Worcester's households. Another 4,200 households incurred housing costs between 30% and 35% of their income in 2000, including 2,900 renters and 1,300 owners. This group represents another 7% of total households.

-- These two groups combined, totaled 18,600 households in 2000 and they would be considered "at risk". They represent 31% of the households in Worcester.

c) Low-Income Households

-- Approximately 23,800 Worcester households would be income eligible for rental assisted housing based on the 2002 income criteria of the Worcester MSA. This figure represents roughly 36% of all Worcester households.

-- Over 14,900 households would be classified as extremely low-income. Another 4,720 households would be considered have very low-income, and 2,300 households would b categorized as low-income. The remaining 1,980 households would be considered as moderate-income households.

d) Supply of Rental Assisted Housing

-- The City of Worcester has nearly 9,360 housing units categorized as rental assisted units at project based developments. This supply increased by 924 units since 1990, and this increase in units represents 25.5% of the new units added in Worcester during the 1990s.

-- The supply of rental assisted housing in the region totaled roughly 1,550 units in 2002. The region's supply increased by 164 units during the 1990s, which represents only 2.2% of the new units added during the 1990s (6,550 units). This percentage of rental assisted housing to new units is one-tenth the amount indicated for Worcester.

-- Only 3.4% of the year-round housing in the region is for low-income households in 2002, while in Worcester, 13.3% of its units are allocated for such purposes.

--There are also 2,700 households who lease housing in Worcester with a rental voucher or Section 8 Housing Choice Certificate. These households represent another 3.8% of the housing in Worcester, such that 17.1% of Worcester's housing is used for rental assistance.

SOME BASIC CONCLUSIONS AND CONSERATIONS:

-- Worcester's 41 Census Tracts break out somewhat naturally into 15 distinct sub-markets or neighborhood groupings. Improving conditions in the bottom five performing sub-markets as well as the downtown should be considered a priority.

-- These six sub-markets combined, represent the geographic core of the City as well as the region, and face many challenges in balancing the commercials and industrial uses with residential. In addition transportation issues will also play a part in redeveloping these sub-markets.

-- The residential aspects of these sub-markets are generally poorer than many of the other sub-markets in the City, given the low values, the amount of abandoned buildings in place and disinvestment. These six sub-markets account for 13% of the assessed land area and nearly 40% of the housing units. They also represent about 27% of the City's tax base.

-- Improving the quality of the housing and the neighborhood amenities in these six-sub-markets would include, increasing green space, pocket parks, transportation, and off-street parking opportunities. Increasing homeownership rates in these sub-markets is likely to help stabilize and revitalize these areas.

-- Worcester continues to be a regional center for affordable housing and is working to do its fair share for the region, while it continues to try achieve a balance that meets the needs and demands of middle and upper income households as well. Maintaining the level of affordability in the City should be achieved both by maintaining the amount of affordable units and by helping low-income residents move up the economic ladder through continuing citywide economic development efforts, educational and social services. Creating homeownership opportunities for those moving up the ladder should be a priority as well.

- Worcester continues to need to work on the quality of its housing and neighborhoods, particularly in its geographic core. It should aggressively address and work to resolve potential conflicts between residential and commercial and industrial uses, as well as transportation issues that threaten residential areas.

-- Encouraging more housing downtown and visions and plans for the improvement of

major corridors into the downtown will likely help increase the success of both the commercial and residential sectors.

A New Front: Clearing the Way for Worcester's Future

Executive Summary
By Timothy P. Murray

Too often in discussions about the many exciting projects that have been completed or that are on the drawing board in and around our downtown we refuse to talk about the proverbial "white elephant" in the middle of the room: The Worcester Common Outlets Mall. The mall, in its current state, prevents us from linking these projects together in a coherent fashion to create a vibrant and pedestrian-friendly downtown. So it's time we cut to the chase and publicly acknowledge what most city residents already know to be true: The mall is a failure as a shopping center and a failure as a urban renewal project. It has become a physical and psychological barrier to the downtown's rebirth and no fancy marketing campaign will change this obvious fact.

That's the bad news. The good news is that neither the problem we face with the mall, nor the potential solution, is mysterious or unique to Worcester. From Lafayette Place in Boston to the Plaza in Pasadena, California failed urban shopping malls dot the national landscape and there are many examples of successful redevelopment of these malls. In city after city, these hulking old relics have been knocked down, city streets reconnected and neighborhoods knit back together, transforming once barren retail monstrosities into vibrant urban settings.

In a detailed study released in 2001, the well-respected consulting firm of Price Waterhouse Coopers examined nearly 2,000 shopping malls across the country and identified the key criteria that define a failed mall. The study is available at www.cnu.org/malls and I urge anyone interested in the revitalization of downtown to read it. By any reasonable interpretation of that study, one has to conclude that the outlet mall is a classic example of a failed mall and it is time to explore the demolition of all or parts of the mall, not including the attached office towers.

Based upon their performance it is unclear whether CIGNA, the owner of the mall, will embrace the idea to look at alternative uses for their property. It appears that CIGNA management's primary focus over the past several years has been to facilitate the devaluation of the retail portion of the mall to free itself from the obligations it agreed to when the city granted it a tax increment financing plan in 1995. In the midst of the biggest real estate boom in recent history, the assessed value of the retail portion of the mall has dropped from $21,646,200 to $13,569,200. It appears that CIGNA management, knowing the retail trends at play, has allowed the retail portion of the mall to wither, not wanting to throw good money after bad on marketing because it knows that malls like the Worcester Common Outlet are no longer viable retail locations, given the competition from nearby malls and the advent of e-commerce.

Perhaps there is hope that CIGNA and others will recognize that there is a higher and better use for the 20 acres that the mall and garage encompasses in the heart of our city. The property's location next to Union Station, the public library, Massachusetts College of Pharmacy, St. Vincent Hospital (Worcester Medical Center), the Centrum and the myriad of downtown legal, financial, cultural and commercial institutions make it ripe for mixed-use development with housing, office space, cafes,

theaters, and restaurants. Policies are now being developed at the state and federal level to foster transit oriented development aimed at combating urban sprawl. There will likely be financial incentives to developers to build in downtown locations that are in close proximity to transportation centers like Union Station. Moreover, interest rates are the lowest we've seen in years.

Hopefully, CIGNA management will become an engaged partner with the city concerning the future use of the mall. Nonetheless, the city cannot afford to sit idle. Now is the time for us to take a pro-active role. Worcester's downtown has seen a major infusion of public and private investment over the past few years-some $500 million in construction projects having already been completed, with more on the way. Even the most ardent pessimist among us would have to agree that these projects present an enormous opportunity for Worcester, if we can solve the roadblock of the mall and link them all together.

While some critics may suggest that the course I am recommending is too expensive, I would argue we cannot afford continued inaction and delay. Moreover, the recent agreement to remove the ramps with CIGNA will require the city to spend millions on infrastructure enhancements to the mall's garage. That is why I am requesting the City Council to ask the City Manager to prepare a request for proposals that will invite developers and their architects and engineers to submit reuse plans for the mall. These plans would lay out the costs and potential redevelopment options that will flow from taking down the mall, or portions of it, while reconnecting our streets and our downtown with the Shrewsbury Street and Green Island/Water Street neighborhoods. This is not a pie in the sky idea. There are literally dozens of examples around the country where private developers, either on their own or in partnership with local governments, have razed urban malls and in their stead created vibrant mixed-use districts.

I am suggesting this approach because the lessons of some past projects are all too clear. The city needs to have a plan and a private development partner in place before it moves to take the mall or commit other resources that would facilitate the mall's reuse. If there is no private sector interest then nothing will change and we will have lost very little in exploring our options. But the weight of evidence suggests that developers would be eager to work with the city on a project of this scale, with such enormous potential.

The Worcester Redevelopment Authority, with the support of the city, took private property by eminent domain, assembled these small parcels and wiped out city blocks to create the mall. At the time, city leaders had the best of intentions, but it turned out to be a failure. So just as the city had the power to create the problem, city government also has the power to correct it. Growth patterns and state demographics have been moving steadily towards Worcester and Central Massachusetts and developers know this as well as any government official. Now is the time for us to test the waters and to explore ridding ourselves of the physical and psychological barrier that the mall is to our downtown.

A New Front: Clearing the Way for Worcester's Future

The Mall is Dead

Too often in discussions about the many exciting projects that have been completed or that are on the drawing board in and around our downtown we refuse to talk about the proverbial white elephant in the middle of the room: The Worcester Common Outlets Mall. The mall, in its current state, prevents us from linking these projects together in a coherent fashion to create a vibrant and pedestrian-friendly downtown. So it's time we cut to the chase and publicly acknowledge what most city residents already know to be true: The mall is a failure as a shopping center and a failure as a urban renewal project. It has become a physical and psychological barrier to the downtown's rebirth and no fancy marketing campaign will change this obvious fact. In fact, there is a term used for outdated urban malls like the outlet mall – it is defined as a "greyfield."

A greyfield is defined as "a developed site that is economically and physically ripe for major redevelopment." (G.I.G., P.1) In addition to the increasing use of e-commerce, nearby malls such as the Solomon Pond Mall, Greendale Mall, and Auburn Mall provide steady and strong competition. Furthermore, a new mall is currently under construction in Millbury, which will include Kohl's and Target, and it will present even more competition for the Outlet Mall. A Ball State University retail marketing industry expert claims, "Outlet malls used to be new and different, but it seemed for a while they were everywhere. The main competition now comes from Target and Kohl's, two discounters that are rapidly expanding across the country. They offer the same merchandise at the same prices, but are located closer to shoppers." (B.S.U., p.1) The Worcester Common Outlets Mall is a textbook example of where bigger and newer retail stores have come in and have taken away retail business.

The Congress for the New Urbanism and the well-respected Pricewaterhouse Coopers financed a recent study titled *Greyfields into Goldfields, from failing shopping centers to great neighborhoods*. The results were published in February 2001. The statistical analysis from the report shows that the larger acreage and gross leasable space a mall has the more viable the mall is. The mean for a healthy mall is around 123 acres and the mean for a greyfield mall is about 45 acres. The Worcester Common Outlets Mall and garage occupy about 20 acres, which is much too small to be viable as a retail center according to the study. The amount of gross leasable area (GLA) is also directly related to the success of a mall. The mean of gross leasable area for a healthy mall is around 900,000 square feet. The new route 146 mall will be 750,000 square feet and the Solomon Pond Mall is 880,000 square feet. The malls that have a GLA of less than 550,000 square feet are considered vulnerable or greyfield. According to the 2003 Directory of Major Malls, the Worcester Common Outlets has 517,000 square feet of gross leasable area, which would fit directly into the greyfield category. According to a memo from Worcester's Assessing Department dated January 22, 2003, the net rentable area for the mall is only 486,756 square feet which is much less than what the average healthy mall contains. As of January 22, 2003 of those 486,756 square feet only 335,000 square feet were rented leaving 151,756 of unused space for which rent is not collected. The data from the Directory of Major Malls show that the Worcester Common Outlets has a 61% occupancy rate. Using the conservative Assessing Department numbers this means that in 2003 the WCO is only using 69% of its building. Thus, their occupancy rate is far below what is required of a healthy or viable mall. At least a 90% occupancy rate is required for a strong mall. While the exact sales figures from the Worcester Common Outlets are not known, we can assume by looking to similar malls that it would fall in the lower categories such as vulnerable or greyfield. The Worcester Common Outlets is a private company; therefore, it

does not have to divulge sales data information. This is a customary practice for most private malls, especially malls in financial distress.

The Worcester Common Outlets was originally built in 1971 under the name of the Worcester Galleria. According to the Pricewaterhouse Cooper study, the older the original mall the less likely it is to be viable in the current day. Any mall built in the early 1970's or earlier was classified as the mean for vulnerable or greyfield. From its beginnings the Worcester Center Galleria never realized its full potential as a retail complex and the surrounding area in downtown Worcester suffered as a result. Former Mayor Jordan Levy in 1990 voiced his frustration shared by many when he said: "The lack of progress has obviously had some devastating effects on the total of downtown." (WBJ, p.16)

Gunnar Grundberg was the President of the Worcester Center Merchants Association in the early 1990's. Grundberg said of the mall management: "When they bought Worcester Center they in fact bought Worcester's commercial heart. What they don't seem to realize is that there is a certain moral obligation that goes with buying the Worcester Center Galleria, and that is the obligation that goes with being a key player, the quarterback, for the entire commercial welfare of our downtown. They are stymieing the whole commercial and businesses activity downtown and they don't understand, I think, I don't think they realize that."(*Worcester Business Journal*, March 1990) Although this sentiment was expressed over ten years ago, it serves, nevertheless, as a timely reminder of how important this land in our downtown is to our identity and how much a symbolic and psychological anchor the mall has become to Worcester's psyche as we attempt to improve our downtown.

Nearly a decade after the attempted revitalization of the Worcester Galleria to the Worcester Common Fashion Outlets to finally the Worcester Common Outlets we as a city must realize it is a

lost cause. Based upon its performance to date it is unclear whether CIGNA will embrace the need to look at alternative uses for their property. It appears that CIGNA management's primary focus over the past several years has been to facilitate the devaluation of the retail portion of the mall so as to free itself from the obligations it agreed to when the city granted it a tax increment financing plan (TIF) in 1995. In the midst of the biggest real estate boom in recent history, the assessed value of the retail portion of the mall has dropped from $21,646,200 to $13,569,200. It appears that CIGNA management, knowing the retail trends, has allowed the retail portion of the mall to wither, not wanting to throw good money after bad on marketing because it knows that malls like the outlet mall are no longer viable retail locations given local competition and the advent of e-commerce.

At this current time CIGNA owns four parcels of land in the downtown Worcester area. These four properties are the Fleet Tower, Flagship Tower, "vacuum cleaner" property, and the Outlet Mall. The assessed values of the Flagship Tower over the past four years are as follows: in 2000, $10,591,800; in 2001, $ 10,675,800; in 2002, $11,229,900; and in 2003, $11,229,900. The assessed value of the Fleet Tower over the past four years is as follows: in 2000, $15,608,100; in 2001, $21,646,200; in 2002, $16,508,400; and in 2003, $16,508,400. The "Vacuum Cleaner" Property has also maintained its value over the past four years increasing from $212,700 in 2000, to $225,100 in 2001, to $225,100 in 2002, and to $223,300 in 2003. The final parcel of land, the Worcester Common Outlets and garage, was assessed at the same price from the year 2000 to 2002 at $21,646,200. As stated above, in 2003 the assessed rate of the mall dropped to $13,569,200, which is over an eight million dollar decrease. (Memo to the Worcester City Council from the City Manager, February 11, 2003)

Recently, the City Council approved an agreement to demolish the ramps from the mall garage to facilitate the construction of the bus ports at Union Station and the roadwork at

Washington Square. This agreement took nearly five years to negotiate and will require the city to spend millions in infrastructure improvements over the next several years to ensure access into the mall's garage. The delay in reaching this Faustian agreement can in part be attributed to the fact that the City Manager has had three different Chief Economic Development Officers over the past five years. Many in and outside of government, however, will say behind closed doors that the delay in reaching this agreement is due in most part to the indifference, indecision or both on the part of CIGNA management. A disengaged management that has shunned invitations from the city to discuss the future of the mall, opting to instead to sit back and collect rents from the office towers, while essentially mothballing the retail portion of the property. As a corporate entity in the heart of downtown surrounded by over a half billion in public and private investment, they owe Worcester better.

Why we need to take action

Worcester's immediate downtown has been the recipient of a huge infusion of public and private investment over the past fifteen plus years with approximately $500 million in construction having already been completed or on the drawing board. The Centrum, Centrum Center, St.Vincent Hospital at Medical City, Worcester Public Library, Massachusetts College of Pharmacy, Worcester Center Boulevard Garage, and Union Station restoration have been completed. Moreover, the $25 million Hilton Garden Inn and the $125 million State Court House as well as a $5 million plan to renovate the Worcester Common will all break ground within the year. Even the most ardent pessimist would have to agree that these projects present a tremendous opportunity for Worcester. Future investment also includes the Shrewsbury Street beautification project, Shrewsbury Street Maintenance Building, Washington Square, the bus ports at Union Station, and the canal district. We have an obligation to make sure that we leverage these

investments to induce further private sector development and link them together in a coherent fashion given their proximity to one another.

In the past there has been a debate about the highest and best use of land in Worcester. Over the past 15 years we have seen two substantial projects that have redeveloped substantial tracts of land in the city, recognizing that there was a higher and better public and private use for the property.

The Medical City Project now known as St. Vincent Hospital at Worcester Medical Center involved acquiring approximately 25 acres of private property in our downtown to build a new hospital and medical facility. This land acquisition involved over 30 different property owners. The rationale behind this project, led by Mayor Jordan Levy and City Manager Jeff Mulford and local business leaders, was that much of this property was underutilized or vacant, and could be put to a higher and better use. The entire area involving this 25-acre project was paying $270,000 annually in taxes prior to construction of the hospital. Tenet is now paying $1.6 million, which will rise to $3.9 million annually before full valuation kicks in when Tenet's TIF agreement expires, bringing more revenue to the city. The vision of these leaders not only kept St. Vincent Hospital in Worcester and retained jobs, but it also substantially increased the city's tax base.

Another important project involves the redevelopment of land at the site of the vacant Wyman Gordon factory near Kelly Square. For years residents considered this area to be an eyesore and a decaying symbol of Worcester's one-time prominence as a national manufacturing center. The owners, however, have recognized that this 25-acre piece of property has great development potential given its close proximity to Interstate 290 and the new Route 146 and Mass Pike interchange. The owners have torn down the factory and its rusted shell and cleaned up the soil. This classic example of a brownfield reclamation was undertaken by the property owner

without any governmental assistance. This is also an example of how investors in and outside the city increasingly view Worcester's future growth potential given our strong transportation, education, and medical assets.

These are two local examples of how we have cleaned up and utilized property for a higher and better use. Moreover, there are dozens of other specific examples where enlightened developers, with and without public assistance, have torn down or partially demolished decaying urban malls. From Lafayette Place in Boston to the Plaza in Pasadena, California failed urban shopping malls dot the national landscape and there are many examples of successful redevelopment of these malls. In city after city, these hulking old relics have been knocked down, city streets reconnected and neighborhoods knit back together, transforming once barren retail monstrosities into vibrant urban settings.

Perhaps there is hope that CIGNA and others will recognize that there is a higher and better use for the 20 acres that the mall and garage encompasses in the heart of our city. The property's location next to Union Station, the public library, Massachusetts College of Pharmacy, St. Vincent Hospital (Worcester Medical Center), the Centrum and the myriad of downtown legal, financial, cultural and commercial institutions make it ripe for mixed-use development with housing, office space, cafes, theaters, and restaurants. Policies are now being developed at the state and federal level to foster transit oriented development aimed at combating urban sprawl. There will likely be financial incentives to developers to build in downtown locations that are in close proximity to transportation centers like Union Station. Moreover, interest rates are the lowest we've seen in years.

While some may argue that the course I am suggesting is too expensive, I would argue we cannot afford continued inaction and delay. Moreover, the recent agreement to remove the ramps

with CIGNA will require the city to spend millions on infrastructure enhancements to the mall's garage. That is why I will request the City Council to ask the City Manager to prepare a request for proposals that will invite developers and their architects and engineers to submit reuse plans for the mall. These plans would lay out the costs and potential redevelopment options that will flow from taking down the mall, or portions of it, while reconnecting our streets and our downtown with the Shrewsbury Street and Green Island/Water Street neighborhoods. As previously stated, this is not a pie in the sky idea. There are literally dozens of examples around the country where private developers, either on their own or in partnership with local governments, have razed urban malls and in their stead created dynamic mixed-use districts.

I am suggesting this approach because the lessons of some past projects are all too clear. The city needs to have a plan and a private development partner in place before it moves to take the mall or commit other resources that would facilitate the malls reuse. If there is no private sector interest then nothing will change and we will have lost very little in exploring our options. But the weight of evidence suggests that developers would be eager to work with the city on a project of this scale, with such enormous potential.

The Worcester Redevelopment Authority, with the support of the city, took private property by eminent domain, assembled these small parcels and wiped out city blocks to create the mall. At the time, city leaders had the best of intentions, but it turned out to be a failure. So just as the city had the power to create the problem, city government also has the power to correct it. Growth patterns and state demographics have been moving steadily towards Worcester and Central Massachusetts and developers know this as well as any government official. Now is the time for us to test the waters and explore ridding ourselves of the physical and psychological barrier that the mall is to our downtown.

Recent Public and Private Investment in Downtown Worcester

Total Cost of Library Renovation

$23,730,000 (everything) $18,850,000 (just construction)

Total Cost of Construction: Massachusetts College of Pharmacy

$15 Million

Total Cost of Construction: St Vincent Hospital at Worcester Medical Center

$200 Million plus

Total Cost of Construction: Centrum Centre

$25.6 Million (1982)
$39.5 Million (1997) Convention Centre

Worcester Common Project

$5 Million budget

Shrewsbury Street Beautification Project

$4.5 Million

Union Station Project

$40 Million

Worcester Center Boulevard Garage

$14.7 Million

New State Court House

$125 Million

Hilton Garden Inn Hotel

$25 Million

TOTAL: $518,030,000

Examples of Urban Mall Demolition and Re-use

- **Belmar (Lakewood, Colorado)**

For 35 years, the Villa Italia Mall was viewed as the commercial and social center of Lakewood. Developed by Gerri Von Frellick and opened in 1966, Villa Italia held the distinction of being the largest indoor shopping mall between Chicago and the West Coast with 1.4 million square feet of gross leasable area (GLA). The mall was located in the heart of downtown Lakewood, population 150,000. The life cycle of Villa, however, taught the citizens and civic leaders of Lakewood a valuable lesson: big shopping malls tend to become obsolete. The construction of a new $560 million mixed-used site is designed for every dimension of daily life. This 10-year redevelopment project is a public-private partnership between the city and Continuum Partners, a Denver-based commercial real estate developer. This 103-acre site, called Belmar, will contain 1 million square feet of retail space, 800,000 square feet of offices, and 1,300 residential units (a database of those interested in living in Belmar residences has been created). Offices, shops, galleries, restaurants, outdoor cafes, movies, and even parks and plazas will make up the composition of Belmar. An asphalt recycling operation is presently underway, processing a large amount of asphalt on the property. Some 70 percent of all the material at the site has been recycled.

For more information, go to http://www.villa-lakewood.com/bigPicture/

- **Paseo Colorado (Pasadena, California)**

Paseo Colorado is a new urban village, an open-air, Mediterranean-style marketplace spanning three blocks along Colorado Boulevard in Pasadena's very popular retail district. Paseo Colorado replaces the old Plaza Pasadena, a 1980's hulking enclosed mall which was universally despised as an eyesore that ruined the heart of downtown. Located along Colorado Boulevard, Pasadena's main commercial artery, and encompassing three city blocks, the property brings vibrant street-front retail to both Colorado Boulevard and Green Street. Paseo Colorado features approximately 557,000 square feet of open-air retail space. The property opened in November 2002 with a stellar line up of retailers in a dramatic and architecturally distinct property. The development also includes 387 luxury apartment units located above portions of the retail. The apartments are owned and operated by Post Properties. Paseo Colorado is the newest shopping center to open in thriving Pasadena, which boasts more than 85,000 daytime employees, thousands of residential units, a retail district featuring hundreds of shops, as well as a multitude of theaters, clubs, hotels, concert halls, and museums.

For more information, go to http://www.paseo411.com/

- **Mizner Park (Boca Raton, Florida)**

Mizner Park occupies the site of the former Boca Mall, a 430,000 square feet regional shopping center developed by Smathers, Plagginger and Aronovitz that opened in 1974. When it first opened

its doors to shoppers in Boca Raton, Florida, in 1989, Mizner Park represented an unusual phenomenon for the time: a mixed-use retail development undertaken jointly by the public and private sectors. Named for prominent Florida resort architect Addison Mizner (1872-1933), who brought Mediterranean influences to Florida architecture, Mizner Park is a lifestyle center combining office, residential and retail/cultural uses. Laid out in an open-air, central plaza configuration, it has a landscaped common area park decorated with fountains and two gazebos; two-story brick structures surround this piazza, giving the whole complex a downtown streetscape look. The center's design and overall concept earned it a Sierra Club award for smart growth in November 2000. Mizner Park stands out even among mixed-use projects because two-thirds of the site is devoted to public areas. The land is all owned by the city of Boca Raton. Besides 235,000 square feet of retail, Mizner Park comprises 272 apartment units and 103,000 square feet of office space. The Centre for the Arts, including the Boca Raton Museum of Art and an amphitheater, is at the north end. Now in its second decade, it is not only demonstrating staying power, but also gaining in vitality, with new tenants and cultural attractions.

For more information, go to http://www.miznerpark.org/

- **Eastgate Mall (Chattanooga, Tennessee)**

The mayor of Chattanooga directed the county planning agency to commission a study to revitalize the vacant Eastgate Mall, a 1960s shopping area. The consensus plan will reconfigure the mall into a town center, develop the surrounding surface parking lot, and reconnect the area to the adjacent neighborhood and office park. The designer conducted a weeklong public meeting with more than 300 residents participating. A market analysis was conducted to determine untapped potential and an optimum mix of housing choices. A transportation analysis examined automobile, transit, bicycle, and pedestrian opportunities. Emphasis was placed on creating a plan that could be implemented in incremental phases, helping to ensure financial viability. The plan received immediate acclaim, and the city adopted it in 1998. Construction of the new town square and three defining buildings is underway, and businesses are leasing storefront space on the square. In the first nine months, shopping center properties went from less than 25 percent leased to more than 90 percent leased.

For more information, go to http://www.doverkohl.com/project_detail_pages/eastgate.html

- **Cinderella City (Englewood, Colorado)**

Cinderella City opened for business on March 7, 1968, making it the largest shopping mall west of the Mississippi. Cinderella City enjoyed tremendous success until the early 1980's, when a downturn in the economy coupled with growing competition caused many of the anchor stores to close. In 1991, the City of Englewood began steps to redevelop the site. By 1995, the mall was virtually deserted by its shoppers and its tenants. CityCenter Englewood replaced Cinderella City with a transit-oriented development (TOD). CityCenter Englewood is the first project in Colorado--and among a handful nationally--to replace a suburban shopping mall with a living, breathing, mixed-use downtown. It provides a model for intelligent regional design that directs development into established cities served by transit. This 55-acre public/private project focuses development on a central public place and connects the site with walkable streets, civic and cultural uses, light rail

transit station, retail and office space, residential housing, a public library, outdoor performance space, an art museum and outdoor sculpture. CityCenter Englewood is revitalizing the community spirit as well as the tax base of Englewood and provides a model for healthy urban redevelopment.

For more information, go to http://www.englewoodgov.org/citycenter/revisedcincityhistory.htm

- **Lafayette Corporate Center (Boston, Massachusetts)**

Ignoring the call of urban shoppers for storefront windows and enticingly clad mannequins decked in the latest fashions, Mitchell/Giurgola Architects built Lafayette Place, a suburban mall in the heart of downtown Boston, during the 1980s. From the day it opened its doors until the mall's closing in 1992, the block-long shopping locale failed to bring in both retailers and shoppers, and was never fully leased. Amerimar Enterprises Inc., a Philadelphia-based real estate developer, had previously invested in a nearby building, 600 Washington Street, and watched Lafayette Place struggle from birth to death. In order to realize a renovation project, Amerimar sought financial backing from Angelo, Gordon & Co. and rallied together in a joint venture with Centrum Properties. The renovation of this three-story building involved the construction of an additional three levels. When completed Lafayette Corporate Center would house 50,000 square feet of retail space along Washington Street and provide 575,000 rentable square feet of office space in the five stories above.

For more information, go to http://www.buildings.com/Articles/detail.asp?ArticleID=523

Other Examples

- Winter Park Mall (Winter Park, Florida)

  http://www.doverkohl.com/project_detail_pages/winter_park_mall.html

- Village of Park Forest (Park Forest, Illinois)

  http://www.villageofparkforest.net/index.php?submenu=EconomicDevelopment&src=gendocs&link=DownTownHome

- New Roc City (New Rochelle, New York)

  http://www.newroccity.com/

- The Crossings (Mountain View, California)

  http://www.calthorpe.com/Project%20Sheets/crossings.htm

- Santana Row (San Jose, California)

  http://www.santanarow.com/

- Anderson Town Center (Anderson, Indiana)

  http://www.cityofanderson.com/news.aspx?NewsArticle=22

- Town Center (Rockville, Maryland)

  http://www.ci.rockville.md.us/towncenter/

- CityPlace (West Palm Beach, Florida)

  http://www.cityplace.com/home.html

- Phalen Corridor Initiative (St. Paul, Minnesota)

  http://www.ci.stpaul.mn.us/depts/ped/pci/pci.html

Worcester Common – Circa 1 6 6 9

Welcome to the Worcester Common Groundbreaking Ceremony

May 7th, 2004

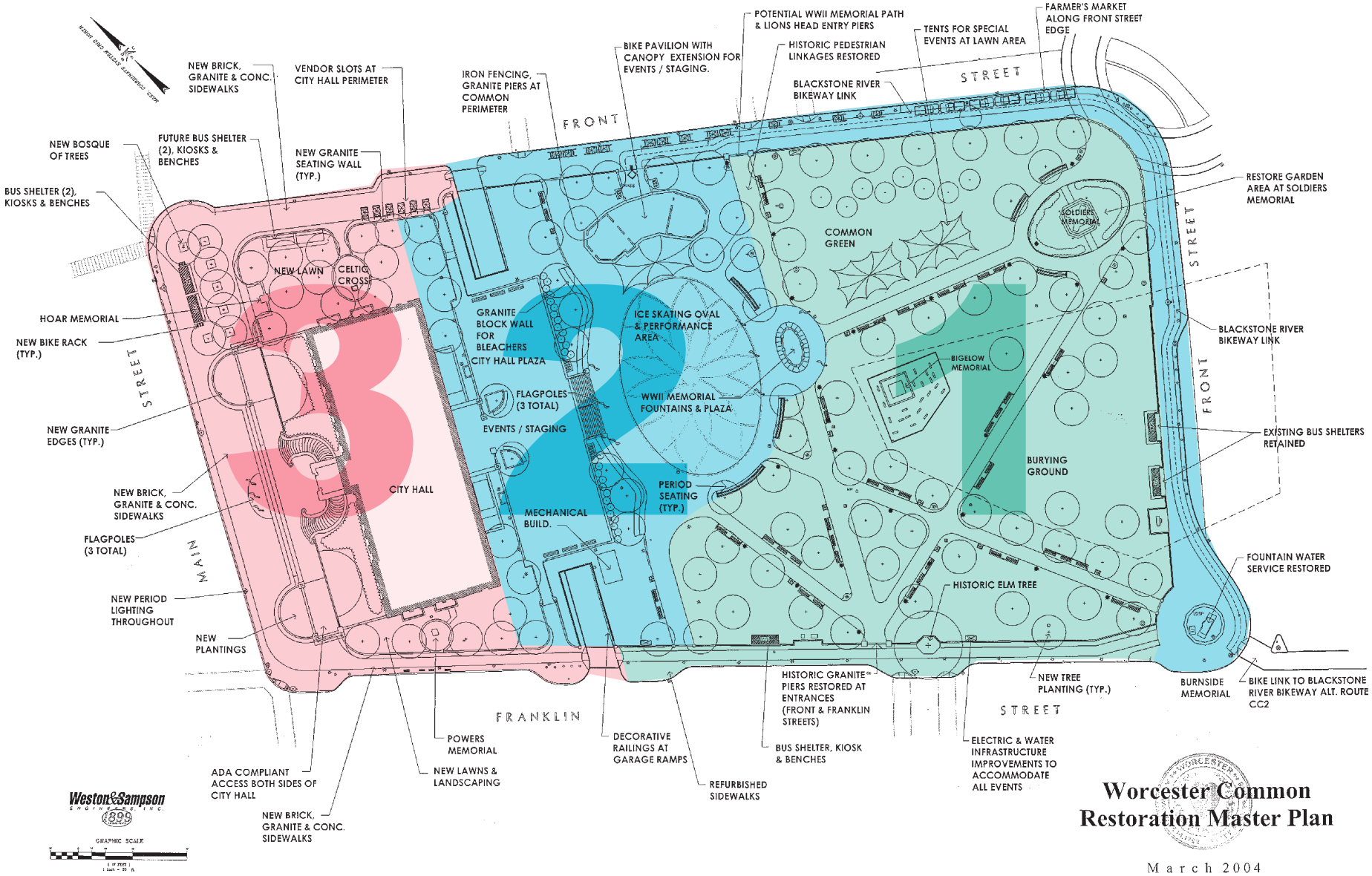
On this day, we celebrate a new beginning for the Worcester Common, a special and revered green-space with roots dating back to 1669. The Phase One groundbreaking sets the stage for the renaissance of this civic, cultural, and historic center. Our priority is to respect and to protect the past while creating new and sensible amenities for the future. The fully restored Worcester Common will form the hub of an exciting future Downtown with an urban fabric that provides new and renewed opportunities to dine, shop, work, live, and visit.

The full restoration program will encompass three distinct phases totaling approximately $5.6 M in new construction. In total, the three phases of construction will encompass the following:

Phase	Scope of Improvements	Status	Approximate Budget	Date of Completion
1	Restoration of Worcester Common Proper, including perimeter fencing, granite entrance piers, historical site entrances and walkways, landscaping, extensive site furnishings, lighting and utility infrastructure and support systems. City/ LWCF	100% Design	$2,000,000	May 2005
2	Construction of the Bikeway Pavilion/ Park Support Facility, ice skating oval/ plaza and mechanical systems, site entrances and walkways, landscaping, furnishings, lighting and utility support systems. Construction of the Blackstone River Bikeway connections and links to the Worcester Common. City/ LWCF/ HPP – Pending	Preliminary Design	$3,200,000	December 2005
3	Restoration of the areas surrounding Worcester City Hall at Franklin, Main and Front Streets, including Bus Shelters, ADA improvements, sidewalks, other paved areas, landscaping, extensive furnishings, lighting and utility systems. Enhancement of Monument and Memorial Settings. City/ MHD Enhancement (Grant Pending)	Preliminary Design	$400,000	December 2005

NEW BRICK, GRANITE & CONC. SIDEWALKS
VENDOR SLOTS AT CITY HALL PERIMETER
IRON FENCING, GRANITE PIERS AT COMMON PERIMETER
BIKE PAVILION WITH CANOPY EXTENSION FOR EVENTS / STAGING.
POTENTIAL WWII MEMORIAL PATH & LIONS HEAD ENTRY PIERS
HISTORIC PEDESTRIAN LINKAGES RESTORED
BLACKSTONE RIVER BIKEWAY LINK
TENTS FOR SPECIAL EVENTS AT LAWN AREA
FARMER'S MARKET ALONG FRONT STREET EDGE
FRONT STREET
NEW BOSQUE OF TREES
FUTURE BUS SHELTER (2), KIOSKS & BENCHES
NEW GRANITE SEATING WALL (TYP.)
BUS SHELTER (2), KIOSKS & BENCHES
RESTORE GARDEN AREA AT SOLDIERS MEMORIAL
SOLDIERS MEMORIAL
COMMON GREEN
NEW LAWN
CELTIC CROSS
GRANITE BLOCK WALL FOR BLEACHERS
ICE SKATING OVAL & PERFORMANCE AREA
HOAR MEMORIAL
NEW BIKE RACK (TYP.)
BLACKSTONE RIVER BIKEWAY LINK
BIGELOW MEMORIAL
FLAGPOLES (3 TOTAL)
WWII MEMORIAL FOUNTAINS & PLAZA
STREET
FRONT STREET
NEW GRANITE EDGES (TYP.)
EVENTS / STAGING
EXISTING BUS SHELTERS RETAINED
BURYING GROUND
CITY HALL
PERIOD SEATING (TYP.)
NEW BRICK, GRANITE & CONC. SIDEWALKS
MECHANICAL BLDG.
FLAGPOLES (3 TOTAL)
MAIN
FOUNTAIN WATER SERVICE RESTORED
HISTORIC ELM TREE
NEW PERIOD LIGHTING THROUGHOUT
NEW PLANTINGS
HISTORIC GRANITE PIERS RESTORED AT ENTRANCES (FRONT & FRANKLIN STREETS)
NEW TREE PLANTING (TYP.)
BURNSIDE MEMORIAL
BIKE LINK TO BLACKSTONE RIVER BIKEWAY ALT. ROUTE CC2
FRANKLIN STREET
POWERS MEMORIAL
DECORATIVE RAILINGS AT GARAGE RAMPS
BUS SHELTER, KIOSK & BENCHES
ELECTRIC & WATER INFRASTRUCTURE IMPROVEMENTS TO ACCOMMODATE ALL EVENTS
ADA COMPLIANT ACCESS BOTH SIDES OF CITY HALL
NEW LAWNS & LANDSCAPING
REFURBISHED SIDEWALKS
NEW BRICK, GRANITE & CONC. SIDEWALKS
Weston&Sampson
Worcester Common
Restoration Master Plan
March 2004

Construction Phases



City of
Worcester

Worcester City Hall Façade Restoration

City Hall has served as the heart of City government and civic life since its construction in 1898. The City, under the leadership of City Manager Thomas R. Hoover and with the support and the guidance of the Worcester City Council, has recently embarked on a phased effort to restore the building's façades to their original grandeur. The first major project involves the restoration of all windows, window frames and sills at an estimated cost of $800,000. Commissioner Michael V. O'Brien of the Parks, Recreation and Cemetery Department will steward these restoration efforts.

The initial scopes (research, design development, and construction documentation) are now complete. Extensive research and analysis was undertaken to determine the condition of all windows, window frames and sill components and to verify the original color scheme established at the time the building was erected. Window components will be replaced or will be restored based on their existing condition. Under all cases, window glass is to be removed and replaced with new, energy-efficient glass and glazing. A preservation consultant has confirmed the original wood species used to frame and trim the windows and the original color scheme. When restored, a deep and rich maroon color will prevail at all window installations and will offer an elegant contrast to the lightly-colored stone elements that make up much of the majestic building's façades.

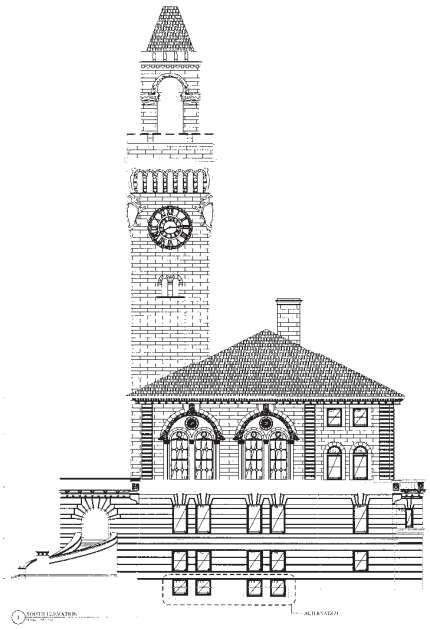
To date, $190,000.00 has been dedicated to this process by and through a $95,000 Massachusetts Preservation Projects Fund grant from the Massachusetts Historical Commission and the required City-side match of $95,000.00. It is anticipated that the balance of funds required to complete this project will be authorized by the City in the FY04 Capital Budget.

Construction efforts are slated to begin in the Fall of 2003 (subject to the appropriation) and to conclude in time for the unveiling of a fully restored and fully enhanced Worcester Common in November of 2004. At that time, an estimated $8,000,000 will have been expended in an effort to restore both the building and these grounds to their historical place at the center of Worcester's civic, social and cultural life.

Worcester
City Hall Façade Restoration
Elevations

East

West



North

South

Worcester
City Hall Façade Restoration
Existing Conditions

WORCESTER PARKS, RECREATION AND CEMETERY DEPARTMENT
GRAPHICS PREPARED BY WESTON & SAMPSON

City of
Worcester

Worcester City Hall Façade Restoration

City Hall has served as the heart of City government and civic life since its construction in 1898. The City, under the leadership of City Manager Michael V. O'Brien and with the support and the guidance of the Worcester City Council, has recently embarked on a phased effort to restore the building's façades to their original grandeur. The first major project involves the restoration of all windows, window frames and sills at an estimated cost of $800,000. Commissioner Robert C. Antonelli, Jr. of the Parks, Recreation and Cemetery Department will steward these restoration efforts.

The initial scopes (research, design development, and construction documentation) are now complete. Extensive research and analysis was undertaken to determine the condition of all windows, window frames and sill components and to verify the original color scheme established at the time the building was erected. Window components will be replaced or will be restored based on their existing condition. Under all cases, window glass is to be removed and replaced with new, energy-efficient glass and glazing. A preservation consultant has confirmed the original wood species used to frame and trim the windows and the original color scheme. When restored, a deep and rich maroon color will prevail at all window installations and will offer an elegant contrast to the lightly-colored stone elements that make up much of the majestic building's façades.

To date, $190,000.00 has been dedicated to this process by and through a $95,000 Massachusetts Preservation Projects Fund grant from the Massachusetts Historical Commission and the required City-side match of $95,000.00. It is anticipated that the balance of funds required to complete this project will be authorized by the City in the FY04 Capital Budget.

Construction efforts are slated to begin in 2004 (subject to the appropriation) and to conclude prior to the unveiling of a fully restored and fully enhanced Worcester Common. At that time, an estimated $8,000,000 will have been expended in an effort to restore both the building and grounds to their historical place at the center of Worcester's civic, social and cultural life.

THE LEGAL DESCRIPTION OF CITY SQUARE

FRONT STREET:

Beginning at a point on a curve on the northerly sideline of the existing Front Street, being distant from a point of curvature a length of 45.44 feet on a curve having a radius of 110.00 feet thence running S63°39’03”E, a distance of 197.17 feet to a point,

thence N71°44’41”E, a distance of 29.12 feet to a point on the southerly sideline of Trumbull Street;

thence S69°07’09”E by said southerly sideline of Trumbull Street, a distance of 75.34 feet to a point of curvature;

thence by a non-tangent curve to the left having a radius of 16.00 feet, an arc length of 26.07 feet, a chord bearing of S20°19’57”E, and a chord distance of 23.28 feet to a point of compound curvature;

thence by a curve to the left having a radius of 962.00 feet and an arc length of 178.59 feet to a point of tangency;

thence S77°39’03”E, a distance of 103.03 feet to a point of curvature;

thence by a curve to the left having a radius of 16.00 feet and an arc length of 28.79 feet to a point on the southerly sideline of Connector;

thence S68°32’07”E by said southerly sideline of Connector, a distance of 43.21 feet to a point of curvature;

thence by a non-tangent curve to the left having a radius of 16.00 feet, an arc length of 22.67 feet, a chord bearing of S41°20’59”E, and a chord distance of 20.82 feet to a point of compound curvature;

thence by a curve to the left having a radius of 162.00 feet and an arc length of 24.91 feet to a point of tangency;

thence N89°14’43”E, a distance of 166.76 feet to a point on a curve on the westerly line of Worcester Center Boulevard;

thence by said westerly line of Worcester Center Boulevard, by a non-tangent curve to the left, having a radius of 412.00 feet, an arc length of 67.58 feet, a chord bearing of S14°53’45”W, and a chord distance of 67.50 feet to a point;

thence S89°14’43”W, a distance of 148.55 feet to a point of curvature;

thence by a curve to the right, having a radius of 227.00 feet and an arc length of 51.92 feet to a point of tangency;

thence N77°39’03”W, a distance of 129.10 feet to a point of curvature;

thence by a curve to the right, having a radius of 1327.00 feet and an arc length of 31.04 feet to a point of reverse curvature;

thence by a curve to the left, having a radius of 16.00 feet and an arc length of 21.60 feet to a point on the northerly sideline of Side Street;

thence N81°36’00”W by said northerly sideline of Side Street, a distance of 63.07 feet to a point of curvature;

thence by a non-tangent curve to the left, having a radius of 16.00 feet, an arc length of 27.68 feet, a chord distance of N23°12’57”W, and a chord distance of 24.36 feet to a point of reverse curvature;

thence by a curve to the right, having a radius of 1027.00 feet and an arc length of 163.66 feet to a point of tangency;

thence N63°39’03”W, a distance of 158.27 feet to a point of curvature;

thence by a curve to the left, having a radius of 23.50 feet and an arc length of 35.80 feet to a point of tangency;

thence S29°04’05”W, a distance of 15.30 feet to a point;

thence N63°42’55”W, a distance of 5.27 feet to a point on a curve on the easterly sideline Front Street;

thence by said easterly sideline of Front Street, by a non-tangent curve to the left, having a radius of 110.00 feet, an arc length of 119.34 feet, a chord bearing of N08°58’06”W, and a chord distance of 113.57 feet to the point of beginning.

TRUMBULL STREET

Beginning at a point on the northerly sideline of Front Street, being the southwesterly most point of the layout of Trumbull Street;

thence N26°20’57”E, a distance of 348.58 feet to a point;

thence N21°32’59”E, a distance of 245.78 feet to a point on a curve on the southerly sideline of Worcester Center Boulevard;

thence along said southerly sideline of Worcester Center Boulevard, by a non-tangent curve to the right, having a radius of 844.00 feet, an arc length of 67.12 feet, a chord bearing of S54°04’40”E, and a chord distance of 67.10 feet to a point;

thence S21°32’59”W, a distance of 247.09 feet to a point of curvature;

thence by a curve to the left, having a radius of 16.00 feet, an arc length of 22.90 feet, a chord bearing of S19°26’50”E, and a chord distance of 20.99 feet to a point;

thence S11°46’29”W, a distance of 42.01 feet to a point of curvature;

thence by a non-tangent curve to the left, having a radius of 16.00 feet, an arc length of 26.03 feet, a chord bearing of S72°57’09”W, and a chord distance of 23.25 feet to a point of tangency;

thence S26°20’57”W, a distance of 257.67 feet to a point on the northerly sideline of Front Street;

thence N69°07’09”W by said northerly sideline of Front Street, a distance of 75.34 feet to the point of beginning.

CONNECTOR

Beginning at a point on the northeasterly sideline of Trumbull Street, being at a point of tangency and also being the most northeasterly corner of the layout of Connector;

thence S60°26’39”E, a distance of 50.01 feet to a point of curvature;

thence by a curve to the right, having a radius of 220.00 feet and an arc length of 100.15 feet to a point of compound curvature;

thence by a curve to the right, having a radius of 550.00 feet and an arc length of 134.29 feet to a point of compound curvature;

thence by a curve to the right, having a radius of 220.00 feet and an arc length of 75.33 feet to a point of tangency;

thence S00°45’17”E, a distance of 92.29 feet to a point on the northerly sideline of Front Street;

thence N68°32’07”W by said northerly sideline of Front Street, a distance of 43.21 feet to a point;

thence N00°45’17”W, a distance of 75.95 feet to a point of curvature;

thence by a curve to the left, having a radius of 180.00 feet and an arc length of 61.63 feet to a point of compound curvature;

thence by a curve to the left, having a radius of 510.00 feet and an arc length of 124.52 feet to a point of compound curvature;

thence by a curve to the left, having a radius of 180.00 feet and an arc length of 81.94 feet to a point of tangency;

thence N60°26’39”W, a distance of 37.18 feet to a point on the southeasterly sideline of Trumbull Street;

thence N11°46’29”E by said southeasterly sideline of Trumbull Street, a distance of 42.01 feet to the point of beginning.

SIDE STREET

Beginning at a point on the northerly sideline of Franklin Street, being 160.88 feet distant from a point of curvature on the northerly sideline of Franklin Street and the westerly line of Worcester Center Boulevard;

thence N55°04’42”W by said northerly sideline of Franklin Street, a distance of 64.07 feet to a point;

thence N26°17’05”E, a distance of 244.52 feet to a point;

thence S63°42’55”E, a distance of 3.63 feet to a point;

thence N26°20’57”E, a distance of 200.47 feet to a point on the southerly sideline of Front Street;

thence S81°36’00”E by said southerly sideline of Front Street, a distance of 63.07 feet to a point;

thence S26°20’57”W, a distance of 473.98 feet to a point on the northerly sideline of Franklin Street, also being the point of beginning.

◆

The legal description of the City Square DIF District includes all of City Square and the adjoining public right-of-way, known as Worcester Center Boulevard, (which is not herein described).