Appendix 3

Volume IV

study for

J. Michael Ruane Judicial Center
Salem Trial Court TRC 9910 ST2

Salem, Massachusetts

April 4, 2007

GOODY CLANCY
ARCHITECTURE
PLANNING
PRESERVATION

Volume IV

study for J. Michael Ruane Judicial Center Salem Trial Court TRC 9910 ST2

Salem, Massachusetts
April 4, 2007

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GOODY CLANCY
ARCHITECTURE
PLANNING
PRESERVATION

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A2 Appendix 2

A2.1 *Salem Probate and Family Court Existing Conditions Report*, Goody Clancy, Draft: September 26, 2005, Revised: November 11, 2005

A2.2 *Salem Probate and Family Court Space Program*, DCAM, Draft–March 6, 2006

A2.3 *Chapter 34 Evaluation Renovation of the Probate and Family Court Building*, *Salem, Massachusetts, J. Michael Ruane Judicial Center*, Rolf Jensen & Associates, Inc., April 19, 2006;

A2.4 *Mechanical and Electrical Systems Analysis, Salem Trial Courts*, SEi, February 13, 2007; Mechanical Drawings, Salem New Trial Court, February 6, 2007; *Plumbing and Fire Protection Systems Analysis, J. Michael Ruane Judicial Center, Salem, Massachusetts*, Draft–February 2007

A2.5 *Salem Additional Service—Alternate Plan B Draft Study, Task 9—Identify Possible Levels of Partial Renovation of the PFC*, November 21, 2006

A2.6 *Asbestos, Lead Paint and Other Hazardous Materials Survey, Probate and Family Court Complex*, ATC Associates Inc., April 1, 2006

A2.7 *MEP HVAC Options for Minimal Renovation to PFC*, *Salem Courts*, September 27, 2006

A2.8 *Salem Courts Expansion Study, Salem, Massachusetts, Structural Evaluation*, Green International Affiliates, Inc., July 2003

A2.9 *Permitting Analysis*, *J. Michael Ruane Judicial Center and Salem Trial Courts*, Epsilon Associates, November 2005

A2.10 *Calculation of Water Usage and Discharge in New Court Facilities*, DCAM, March 7, 2007

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A3 Appendix 3

A3.1 *Environmental Notification Form, J. Michael Ruane Judicial Center, Salem Trial Courts*, Epsilon Associates, Inc., January 2, 2007

A3.2 *Certificate of the Secretary of Environmental Affairs on the Environmental Notification Form*, February 22, 2007

A3.3 *Memo: DCAM, Proposed Trial Courts Expansion, Salem, Massachusetts, Pedestrian Improvement and Accommodations and Traffic Calming*, Earth Tech, Inc., February 7, 2007

A3.4 *Memo: DCAM, Proposed Trial Courts Expansion, Salem, Massachusetts, MBTA Garage Data—Traffic Analysis*, February 8, 2007

A3.5 *Functional Design Report, Proposed Construction of a New Trial Court Facility, J. Michael Ruane Judicial Center, Salem, Massachusetts*, Earth Tech, Inc., November 2006

A3.6 *Salem Trial Courts Transportation Study*, Howard/Stein-Hudson Associates, Inc., May 2002

A3.7 *Final Geotechnical Data Report, North Street and Bridge Street Ramp Re-Alignment, Salem, Massachusetts*, Nobis Engineering, October 14, 2005

A3.8 *Phase I and II Site Analysis, Detailed Review*, ICON architecture, inc., July 2003

A3.1 Environmental Notification Form

J. Michael Ruane Judicial Center and Salem Trial Courts
Epsilon Associates, Inc.
January 2, 2007

Epsilon
ASSOCIATES INC.

January 2, 2007

Secretary Robert W. Golledge, Jr.
Executive Office of Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114-2524

Attn: MEPA Unit

Subject: **Environmental Notification Form**
J. Michael Ruane Judicial Center / Salem Trial Courts, Salem

Dear Secretary Golledge:

On behalf of the Massachusetts Division of Capital Asset Management (DCAM) enclosed please find the Environmental Notification Form for the J. Michael Ruane Judicial Center / Salem Trial Courts project in Salem, Massachusetts.

Please notice the ENF in the Environmental Monitor published on January 9, 2007. The Public Comment period will extend through January 29, 2007 and the Secretary's Certificate will be issued on February 8, 2007.

By copy of this letter, I am advising recipients of the ENF that written comments may be filed during the comment period, addressed as follows:

Secretary Robert W. Golledge, Jr.
Executive Office of Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114-2524
Attn: MEPA Unit

Copies of the ENF may be obtained by contacting me at (978) 897-7100, or by e-mail at dkelleher@epsilonassociates.com. Thank you for your attention to this matter.

Sincerely,
EPSILON ASSOCIATES, INC.

Douglas J. Kelleher
Senior Planner

Attachment

cc: Recipients of the ENF
Gail Rosenberg, DCAM
Carol Meeker, DCAM

PRINCIPALS
Theodore A Barten, PE
Margaret B Briggs
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Environmental Notification Form

J. MICHAEL RUANE JUDICIAL CENTER SALEM TRIAL COURTS

Submitted by:
Division of Capital Asset Management
One Ashburton Place
Boston, MA 02108

Submitted To:
Executive Office of Environmental Affairs
MEPA Office
100 Cambridge St., Suite 900
Boston, MA 02114

January 2, 2007

Epsilon ASSOCIATES INC.

ENGINEERS ENVIRONMENTAL CONSULTANTS

Environmental Notification Form

J. MICHAEL RUANE JUDICIAL CENTER / SALEM TRIAL COURTS

Prepared for:

Division of Capital Asset Management
One Ashburton Place
Boston, MA 02108

Prepared by:

Epsilon Associates, Inc.
3 Clock Tower Place
Suite 250
Maynard, Massachusetts 01754

January 2, 2007

Commonwealth of Massachusetts
Executive Office of Environmental Affairs ■ MEPA Office

ENF Environmental Notification Form

For Office Use Only *Executive Office of Environmental Affairs*
EOEA No.: MEPA Analyst: Phone: 617-626-

The information requested on this form must be completed to begin MEPA Review in accordance with the provisions of the Massachusetts Environmental Policy Act, 301 CMR 11.00.

Project Name:	J. Michael Ruane Judicial Center / Salem Trial Courts				
Street:	Federal Street				
Municipality:	Salem	Watershed:	Salem		
Universal Transverse Mercator Coordinates:		Latitude:	42.5231°N		
X344084, Y4709608		Longitude:	70.8982°W		
Estimated commencement date:	May 2008	Estimated completion date:	June 2010		
Approximate cost: $106 million		Status of project design: Conceptual Design	10	% complete	
Proponent:	Massachusetts Division of Capital Asset Management				
Street:	One Ashburton Place, 15th Floor				
Municipality: Boston		State: MA	Zip Code: 02108		
Name of Contact Person From Whom Copies of this ENF May Be Obtained:					
Doug Kelleher					
Firm/Agency:	Epsilon Associates, Inc.	Street:	3 Clock Tower Place, Suite 250		
Municipality:	Maynard	State:	MA	Zip Code:	01754
Phone:	(978) 897-7100	Fax:	(978) 897-0099	E-mail:	dkelleher@epsilonassociates.com

Does this project meet or exceed a mandatory EIR threshold (see 301 CMR 11.03)?
☐Yes ☒No

Has this project been filed with MEPA before?
☐Yes (EOEA No. _____) ☒No

Has any project on this site been filed with MEPA before?
☐Yes (EOEA No. _____) ☒No

Is this an Expanded ENF (see 301 CMR 11.05(7)) requesting:

a Single EIR? (see 301 CMR 11.06(8))	☐Yes	☒No
a Special Review Procedure? (see 301CMR 11.09)	☐Yes	☒No
a Waiver of mandatory EIR? (see 301 CMR 11.11)	☐Yes	☒No
a Phase I Waiver? (see 301 CMR 11.11)	☐Yes	☒No

Identify any financial assistance or land transfer from an agency of the Commonwealth, including the agency name and the amount of funding or land area (in acres): The project is being undertaken by a state agency.

Are you requesting coordinated review with any other federal, state, regional, or local agency?
☐Yes (Specify _____) ☒No

List Local or Federal Permits and Approvals: The project will require coverage under the NPDES general permit for construction.

Which ENF or EIR review threshold(s) does the project meet or exceed (see 301 CMR 11.03):

☐ Land	☐ Rare Species	☐ Wetlands, Waterways, & Tidelands
☐ Water	☐ Wastewater	☐ Transportation
☐ Energy	☐ Air	☐ Solid & Hazardous Waste
☐ ACEC	☐ Regulations	☒ Historical & Archaeological Resources

Summary of Project Size & Environmental Impacts	Existing	Change	Total
LAND			
Total acreage	3.8		
New acres of land altered		Plan A: 1.9 Plan B: 1.3 Plan C: 1.9	
Acres of impervious area	2.5	Plan A: 0.3 Plan B: 0.5 Plan C: 0.3	Plan A: 2.8 Plan B: 3.0 Plan C: 2.8
Square feet of new bordering vegetated wetlands alteration		0	
Square feet of new other wetland alteration		0	
Acres of new non-water dependent use of tidelands or waterways		0	
STRUCTURES			
Gross square footage	133,317	190,000	323,317
Number of housing units	21	Plan A: -21 Plan B: -21 Plan C: -21	Plan A: 0 Plan B: 0 Plan C: 0
Maximum height (in feet) Federal Street Plan A Plan B Plan C Bridge Street Plan A Plan B Plan C	 62 73 	 0 +10 0 0 +16 0	 62 72 62 73 89 73
TRANSPORTATION			
Vehicle trips per day	1,423	650*	2,073
Parking spaces	90	+30	120
WATER/WASTEWATER			
Gallons/day (GPD) of water use	16,054	15,675**	31,729
GPD water withdrawal	0	0	0
GPD wastewater generation/ treatment	14,594	14,250**	28,844
Length of water/sewer mains (in miles)	N/A	<0.25	<0.25

State Permits & Approvals

- ☐ Order of Conditions
- ☐ Superseding Order of Conditions
- ☐ Chapter 91 License
- ☐ 401 Water Quality Certification
- ☐ MHD or MDC Access Permit
- ☐ Water Management Act Permit
- ☐ New Source Approval
- ☐ DEP or MWRA Sewer Connection/ Extension Permit
- ☐ Other Permits (*including Legislative Approvals*) – Specify:

Massachusetts Historical Commission – State Register Review

* Please see Transportation – Traffic Section on page 15 for an explanation of projected trip generation.

**These water supply and wastewater estimates are based on commercial use (75 gpd per 1000 s.f.) per Title 5. Empirical data provided by DCAM indicate that 11,000 gpd is the expected increase in water usage and 5,675 gpd is

the expected increase in wastewater generation. As required by MEPA, this ENF relies on Title 5 data to be conservative. See Water Supply Section (page 11) and Wastewater Section (page 13) for an explanation of projected water consumption and wastewater generation figures.

CONSERVATION LAND: Will the project involve the conversion of public parkland or other Article 97 public natural resources to any purpose not in accordance with Article 97?

☐Yes (Specify_____) ☒No

Will it involve the release of any conservation restriction, preservation restriction, agricultural preservation restriction, or watershed preservation restriction?

☐Yes (Specify_____) ☒No

RARE SPECIES: Does the project site include Estimated Habitat of Rare Species, Vernal Pools, Priority Sites of Rare Species, or Exemplary Natural Communities?

☐Yes (Specify:) ☒No

HISTORICAL /ARCHAEOLOGICAL RESOURCES: Does the project site include any structure, site or district listed in the State Register of Historic Place or the inventory of Historic and Archaeological Assets of the Commonwealth?

☒Yes (Specify: County Commissioner's Building, 32 Federal Street; Superior Courthouse, 34 Federal Street; Essex County Registry of Deeds / Probate and Family Court, 36 Federal Street; First Baptist Church, 54 Federal Street; and three properties at 58, 60 and 62 Federal Street) ☐No

If yes, does the project involve any demolition or destruction of any listed or inventoried historic or archaeological resources?

☒Yes (Specify: Plan A: Relocation and reuse of the First Baptist Church, 54 Federal Street, and the relocation or demolition of the three properties at 58, 60 and 62 Federal Street; Plan B: Relocation or demolition of the three properties at 58, 60 and 62 Federal Street; Plan C: Relocation and reuse of the First Baptist Church, 54 Federal Street) ☐No

AREAS OF CRITICAL ENVIRONMENTAL CONCERN: Is the project in or adjacent to an Area of Critical Environmental Concern?

☐Yes (Specify_____) ☒No

PROJECT DESCRIPTION: The project description should include **(a)** a description of the project site, **(b)** a description of both on-site and off-site alternatives and the impacts associated with each alternative, and **(c)** potential on-site and off-site mitigation measures for each alternative (*You may attach one additional page, if necessary.*)

The proposed Project site is bounded by Bridge Street to the north, Washington Street to the east, Federal Street to the south and North Street to the west (Figure 1, USGS Locus Map). The site is approximately 3.8 acres in size. The majority of the project site, approximately 2.2 acres, is land owned by the Commonwealth. An additional 0.8 acres is held in private ownership, and the remaining 0.8 acres is owned by the City of Salem as part of the North Street / Bridge Street roadway interchange layout. The proposed Project site contains seven buildings.

The County Commissioner's Building at 32 Federal Street, also known as the Old Granite Courthouse, sits at the corner of Washington Street and Federal Street. It is connected to the Superior Court to the west via a two-story addition. The Superior Courthouse at 34 Federal Street sits immediately west of the County Commissioner's Building. These two connected buildings collectively house the Superior Court. The Registry of Deeds and Probate and Family Courthouse building is located at 36 Federal Street. Also located on the proposed project site are four non-court related buildings: the First Baptist Church (set back approximately 100 feet from Federal Street, at 54 Federal Street) and three properties at 58, 60 and 62 Federal Street, all situated at the sidewalk edge near the western limits of the proposed project site.

The four streets surrounding the Project site, Federal, North, Bridge, and Washington streets, are all served by MBTA bus service. On the opposite side of Bridge Street is the MBTA Commuter Rail station

providing train service to points between Salem and Boston to the south and to points between Salem and Newburyport and Rockport to the north. North Street, State Route 114, is a designated state highway.

Background

In response to deteriorating physical and operating conditions of the Commonwealth's court buildings, the Massachusetts Division of Capital Asset Management (DCAM) initiated a Master Plan for the improvements of Court Facilities in 1998. Chapter 189 of the Acts of 1998 designated Salem for the study of a new courts facility.

In Salem, five court departments (Superior, District, Probate and Family, Juvenile and Housing) are currently located in several buildings, including the County Commissioner's Building/Superior Courthouse at 32-34 Federal Street, the Registry of Deeds/Probate and Family Court Building at 36 Federal Street, and the District Court Building located at 65 Washington Street. With the exception of the Juvenile Court, which occupies leased space at Shetland Park, none of these buildings (including the District Court, built in the 1970s) meets current standards for safety, security and accessibility.

Alternative Site Evaluations

In an effort to improve court functions in Salem, a study was undertaken to examine options for accommodating court operations in a variety of configurations. The site alternatives analysis was an extensive, iterative process that included state and local officials as well as neighborhood representatives and interest groups. Given the City's strong preference for keeping the courts in the downtown area, the initial site scoping evaluated the two existing Commonwealth-owned court locations on Federal and Washington Streets as well as several additional sites (some with existing structures) in proximity to the current courts complex that could potentially accommodate new facilities.

The preliminary site scoping identified the following three sites in addition to the existing court locations:

- The MBTA commuter parking lot (Bridge Street)
- The Telephone Co. building (10 Federal Street)
- The Church Street parking lot (behind District Court)

It became readily apparent that, of these sites, only the MBTA site (including an adjacent city-owned crescent shaped parcel) offered the combination of capacity, visibility, proximity and access that justified further evaluation. The footprint of the Telephone Co. building was too small to accommodate significant expansion and the Church Street parking lot served a critical need for downtown parking which the City could not afford to lose.

The MBTA parcel across Bridge Street from the main court complex became the focus of the off-site alternatives analysis. Numerous site development possibilities for a new court complex were examined, including joint development possibilities with the MBTA, which was initiating its own studies for the construction of a major parking structure to serve its adjacent commuter rail station. After careful consideration, this site was deemed unsuitable because of a lack of good pedestrian connection between the proposed site and the existing court complex, a private rail spur that runs through the site, building in the flood plain, and security issues raised with a public garage located beneath a court facility and the proximity to a rail line in the wake of September 11, 2001.

Having eliminated nearby off-site alternatives from consideration, DCAM continued to examine the existing court buildings for possible conversion to consolidated facilities which meet current standards and needs. The heightened awareness of security concerns after 9/11 coincided with a move towards

creating consolidated court facilities in keeping with a statewide effort to improve and streamline overall court functions. The intent behind the consolidated facilities is to create regional justice centers which:

- Help to relieve current overcrowded conditions;
- Bring the courts in line with national standards;
- Increase security, and
- Eliminate duplicative administrative and other support services

In Salem, it was determined that the District Court site was far too constrained to accommodate a consolidated court facility by itself and too physically removed from the remainder of the courts complex to be incorporated into a new consolidated facility located across the street. Of the remaining existing buildings, the Registry of Deeds/Probate and Family Court Building was determined to be easily adaptable to current court standards and security requirements and could be combined with the construction of an adjacent or nearby new facility to meet the overall programmatic needs and court functions of a new consolidated facility. However, the Superior Courthouse/County Commissioner's Building proved less adaptable. The existing courthouse consists of two radically different floorplates resulting in a significant lack of accessibility throughout the buildings. In order to provide 100 percent accessibility within the facility, either multiple elevators or major floor structural re-alignments are required, representing prohibitively expensive renovations and compromised program space due to building size and configuration constraints. Moreover, such an accommodation would require significant alteration to the historic fabric of these buildings and would not be prudent or feasible. See Appendix A for table detailing the programmatic needs of a consolidated facility and the space available in the existing court facilities on the Site.

Proposed Project

The proposed project involves the construction of a new 190,000 square foot consolidated Trial Court Facility. The new facility will consolidate Superior Court, District Court, Housing Court, Juvenile Court and the Law Library (Probate and Family Court operations will continue to be accommodated in the Probate and Family Courthouse building). The new facility will contain eleven courtrooms, with five courtrooms to be located in the adjacent existing Probate and Family Court building. This results in a total of sixteen courtrooms, a net increase of five courtrooms on the site. In accordance with Executive Office for Administration and Finance Bulletin 12: Establishment of Minimum Standards for Sustainable Design and Construction of New Buildings and Major Renovations by Executive Agencies, the new Courthouse will comply with the newly created "Massachusetts LEED Plus" standard. The "Massachusetts LEED Plus" standard requires that a project be able to obtain the basic U.S. Green Building Council's LEED (Leadership in Energy and Environmental Design) certification. This project will be LEED Silver certifiable.

As part of the proposed project, the functions currently housed in the Superior Court (County Commissioner's / Superior Court building), including Superior Court and the Law Library, will be relocated to the new courthouse. Following completion of the new courthouse, the County Commissioner's and Superior Court buildings will be vacated and made available for non-court related uses. DCAM is in the process of developing a plan for "mothballing" the County Commissioner's / Superior Court building for the period of time that it will not be occupied. The mothballing plan will include detailed specifications for adequate security, heating, and ventilation to ensure the preservation of the building. DCAM will work with City of Salem officials in identifying appropriate reuse alternatives for the County Commissioner's and Superior Court buildings that are consistent with the city's planning goals and ensure the buildings' future preservation.

All of the alternatives described below would involve removal of the loop ramp located in the southeast quadrant of the North Street/Bridge Street interchange. As part of roadway improvements currently under

construction by the Massachusetts Highway Department, modifications will be made to the North Street/Bridge Street interchange to accommodate the removal of the loop ramp and to increase pedestrian safety at this heavily traveled location. All existing traffic will continue to be accommodated by these minor modifications.

The project may also include renovations to the existing Registry of Deeds / Probate and Family Courthouse at 36 Federal Street, including the 1970s rear addition fronting on Bridge Street. The new courthouse will include limited secured on-site parking. Figure 2 depicts an aerial view of the project site illustrating the existing buildings on the site. Figure 3 is an illustrative Existing Conditions plan.

The following is a summary of the three feasible project alternatives:

The first alternative **(Plan A)** would involve the relocation and reuse of the original 1805 portion of the First Baptist Church at 54 Federal Street. Plan A would also involve either relocating off-site or demolishing the three houses located at 58, 60 and 62 Federal Street. The new Courthouse would be built on the newly assembled site directly abutting the Registry of Deeds / Probate and Family Courthouse. The First Baptist Church would be relocated to the corner of Federal and North streets and incorporated into the construction of the new Courthouse to house the Southern Essex County Law Library, currently located in the Superior Court/County Commissioner's Building. This alternative would allow the new building to be scaled in size so as not to dominate the Federal Street streetscape (see Figure 4). DCAM developed Plan A to meet programmatic needs efficiently and at lower cost than other alternatives discussed below. At the same time, the scale and relationship of buildings in Plan A reflects a strong civic presence, befitting a public building, especially a Courthouse. Plan A is the preferred alternative.

DCAM has concurrently developed **Plan B**, which would not involve using or relocating the First Baptist Church. Under Plan B, the new Courthouse would be constructed between the Church and North Street (see Figure 5). The three houses located at 58, 60 and 62 Federal Street would be either relocated off-site or demolished. Because it does not use the Church property, Plan B requires that the new Courthouse be taller than it would be in Plan A or Plan C (below). The height of the Federal Street frontage would be approximately 72 feet, 10 feet taller than the building in either Plan A or Plan C; and 89 feet, 16 feet taller than the building in either Plan A or Plan C at the rear, Bridge Street elevation. Due to a compressed floorplates resulting from site constraints, this plan is less efficient than Plans A or C and may have additional costs, but remains a feasible alternative and meets the Court's programmatic needs.

Similar in courthouse form to Plan A, a third Alternative **(Plan C)** would relocate and reuse the original 1805 portion of the First Baptist Church but would also retain houses located at 58, 60 and 62 Federal Street in their current locations (see Figure 6). This concept assumes that the three historic houses would create a link between the east and west portions of Federal Street (across North Street, Rte. 114).

As a practical matter, unlike the 1805 First Baptist Church, the three houses cannot be adapted to fit programmatic needs of court uses due to space constraints and cannot be integrated into the new consolidated courts complex. Using these buildings for unrelated functions poses security issues, given their proximity to the new court complex. Perhaps more important than the practical challenges presented by retaining the houses is the negative impact on the civic presence of the new courthouse which would be largely blocked from Federal Street by the houses. Similarly, the relocated First Baptist Church would be compromised by being pushed to the edge of North Street and partially obscured from view.

This alternative is not preferred because of the unacceptable compromises required in both the design and siting of the new courthouse as well as the placement and presence of the relocated First Baptist Church. Both the new courthouse and the relocated church will be diminished by the retention of the

three houses. Without the houses, the relocated church and new courthouse will complete a streetscape that has developed as a prominent institutional block over the last 150 years, as cited in the National Register of Historic Places nomination form for the Federal Street Historic District.

Mitigation

The proposed project includes benefits to the community and the greater public. In response to the City's desire to keep the courts downtown, DCAM has focused the siting of the new court facility within the immediate vicinity of the existing courthouses. Retaining the courts in downtown Salem not only ensures a continued contribution to Salem's economy and downtown businesses that benefit immensely from their close proximity to the courts, but also maintains Salem's prominence as the judicial center for Essex County. The reuse of the Registry of Deeds / Probate and Family Courthouse ensures the preservation of an historic and architecturally significant local landmark. The relocation and reuse of the First Baptist Church, as envisioned in Plan A and Plan C, also preserves an important historic resource which otherwise faces an uncertain future with a dwindling congregation. DCAM's commitment to working with the City to identify appropriate reuse alternatives for the County Commissioner's / Superior Court building will ensure consistency with the community's planning goals and the preservation of an additional treasured historic property. DCAM's investigation into opportunities for the relocation and reuse off-site of the three properties at 58, 60 and 62 Federal Street by others also provides for the possible retention of three historic properties.

The improvements that will result from the proposed removal of the North Street/Bridge Street interchange loop ramp will greatly improve the pedestrian and vehicular safety of a heavily traveled location that serves as a gateway to the downtown and provides direct pedestrian access to the adjacent MBTA commuter rail station. Lastly, the goal for the project to be LEED Silver certifiable will provide numerous environmental benefits through reuse of a previously developed site and the inclusion of sustainable design techniques and materials.

LAND SECTION – all proponents must fill out this section

I. Thresholds / Permits

A. Does the project meet or exceed any review thresholds related to **land** (see 301 CMR 11.03(1)
___ Yes __X__ No; if yes, specify each threshold:

II. Impacts and Permits

A. Describe, in acres, the current and proposed character of the project site, as follows:

	Existing	Change	Total
Footprint of buildings	1.2	0.3	1.5
Roadways, parking, and other paved areas	0.5	0	0.5
Other altered areas (describe)*	2.1	-0.3	1.8
Undeveloped areas	0	0	0

* landscaped areas

B. Has any part of the project site been in active agricultural use in the last three years?
___ Yes __X__ No; if yes, how many acres of land in agricultural use (with agricultural soils) will be converted to nonagricultural use?

C. Is any part of the project site currently or proposed to be in active forestry use?
___ Yes __X__ No; if yes, please describe current and proposed forestry activities and indicate whether any part of the site is the subject of a DEM-approved forest management plan:

D. Does any part of the project involve conversion of land held for natural resources purposes in accordance with Article 97 of the Amendments to the Constitution of the Commonwealth to any purpose not in accordance with Article 97? ___ Yes __X__ No; if yes, describe:

E. Is any part of the project site currently subject to a conservation restriction, preservation restriction, agricultural preservation restriction or watershed preservation restriction? ___ Yes __X__ No; if yes, does the project involve the release or modification of such restriction? ___ Yes ___ No; if yes, describe:

F. Does the project require approval of a new urban redevelopment project or a fundamental change in an existing urban redevelopment project under M.G.L.c.121A? ___ Yes __X__ No; if yes, describe:

G. Does the project require approval of a new urban renewal plan or a major modification of an existing urban renewal plan under M.G.L.c.121B? Yes ___ No __X__ ; if yes, describe:

H. Describe the project's stormwater impacts and, if applicable, measures that the project will take to comply with the standards found in DEP's Stormwater Management Policy:

The project will comply with DEP's Stormwater Management Policy through implementation of stormwater best management practices. The project involves redevelopment of a previously disturbed site and will meet the stormwater management standards to the maximum extent feasible.

I. Is the project site currently being regulated under M.G.L.c.21E or the Massachusetts Contingency Plan? Yes ___ No __X__ ; if yes, what is the Release Tracking Number (RTN)?

J. If the project is site is within the Chicopee or Nashua watershed, is it within the Quabbin, Ware, or Wachusett subwatershed? ___ Yes __X__ No; if yes, is the project site subject to regulation under the Watershed Protection Act? ___ Yes ___ No

K. Describe the project's other impacts on land:

The project is not expected to have any other impacts to land.

III.. Consistency

A. Identify the current municipal comprehensive land use plan and the open space plan and describe the consistency of the project and its impacts with that plan(s): The relevant land use plan is the City of Salem Master Plan Update and Action Plan, 1996. The proposed project is consistent with the Plan goals to "increase downtown activity of major institutions" through pursuit of "funding" and locating sites "for court improvements and construction of [a] new judicial center."

B. Identify the current Regional Policy Plan of the applicable Regional Planning Agency and describe the consistency of the project and its impacts with that plan: The applicable regional policy plan is the MetroPlan 2000, prepared by the Metropolitan Area Planning Council. The proposed project is consistent with the current use of the site.

C. Will the project require any approvals under the local zoning by-law or ordinance (i.e. text or map amendment, special permit, or variance)? Yes ___ No _X_ ; if yes, describe:

D. Will the project require local site plan or project impact review?
___ Yes _X_ No; if yes, describe:

RARE SPECIES SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **rare species or habitat** (see 301 CMR 11.03(2))? ___ Yes _X_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **rare species or habitat**? ___ Yes _X_ No

C. If you answered "No" to both questions A and B, proceed to the **Wetlands, Waterways, and Tidelands Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Rare Species section below.

II. Impacts and Permits

A. Does the project site fall within Priority or Estimated Habitat in the current Massachusetts Natural Heritage Atlas (attach relevant page)? ___ Yes ___ No. If yes,

1. Which rare species are known to occur within the Priority or Estimated Habitat (contact: Environmental Review, Natural Heritage and Endangered Species Program, Route 135, Westborough, MA 01581, allowing 30 days for receipt of information):
2. Have you surveyed the site for rare species? ___ Yes ___ No; if yes, please include the results of your survey.
3. If your project is within Estimated Habitat, have you filed a Notice of Intent or received an Order of Conditions for this project? ___ Yes ___ No; if yes, did you send a copy of the Notice of Intent to the Natural Heritage and Endangered Species Program, in accordance with the Wetlands Protection Act regulations? ___ Yes ___ No

B. Will the project "take" an endangered, threatened, and/or species of special concern in accordance with M.G.L. c.131A (see also 321 CMR 10.04)? ___ Yes ___ No; if yes, describe:

C. Will the project alter "significant habitat" as designated by the Massachusetts Division of Fisheries and Wildlife in accordance with M.G.L. c.131A (see also 321 CMR 10.30)? ___ Yes ___ No; if yes, describe:

D. Describe the project's other impacts on rare species including indirect impacts (for example,

stormwater runoff into a wetland known to contain rare species or lighting impacts on rare moth habitat):

WETLANDS, WATERWAYS, AND TIDELANDS SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **wetlands, waterways, and tidelands** (see 301 CMR 11.03(3))? ___ Yes _X_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits (or a local Order of Conditions) related to **wetlands, waterways, or tidelands**? ___ Yes _X_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Water Supply Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Wetlands, Waterways, and Tidelands Section below.

II. Wetlands Impacts and Permits

A. Describe any wetland resource areas currently existing on the project site and indicate them on the site plan:

B. Estimate the extent and type of impact that the project will have on wetland resources, and indicate whether the impacts are temporary or permanent:

Coastal Wetlands	Area (in square feet) or Length (in linear feet)
Land Under the Ocean	
Designated Port Areas	
Coastal Beaches	
Coastal Dunes	
Barrier Beaches	
Coastal Banks	
Rocky Intertidal Shores	
Salt Marshes	
Land Under Salt Ponds	
Land Containing Shellfish	
Fish Runs	
Land Subject to Coastal Storm Flowage	
Inland Wetlands	
Bank	
Bordering Vegetated Wetlands	
Land under Water	
Isolated Land Subject to Flooding	
Bordering Land Subject to Flooding	
Riverfront Area	

C. Is any part of the project

1. a limited project? ___ Yes ___ No
2. the construction or alteration of a dam? ___ Yes ___ No; if yes, describe:
3. fill or structure in a velocity zone or regulatory floodway? ___ Yes ___ No
4. dredging or disposal of dredged material? ___ Yes ___ No; if yes, describe the volume of dredged material and the proposed disposal site:
5. a discharge to Outstanding Resource Waters? ___ Yes ___ No
6. subject to a wetlands restriction order? ___ Yes ___ No; if yes, identify the area (in square feet):

D. Does the project require a new or amended Order of Conditions under the Wetlands Protection Act (M.G.L. c.131A)? ___ Yes ___ No; if yes, has a Notice of Intent been filed or a local Order of Conditions issued? ___ Yes ___ No; if yes, list the date and DEP file number:_____. Was the Order of Conditions appealed? ___ Yes ___ No. Will the project require a variance from the Wetlands regulations? ___ Yes ___ No.

E. Will the project:

1. be subject to a local wetlands ordinance or bylaw? ___ Yes ___ No
2. alter any federally-protected wetlands not regulated under state or local law? ___ Yes ___ No; if yes, what is the area (in s.f.)?

F. Describe the project's other impacts on wetlands (including new shading of wetland areas or removal of tree canopy from forested wetlands):

III. Waterways and Tidelands Impacts and Permits

A. Is any part of the project site waterways or tidelands (including filled former tidelands) that are subject to the Waterways Act, M.G.L.c.91? ___ Yes ___ No; if yes, is there a current Chapter 91 license or permit affecting the project site? ___ Yes ___ No; if yes, list the date and number:

B. Does the project require a new or modified license under M.G.L.c.91? ___ Yes ___ No; if yes, how many acres of the project site subject to M.G.L.c.91 will be for non-water dependent use?

Current ___ Change ___ Total ___

C. Is any part of the project

1. a roadway, bridge, or utility line to or on a barrier beach? ___ Yes ___ No; if yes, describe:
2. dredging or disposal of dredged material? ___ Yes ___ No; if yes, volume of dredged material _____
3. a solid fill, pile-supported, or bottom-anchored structure in flowed tidelands or other waterways? ___ Yes ___ No; if yes, what is the base area? _____
4. within a Designated Port Area? ___ Yes ___ No

D. Describe the project's other impacts on waterways and tidelands:

IV. Consistency:

A. Is the project located within the Coastal Zone? ___ Yes ___ No; if yes, describe the project's consistency with policies of the Office of Coastal Zone Management:

B. Is the project located within an area subject to a Municipal Harbor Plan? ___ Yes ___ No; if yes, identify the Municipal Harbor Plan and describe the project's consistency with that plan:

WATER SUPPLY SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **water supply** (see 301 CMR 11.03(4))? ___ Yes **X** No; if yes, specify, in quantitative terms:

Although the project will not exceed MEPA review thresholds relating to water supply, the information below is provided to document that the Project's water use will be significantly below Title V estimates, consistent with the Project's goal of achieving LEED certifiability. Water consumption quantities at the new Courthouse will be mitigated by the use of energy efficient/water efficient equipment. Anticipated water consumption for the Courthouse will come from domestic uses (drinking and sanitary), janitorial activities and provision of makeup water to mechanical systems (i.e., air handlers, cooling towers, pumps, etc.). The

City of Salem will supply the proposed Courthouse's water needs via an existing water main located on Federal Street. The Project Designer in consultation with the Salem Water Department has determined that there are sufficient quantities available to supply the courthouse with the anticipated maximum potable water quantities.

Based on data collected from existing courthouses, DCAM uses approximately 3.5 gallons per day (gpd) per person for domestic uses under maximum occupancy conditions (i.e., all courtrooms are fully occupied for the entire day). Based on the maximum occupancy at the proposed courthouse of 1,350 persons, the maximum domestic water consumption would be 4,725 gpd.

The quantity of non-domestic water consumption is a function of the equipment, operation, maintenance, building and equipment layout, season and other factors. The non-domestic water consumption during winter months is anticipated to be 2,000 to 3,000 gpd; while summer months are anticipated to be 5,000 to 6,000 gpd. The seasonal range in daily consumption is due to the need for makeup water to compensate for evaporation loss from the cooling towers.

In anticipation of achieving LEED certifiability, attempts have been and will be made to reduce the water consumption at the proposed courthouse by use of energy/water efficient equipment and limiting the use of potable water for landscape irrigation. Water consumption at the proposed courthouse will range from a minimal water use on weekends during winter months to a maximum daily water consumption where every courtroom would be filled to capacity for the entire day during the summer. Based on water usage rates at existing courthouses and equipment manufacturers, this maximum daily use is anticipated to be less than 11,000 gpd.

B. Does the project require any state permits related to **water supply**? ___ Yes **_X_** No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Wastewater Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Water Supply Section below.

II. Impacts and Permits

A. Describe, in gallons/day, the volume and source of water use for existing and proposed activities at the project site:

	Existing	Change	Total
Withdrawal from groundwater	_____	_____	_____
Withdrawal from surface water	_____	_____	_____
Interbasin transfer	_____	_____	_____
Municipal or regional water supply	_____	_____	_____

B. If the source is a municipal or regional supply, has the municipality or region indicated that there is adequate capacity in the system to accommodate the project? ___ Yes ___ No

C. If the project involves a new or expanded withdrawal from a groundwater or surface water source,

1. have you submitted a permit application? ___ Yes ___ No; if yes, attach the application
2. have you conducted a pump test? ___ Yes ___ No; if yes, attach the pump test report

D. What is the currently permitted withdrawal at the proposed water supply source (in gallons/day)?

_____Will the project require an increase in that withdrawal?___ Yes ___ No

E. Does the project site currently contain a water supply well, a drinking water treatment facility, water main, or other water supply facility, or will the project involve construction of a new facility? ___ Yes ___ No. If yes, describe existing and proposed water supply facilities at the project site:

	Existing	Change	Total
Water supply well(s) (capacity, in gpd)	_____	_____	_____
Drinking water treatment plant (capacity, in gpd)	_____	_____	_____
Water mains (length, in miles)	_____	_____	_____

F. If the project involves any interbasin transfer of water, which basins are involved, what is the direction of the transfer, and is the interbasin transfer existing or proposed?

G. Does the project involve

1. new water service by a state agency to a municipality or water district? ___ Yes ___ No
2. a Watershed Protection Act variance? ___ Yes ___ No; if yes, how many acres of alteration?
3. a non-bridged stream crossing 1,000 or less feet upstream of a public surface drinking water supply for purpose of forest harvesting activities? ___ Yes ___ No

H. Describe the project's other impacts (including indirect impacts) on water resources, quality, facilities and services:

III. Consistency -- Describe the project's consistency with water conservation plans or other plans to enhance water resources, quality, facilities and services:

WASTEWATER SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **wastewater** (see 301 CMR 11.03(5))? ___ Yes **_X_** No; if yes, specify, in quantitative terms:

While the Project will not exceed MEPA review thresholds relating to wastewater generation, the information below is provided to document that the Project's wastewater generation will be significantly below Title V estimates, consistent with the Project's goals of achieving LEED certifiability. Wastewater generation at the proposed courthouse will be mitigated by the use of energy efficient/water efficient equipment to maximize water efficiency within the building and reduce the quantities of wastewater to the municipal wastewater system. Wastewater will be generated from domestic (sanitary), blowdown condensate, and other wastewater streams associated with mechanical equipment. The Proponent has determined in consultation with the City of Salem that there is capacity in the City's wastewater system to accept the anticipated flows from the proposed courthouse.

Since the anticipated domestic water use is estimated at 4,725 gpd, this value with no reduction will be used as a conservative estimate in determining the quantities of domestic wastewater generated from the site.

The largest quantity of non-domestic wastewater will be attributed to blowdown condensate, with minor quantities from wastestreams associated with mechanical equipment. The quantity of non-domestic wastewater is a function of the equipment, operation, maintenance, layout and other factors. DCAM has successfully used a factor of

0.005 gpd of wastewater per building square foot to estimate the quantity of non-domestic wastewater. The proposed courthouse is anticipated to be approximately 190,000 gross square feet. It is estimated that the non-domestic wastewater generation will be approximately 950 gpd.

In anticipation of achieving LEED certifiability, attempts have been and will be made to reduce the water consumption and thus wastewater generation at the proposed courthouse by use of energy/water efficient equipment. Based on average daily data from other operating courthouses of similar size and number of courtrooms, DCAM anticipates the average daily wastewater quantity to be 2,000 gpd. Wastewater generation at the proposed courthouse will range from a minimal water use on weekends to a maximum daily water consumption where every courtroom would be filled to capacity for the entire day and blowdown condensate is maximized. Based on maximum domestic waster usage and worse case scenario of equipment usage, the maximum daily wastewater generation is anticipated to be 5,675 gpd.

B. Does the project require any state permits related to **wastewater**? ___ Yes __X__ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Transportation -- Traffic Generation Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Wastewater Section below.

II. Impacts and Permits

A. Describe, in gallons/day, the volume and disposal of wastewater generation for existing and proposed activities at the project site (calculate according to 310 CMR 15.00):

	Existing	Change	Total
Discharge to groundwater (Title 5)	_____	_____	_____
Discharge to groundwater (non-Title 5)	_____	_____	_____
Discharge to outstanding resource water	_____	_____	_____
Discharge to surface water	_____	_____	_____
Municipal or regional wastewater facility	_____	_____	_____
TOTAL	_____	_____	_____

B. Is there sufficient capacity in the existing collection system to accommodate the project? ___ Yes ___ No; if no, describe where capacity will be found:

C. Is there sufficient existing capacity at the proposed wastewater disposal facility?___ Yes ___ No; if no, describe how capacity will be increased:

D. Does the project site currently contain a wastewater treatment facility, sewer main, or other wastewater disposal facility, or will the project involve construction of a new facility? ___ Yes ___ No. If yes, describe as follows:

	Existing	Change	Total
Wastewater treatment plant (capacity, in gpd)	_____	_____	_____
Sewer mains (length, in miles)	_____	_____	_____
Title 5 systems (capacity, in gpd)	_____	_____	_____

E. If the project involves any interbasin transfer of wastewater, which basins are involved, what is the direction of the transfer, and is the interbasin transfer existing or proposed?

F. Does the project involve new sewer service by an Agency of the Commonwealth to a municipality or sewer district? ___ Yes ___ No

G. Is there any current or proposed facility at the project site for the storage, treatment, processing, combustion or disposal of sewage sludge, sludge ash, grit, screenings, or other sewage residual materials? ___ Yes ___ No; if yes, what is the capacity (in tons per day):

	Existing	Change	Total
Storage			
Treatment, processing			
Combustion			
Disposal			

H. Describe the project's other impacts (including indirect impacts) on wastewater generation and treatment facilities:

III. Consistency -- Describe measures that the proponent will take to comply with federal, state, regional, and local plans and policies related to wastewater management:

A. If the project requires a sewer extension permit, is that extension included in a comprehensive wastewater management plan? ___ Yes ___ No; if yes, indicate the EOEA number for the plan and describe the relationship of the project to the plan.

TRANSPORTATION -- TRAFFIC GENERATION SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **traffic generation** (see 301 CMR 11.03(6))? ____ Yes __X__ No; if yes, specify, in quantitative terms:

Based on a transportation counts taken for DCAM in 2002, 1423 persons travel per day to the various court facilities, including the Registry of Deeds. The existing eleven courtrooms and the Registry of Deeds yield an average of 130 trips per day per courtroom (To be conservative, because traffic to the Registry of Deeds was not counted separately, this calculation assumes that all 1423 trips were to the courtrooms). With the addition of five new courtrooms, it is conservatively estimated that approximately 650 new person trips per day will result from the new Courthouse. Because its current facility is inadequate to meet its needs, the Registry of Deeds is relocating from the project site. Based on qualitative results from the 2002 survey, the Registry of Deed yields a higher number of person trips per day than do the courtrooms. Survey results also indicate that approximately 90 percent of trips to the Site are made by automobile. In estimating projected traffic for the Project, this ENF does not take credit for either the small percentage of transit and pedestrian trips expected or for potential carpooling. Neither does it take credit for the reduction in trips that will occur after the Registry of Deeds has relocated.

B. Does the project require any state permits related to **state-controlled roadways**? ___ Yes __X__ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Roadways and Other Transportation Facilities Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Traffic Generation Section below.

II. Traffic Impacts and Permits

A. Describe existing and proposed vehicular traffic generated by activities at the project site:

	Existing	Change	Total
Number of parking spaces	_____	_____	_____
Number of vehicle trips per day	_____	_____	_____

ITE Land Use Code(s): _____

B. What is the estimated average daily traffic on roadways serving the site?

Roadway	Existing	Change	Total
North Street, north of Bridge St	38,140	300	38,440
Bridge Street, west of North St	25,381	175	25,556
Bridge Street, east of Flint St	19,806	175	19,981

C. Describe how the project will affect transit, pedestrian and bicycle transportation facilities and services:

The improvements that will result from the proposed removal of the North Street/Bridge Street interchange loop ramp will greatly improve the pedestrian and vehicular safety of a heavily traveled location that serves as a gateway to the downtown and provides direct pedestrian access to the adjacent MBTA commuter rail station. Ongoing coordination among DCAM, the Massachusetts Highway Department, and the MBTA will ensure pedestrian and bicycle accommodations are maintained throughout construction of the project.

III. Consistency -- Describe measures that the proponent will take to comply with municipal, regional, state, and federal plans and policies related to traffic, transit, pedestrian and bicycle transportation facilities and services:

ROADWAYS AND OTHER TRANSPORTATION FACILITIES SECTION

I. Thresholds

A. Will the project meet or exceed any review thresholds related to **roadways or other transportation facilities** (see 301 CMR 11.03(6))? ___ Yes __X__ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **roadways or other transportation facilities**? ___ Yes __X__ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Energy Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Roadways Section below.

II. Transportation Facility Impacts

A. Describe existing and proposed transportation facilities at the project site:

	Existing	Change	Total
Length (in linear feet) of new or widened roadway	_____	_____	_____
Width (in feet) of new or widened roadway	_____	_____	_____

Other transportation facilities:

B. Will the project involve any

1. Alteration of bank or terrain (in linear feet)? _____
2. Cutting of living public shade trees (number)? _____
3. Elimination of stone wall (in linear feet)? _____

III. Consistency -- Describe the project's consistency with other federal, state, regional, and local plans and policies related to traffic, transit, pedestrian and bicycle transportation facilities and services, including consistency with the applicable regional transportation plan and the Transportation Improvements Plan (TIP), the State Bicycle Plan, and the State Pedestrian Plan:

ENERGY SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **energy** (see 301 CMR 11.03(7))? ___ Yes _X_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **energy**? ___ Yes _X_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Air Quality Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Energy Section below.

II. Impacts and Permits

A. Describe existing and proposed energy generation and transmission facilities at the project site:

	Existing	Change	Total
Capacity of electric generating facility (megawatts)	_____	_____	_____
Length of fuel line (in miles)	_____	_____	_____
Length of transmission lines (in miles)	_____	_____	_____
Capacity of transmission lines (in kilovolts)	_____	_____	_____

B. If the project involves construction or expansion of an electric generating facility, what are
1. the facility's current and proposed fuel source(s)?
2. the facility's current and proposed cooling source(s)?

C. If the project involves construction of an electrical transmission line, will it be located on a new, unused, or abandoned right of way?___ Yes ___ No; if yes, please describe:

D. Describe the project's other impacts on energy facilities and services:

III. Consistency -- Describe the project's consistency with state, municipal, regional, and federal plans and policies for enhancing energy facilities and services:

AIR QUALITY SECTION

I. Thresholds

A. Will the project meet or exceed any review thresholds related to **air quality** (see 301 CMR 11.03(8))? ___ Yes _X_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **air quality**? ___ Yes _X_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Solid and Hazardous Waste Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Air Quality Section below.

II. Impacts and Permits

A. Does the project involve construction or modification of a major stationary source (see 310 CMR 7.00, Appendix A)?___ Yes _X_ No; if yes, describe existing and proposed emissions (in tons per day) of:

	Existing	Change	Total
Particulate matter			
Carbon monoxide			
Sulfur dioxide			
Volatile organic compounds			
Oxides of nitrogen			
Lead			
Any hazardous air pollutant			
Carbon dioxide			

B. Describe the project's other impacts on air resources and air quality, including noise impacts:

III. Consistency

A. Describe the project's consistency with the State Implementation Plan:

B. Describe measures that the proponent will take to comply with other federal, state, regional, and local plans and policies related to air resources and air quality:

SOLID AND HAZARDOUS WASTE SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **solid or hazardous waste** (see 301 CMR 11.03(9))? ___ Yes _X_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **solid and hazardous waste**? ___ Yes _X_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Historical and Archaeological Resources Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Solid and Hazardous Waste Section below.

II. Impacts and Permits

A. Is there any current or proposed facility at the project site for the storage, treatment, processing, combustion or disposal of solid waste? ___ Yes ___ No; if yes, what is the volume (in tons per day) of the capacity:

	Existing	Change	Total
Storage			
Treatment, processing			
Combustion			
Disposal			

B. Is there any current or proposed facility at the project site for the storage, recycling, treatment or disposal of hazardous waste? ___ Yes ___ No; if yes, what is the volume (in tons or gallons per day) of the capacity:

	Existing	Change	Total
Storage			
Recycling			
Treatment			
Disposal			

C. If the project will generate solid waste (for example, during demolition or construction), describe alternatives considered for re-use, recycling, and disposal:

D. If the project involves demolition, do any buildings to be demolished contain asbestos?
___ Yes ___ No

E. Describe the project's other solid and hazardous waste impacts (including indirect impacts):

III. Consistency--Describe measures that the proponent will take to comply with the State Solid Waste Master Plan:

HISTORICAL AND ARCHAEOLOGICAL RESOURCES SECTION

I. Thresholds / Impacts

A. Is any part of the project site a historic structure, or a structure within a historic district, in either case listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth? __X__ Yes ___ No; if yes, does the project involve the demolition of all or any exterior part of such historic structure? __X__ Yes ____ No; if yes, please describe:

The project site is located within two historic districts listed on the State and National Registers of Historic Places, the Essex County Court Building Complex (NRDIS: 1976), and the Federal Street Historic District (NRDIS: 1983). The boundaries for the Essex County Court Building Complex are limited to the three court buildings, the County Commissioner's Building, 32 Federal Street; Superior Courthouse, 34 Federal Street; and the Registry of Deeds / Probate and Family Court, 36 Federal Street. The Federal Street Historic District includes the three court buildings as well as all the properties on the north and south sides of Federal Street, between Washington Street to North Street, including the four non-court buildings on the project site, the First Baptist Church, 54 Federal Street; and the three properties at 58, 60 and 62 Federal Street.

The three alternatives under consideration, Plans A, B, and C, would each result in some demolition of exterior parts to some of the State and National Register listed properties mentioned above. Plan A would result in the demolition of the rear portion of the First Baptist Church, 54 Federal Street; and possibly the three properties at 58, 60 and 62 Federal Street if relocation of these three buildings is not feasible. DCAM is investigating the possibility of making the three houses available for relocation off-site by others. Plan B would also possibly result in the demolition of the three properties at 58, 60 and 62 Federal Street if relocation of these three buildings is not feasible, but would not involve the Church, thereby leaving it intact. Similar to Plan A, Plan C would utilize the front, 1805 portion of the Church and involve the demolition of the rear portion of the Church, but would leave the three buildings at 58, 60 and 62 Federal Street intact. Although Plan C would leave the three buildings at 58, 60 and 62 Federal Street intact, using these buildings for unrelated functions poses security issues, given their close proximity to the new court complex. Perhaps more important than the practical challenges presented by retaining the houses is the negative impact on the civic presence of the new courthouse which would be largely blocked from Federal Street by the houses. Similarly, the relocated First Baptist Church would be compromised by being pushed to the edge of North Street and partially obscured from view.

The Plan C alternative is not preferred because of the unacceptable compromises required in both the design and siting of the new courthouse as well as the placement and presence of the relocated First Baptist Church. Both the new courthouse and the relocated church will be diminished by the retention of the three houses. In the Plan A preferred alternative, the relocated church and new courthouse will complete a streetscape that has developed as a prominent institutional block over the last 150 years, as cited as the National Register of Historic Places nomination form for the Federal Street Historic District.

B. Is any part of the project site an archaeological site listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth? ___ Yes __X__ No; if yes, does the project involve the destruction of all or any part of such archaeological site? ___ Yes ___ No; if yes, please describe:

C. If you answered "No" to all parts of both questions A and B, proceed to the **Attachments and Certifications** Sections. If you answered "Yes" to any part of either question A or question B, fill out the remainder of the Historical and Archaeological Resources Section below.

D. Have you consulted with the Massachusetts Historical Commission? __X__ Yes ___ No; if yes, attach correspondence

DCAM officials and other project team representatives have met with Massachusetts Historical Commission staff to discuss the proposed project. In addition, the proponent has met with local preservation organizations including the Salem Historical Commission and Historic Salem, Inc. DCAM is committed to continued consultations with the MHC and interested parties as the project advances to consider prudent and feasible alternatives to avoid, minimize, or mitigate impacts to historic resources on the project site and within the project's vicinity. In recent correspondence to MHC, DCAM has requested the opportunity to meet with MHC to advance the consultation process (see attached correspondence).

E. Describe and assess the project's other impacts, direct and indirect, on listed or inventoried historical and archaeological resources:

The McIntire Historic District, one of four local historic districts in the City of Salem, is located on the west side of North Street, opposite the project site. The National Register listed Chestnut Street Historic District, with similar boundaries as the McIntire Historic District, is also located on the opposite side of North Street from the project site. Numerous other historic districts and individual historic properties exist within the downtown Salem area, within close proximity to the project site.

DCAM is committed to continued consultations with MHC and interested parties as the project advances to consider prudent and feasible alternatives to avoid, minimize, or mitigate impacts to historic resources on the project site and within the project's vicinity.

II. Consistency -- Describe measures that the proponent will take to comply with federal, state, regional, and local plans and policies related to preserving historical and archaeological resources:

In compliance with Massachusetts General Laws, Chapter 9, Section 26-27C, as amended by Chapter 254 of the Acts of 1988 (950 CMR 71.00), DCAM is committed to continued consultations with the MHC and interested parties as the project advances to consider prudent and feasible alternatives to avoid, minimize, or mitigate impacts to historic resources on the project site and within the project's vicinity.

ATTACHMENTS:

1. Plan, at an appropriate scale, of existing conditions of the project site and its immediate context, showing all known structures, roadways and parking lots, rail rights-of-way, wetlands and water bodies, wooded areas, farmland, steep slopes, public open spaces, and major utilities.
2. Plan of proposed conditions upon completion of project (if construction of the project is proposed to be phased, there should be a site plan showing conditions upon the completion of each phase).
3. **Original** U.S.G.S. map or good quality **color** copy (8-½ x 11 inches or larger) indicating the project location and boundaries
4. List of all agencies and persons to whom the proponent circulated the ENF, in accordance with 301 CMR 11.16(2).
5. Other:

CERTIFICATIONS:

1. The Public Notice of Environmental Review has been/will be published in the following newspapers in accordance with 301 CMR 11.15(1):

(Name)	(Date)
Salem Evening News	January 5, 2007

2. This form has been circulated to Agencies and Persons in accordance with 301 CMR 11.16(2).

Dec. 21, 2006 (signature) 12.21.06 (signature)

Date	Signature of Responsible Officer or Proponent	Date	Signature of person preparing ENF (if different from above)
Name	Gail Rosenberg	Name	Douglas J. Kelleher
Firm/Agency	Division of Capital Asset Management	Firm/Agency	Epsilon Associates, Inc.
Street	One Ashburton Place	Street	3 Clock Tower Place, Suite 250
Municipality/ State/Zip	Boston, MA 02108	Municipality/ State/Zip	Maynard, MA 01754
Phone	(617) 727-4050	Phone	(978) 897-7100

Scale 1:24,000
1 inch = 2,000 feet

1,000 0 1,000 2,000 Feet

Figure 1
USGS Locus Map

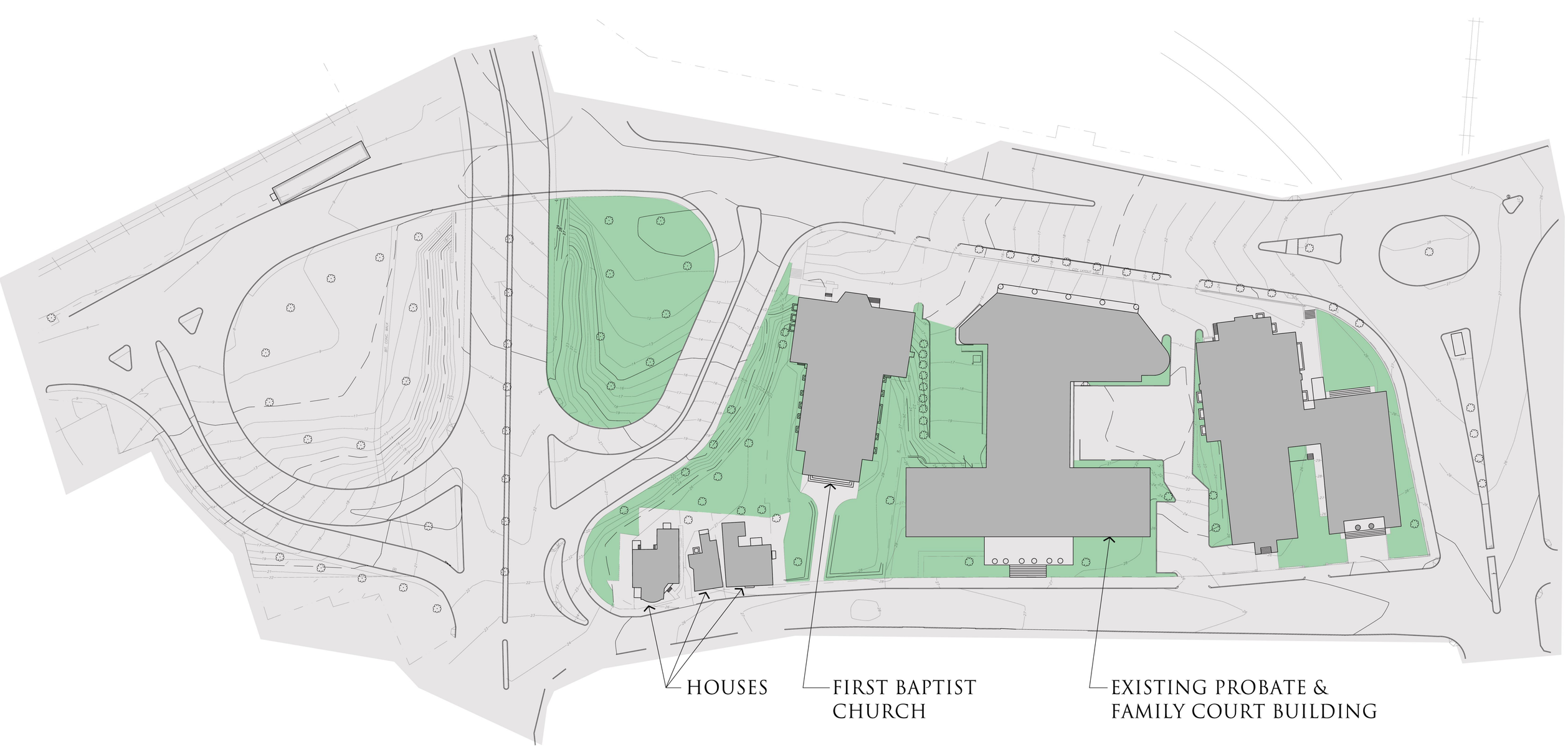
DCAM
Salem, Massachusetts

Basemap: 1985 USGS Quadrangles, MassGIS

Epsilon ASSOCIATES INC.

Figure 2
Site Photo

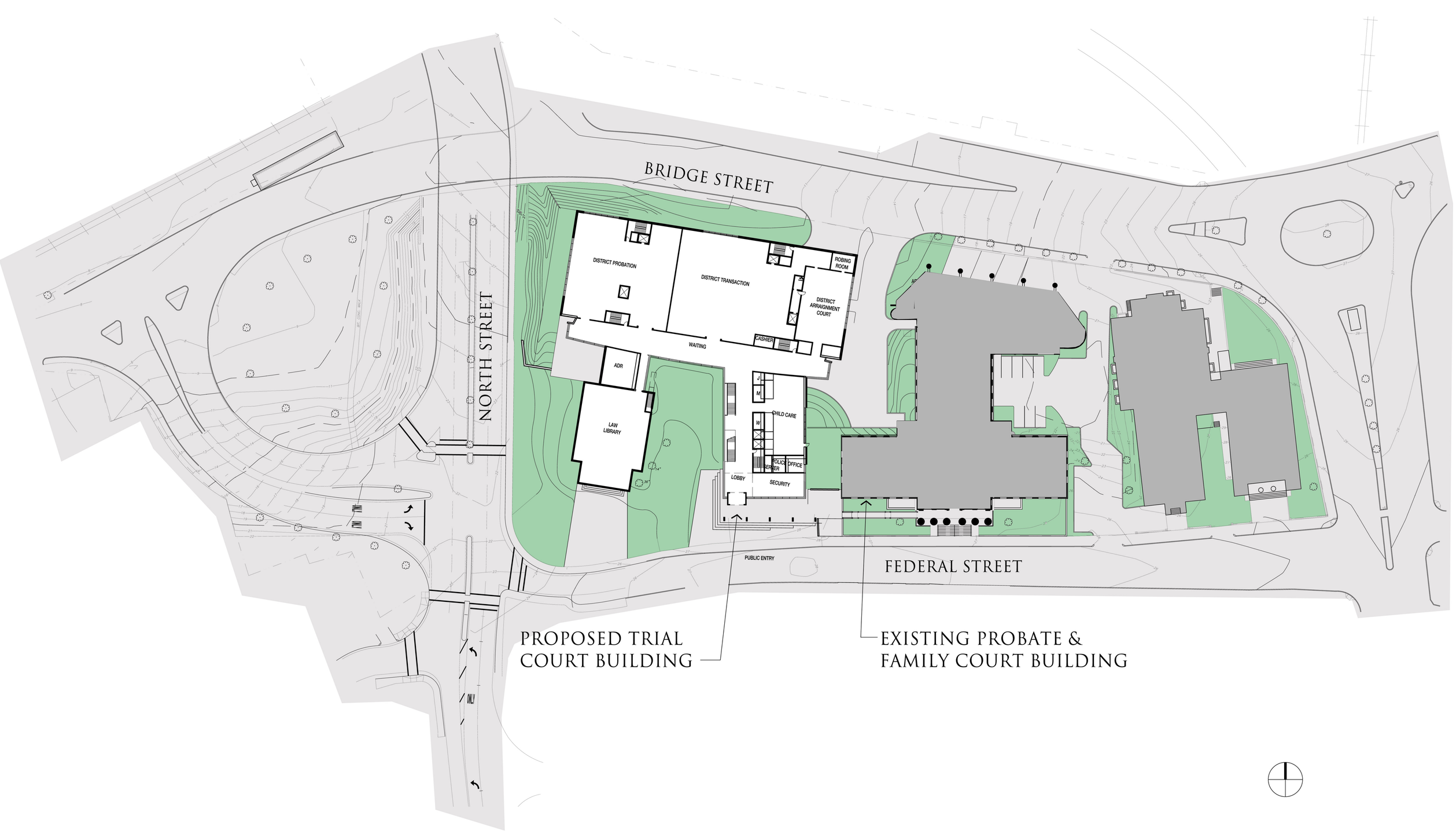
DCAM
Salem, Massachusetts



GOODY CLANCY

SALEM NEW TRIAL COURT
EXISTING SITE

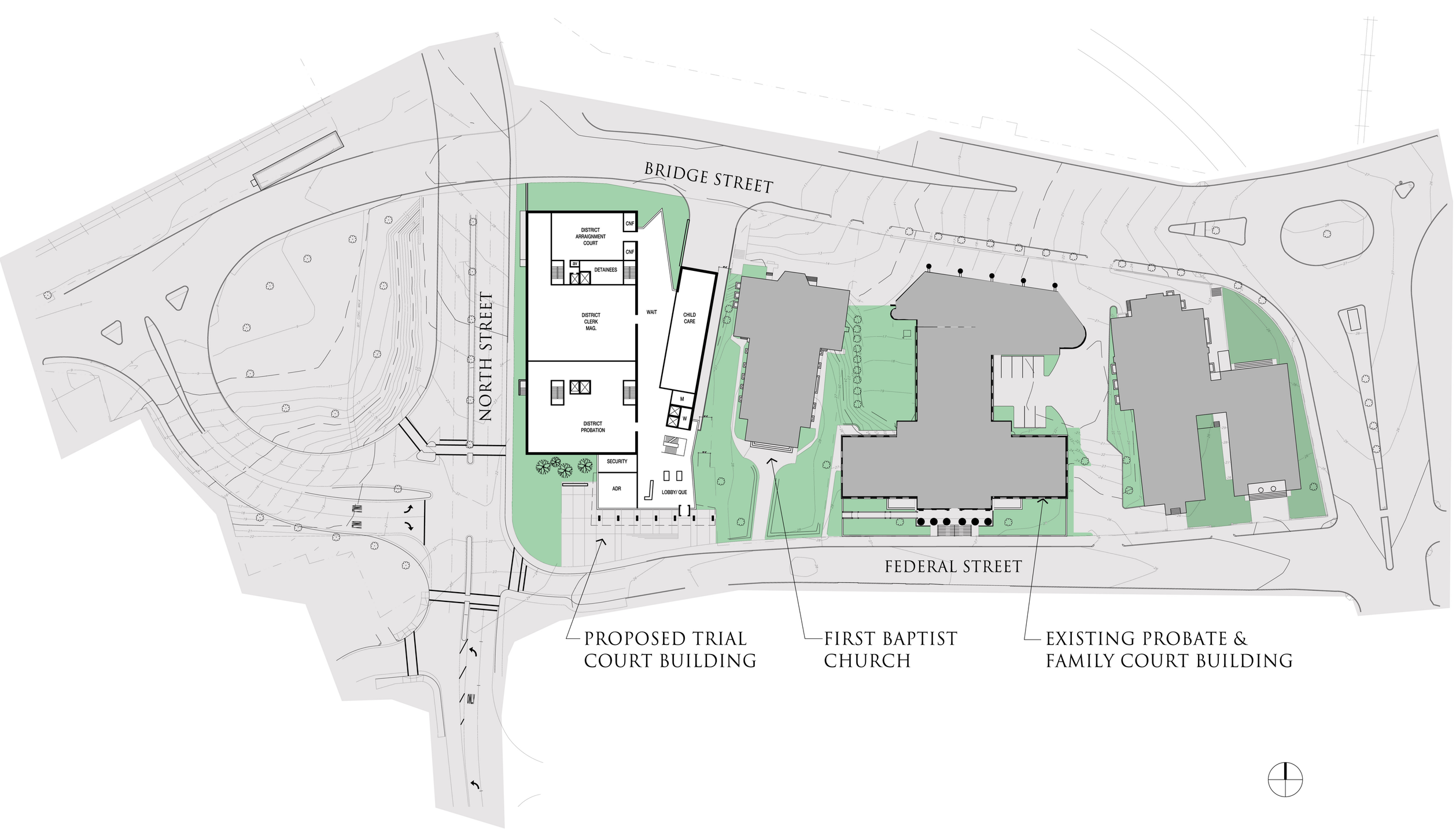
OCTOBER 4, 2006



GOODY CLANCY

SALEM NEW TRIAL COURT
PLAN A

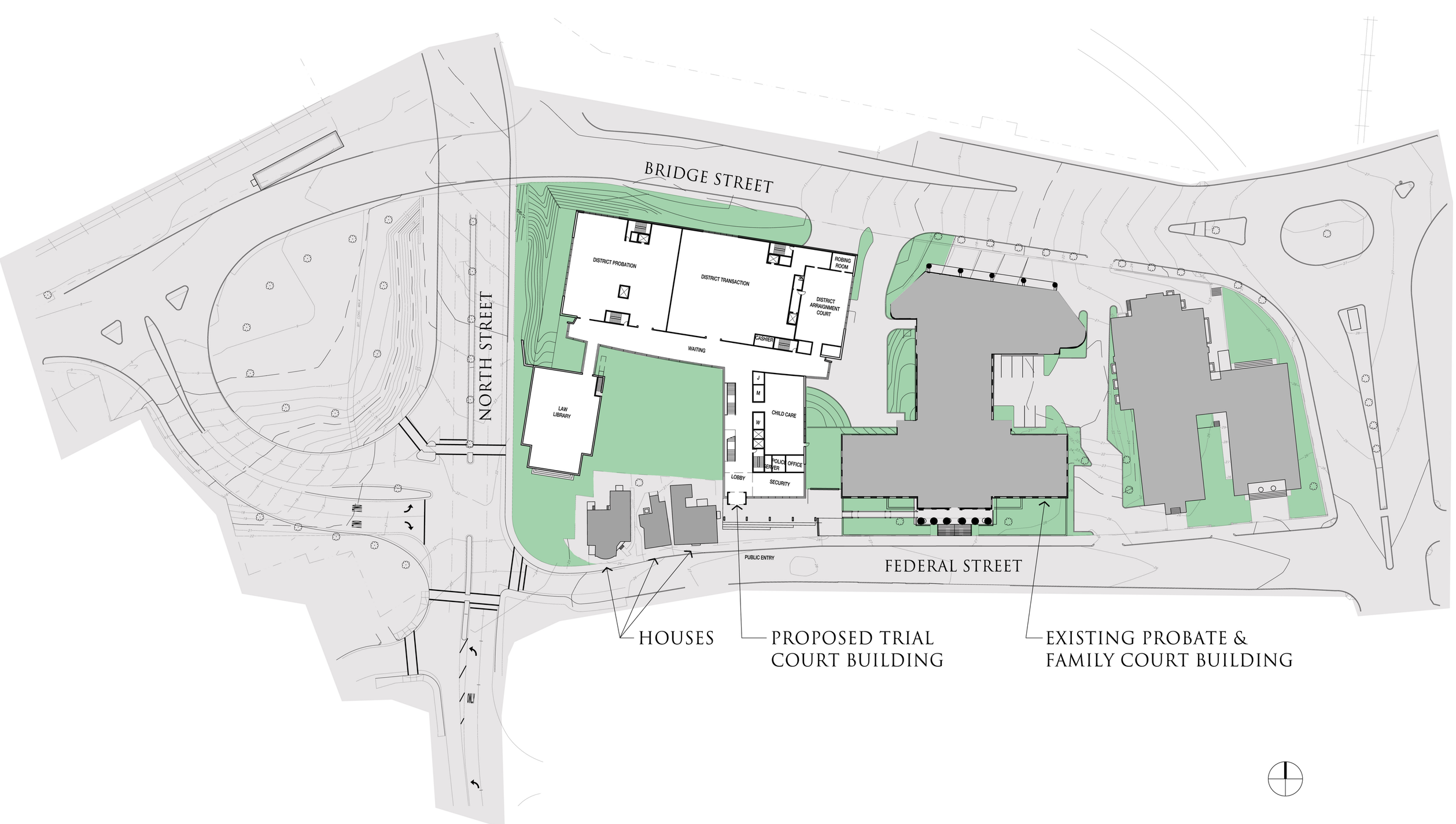
OCTOBER 4, 2006



GOODY CLANCY

SALEM NEW TRIAL COURT
PLAN B

OCTOBER 4, 2006



GOODY CLANCY

SALEM NEW TRIAL COURT
PLAN C

OCTOBER 4, 2006

MITT ROMNEY
GOVERNOR

KERRY HEALEY
LIEUTENANT GOVERNOR

The Commonwealth of Massachusetts
Executive Office for Administration and Finance
Division of Capital Asset Management
One Ashburton Place
Boston, Massachusetts 02108
Tel: (617) 727-4050
Fax: (617) 727-5363

THOMAS H. TRIMARCO
SECRETARY, ADMINISTRATION & FINANCE

DAVID B. PERINI
COMMISSIONER

November 21, 2006

Ann M. Lattinville
Director of Architectural Review
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125

Re: Michael J. Ruane Judicial Center, Salem

Dear Ms. Lattinville:

Following up on a several earlier communications, I am writing to advise you that DCAM is in the process of preparing an Environmental Notification Form which we hope to file with MEPA in mid-December for the above-referenced Salem courthouse project. The project has evolved and developed on several fronts since we met with MHC for an informational meeting last year. In the interim, DCAM has met on numerous occasions with local interested parties, including members of the Salem Historical Commission and Historic Salem, Inc. DCAM would appreciate the opportunity to update MHC on the status of the overall project prior to filing with MEPA.

Please advise if there is time available for you to meet with members of our project team during the next several weeks. The DCAM project team would be happy to come out to your office for the meeting.

Sincerely,

Carol C. Meeker
Deputy General Counsel

Cc: Brona Simon, MHC
Gail Rosenberg, DCAM
Doug Kelleher, Epsilon Associates

The Commonwealth of Massachusetts
Executive Office for Administration and Finance
Division of Capital Asset Management
One Ashburton Place
Boston, Massachusetts 02108
Tel: (617) 727-4050
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MITT ROMNEY
GOVERNOR

KERRY HEALEY
LIEUTENANT GOVERNOR

THOMAS H. TRIMARCO
SECRETARY, ADMINISTRATION & FINANCE

DAVID B. PERINI
COMMISSIONER

September 28, 2006

Ann M. Lattinville
Director of Architectural Review
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125

Re: Michael J. Ruane Judicial Center, Salem

Dear Ms. Lattinville: Ann

Following up on a voicemail which I left for you earlier, I am writing to advise you that DCAM is in the process of preparing an Environmental Notification Form which we hope to file with MEPA in the next few weeks for the above-referenced Salem courthouse project. The project has evolved and developed on several fronts since we met with MHC for an informational meeting last September. DCAM would appreciate the opportunity to update MHC on the status of the project prior to filing with MEPA.

Please let me know if there is any time that would be good for you to meet with members of our project team during the first two weeks of October. We would be happy to come out to your office for the meeting.

Sincerely,

Carol C. Meeker
Deputy General Counsel

Cc: Gail Rosenberg, DCAM Project Manager
[redacted]

Appendix A
Reuse Analysis

Appendix A: Reuse Analysis

Requirements of Judicial program	Existing Superior Court	County Commissioner's Building	Probate & Family Court	New Facility
16 courtrooms in adjacent locations all meeting security, accessibility and long-term adaptability	- 3 existing courtrooms do not meet current security, accessibility and other court requirements. - Would requires extensive renovation /new construction at compromise to historic building	- Currently no courtrooms located in the building - Would require extensive renovation /new construction at compromise to historic building	- 5 existing courtrooms, requires renovation / new construction – minimal capacity on-site, requires temporary relocation of existing functions	- 11 courtrooms meeting all functional accessible and security requirements
3 separate and secure circulation routes	- Not Feasible within existing historic building - Requires extensive renovation /new construction at compromise to historic building	- Not Feasible within existing historic building - Requires extensive renovation /new construction at compromise to historic building	- Minimal renovation/ new construction required – Existing capacity on-site	- Full accommodation
Adequate and separate **detention facilities** for all court departments and courtrooms	- Not Feasible within existing historic building - Requires extensive renovation /new construction at compromise to historic building	- Not Feasible within existing historic building - Requires extensive renovation /new construction at compromise to historic building	- Minimal renovation/ new construction required – minimal need for detention on-site	- Central detention provided, detention at courtrooms and secure sallyport
100% accessible	- Major access issues including multiple floor levels and main entrance would necessitate extensive system of elevators and ramps and create inefficient utilization of space within historic buildings	- Major access issues including multiple floor levels and main entrance would necessitate extensive system of elevators and ramps and create inefficient utilization of space within historic buildings	- Requires minimal renovation - Accessibility improvements recently made (ramp, elevator, toilets)	- Fully accessible accommodations
Adequate **Juror** facilities	- Inadequate juror facilities, access, circulation, HVAC, etc., all inadequate - Requires extensive renovation/new construction to meet program needs.	- Inadequate juror facilities, access, circulation, HVAC, etc., all inadequate - Requires extensive renovation/new construction to meet program needs.	- Requires minimal renovation	- Full accommodation of juror facilities, including access, circulation, HVAC, etc.
Co-location of all 5 court departments in single location	- Superior Court and Law Library only at this location - Requires extensive renovation /new construction at compromise to historic building	- Superior Court only at this location - Requires extensive renovation /new construction at compromise to historic building	- Probate and Family Court only at this location - Could be adjacent to new facility with opportunity for future physical connection	- Locates 4 out of 5 court departments
Probate & Family Court – total square footage needs in consolidated facility: Approximately 59,000 GSF required	- Existing building is 29,643 GSF - Requires extensive renovation / new construction at compromise to historic building.	- Existing building is 12,315 GSF - Requires extensive renovation / new construction at compromise to historic building.	- Existing building is 77,422 GSF (incl. 1970's addition) - Renovation and reuse of building planned for PFC functions	- Probate and Family Court not planned for new facility; will remain in existing building after renovation
Superior Court – total square footage needs in consolidated facility: Approximately 44,600 GSF required	- Existing 29,643 GSF on 4 floors - Requires a significant new addition on limited site - Would compromise historic building	- Existing 12,315 GSF. - Requires a significant new addition on limited site - Would compromise historic building	- Renovation and reuse planned for Probate and Family Court functions	- Fully accommodates Superior Court functions with secure and accessible facilities
District Court – total square footage needs: Approximately 37,000 GSF	- Existing 29,643 GSF on 4 floors - Requires a significant new addition on limited site - Would compromise historic building	- Existing 12,315 GSF. - Requires a significant new addition on limited site - Would compromise historic building	- Renovation and reuse planned for Probate and Family Court functions	- Fully accommodates District Court functions with secure and accessible facilities
Juvenile Court – total square footage needs: Approximately 22,700 GSF	- Existing 29,643 GSF on 4 floors - Requires a significant new addition on limited site - Would compromise historic building	- Existing 12,315 GSF. - Requires a significant new addition on limited site - Would compromise historic building	- Renovation and reuse planned for Probate and Family Court functions	- Fully accommodates Juvenile Court Functions with secure and accessible facilities
Housing Court – total square footage needs: Approximately 20,000 GSF	- Existing 29,643 GSF on 4 floors - Requires significant renovations to accommodate efficient courtroom layout - compromise historic building	- Existing 12,315 GSF. - Requires a significant new addition on limited site - Would compromise historic building	- Renovation and reuse planned for Probate and Family Court functions	- Fully accommodates Housing Court functions with secure and accessible facilities
Secure Parking for Judges and senior staff, approximately 30 spaces	- No secure parking provided - Site restrictions for secure parking	- No secure parking provided - Site restrictions for secure parking	- Limited parking underneath building to be secured as part of renovation	- Fully secure interior spaces
Public Law Library accessible, secure, and climate controlled in close proximity to consolidated courts	- Limited in size - Inaccessible - Poor configuration for staffing and operations - Insufficient climate control	- Limited in size - Inaccessible - Poor configuration for staffing and operations - Insufficient climate control	- Renovation and reuse planned for Probate and Family Court functions	- Fully accommodates relocated Law Library in accessibility, security and climate control

Appendix B
ENF Circulation List

ENF Circulation List

Secretary Robert W. Golledge, Jr.
Executive Office of Environmental Affairs
Attn: MEPA Office
100 Cambridge St, Suite 900
Boston, MA 02114

Undersecretary for Policy
c/o Nancy Gabriel-Sackie
100 Cambridge St., Suite 900
Boston, MA 02114

Department of Environmental Protection
Commissioner's Office
One Winter St
Boston, MA 02108

DEP/Northeastern Regional Office
Attn: MEPA Coordinator
205B Lowell Street
Wilmington, MA 01887

Executive Office of Transportation & Construction (EOTC)
Attn: Environmental Reviewer
10 Park Plaza, Room 3510
Boston, MA 02116-3969

Massachusetts Highway Department
Public/Private Development Unit
10 Park Plaza
Boston, MA 02116

MHD District #4
Attn: MEPA Coordinator
519 Appleton Street
Arlington, MA 02476

Metropolitan Area Planning Council
60 Temple Place, 6th Floor
Boston, MA 02111

Massachusetts Aeronautics Commission
Attn: MEPA Coordinator
10 Park Plaza, Suite 3510
Boston, MA 02116

Massachusetts Historical Commission
The MA Archives Building
220 Morrissey Boulevard
Boston, MA 02125

Representative John Keenan
Massachusetts State House
State House Room 146
Boston, MA 02133

Mayor Kim Driscoll
Salem City Hall
93 Washington Street
Salem, MA 01970

Salem City Council
Salem City Hall
93 Washington Street
Salem, MA 01970

Michael Sosnowski
City Councilor
Salem City Hall
93 Washington Street
Salem, MA 01970

Salem Planning Board
120 Washington Street, 3rd Floor
Salem, MA 01970

Lynn Duncan
City Planner
Salem Planning Department
120 Washington Street, 3rd Floor
Salem, MA 01970

Salem Conservation Commission
120 Washington Street, 3rd Floor
Salem, MA 01970

Salem Health Department
120 Washington Street, 3rd Floor
Salem, MA 01970

Salem Historical Commission
120 Washington Street, 3rd Floor
Salem, MA 01970

Massachusetts Bay Transit Authority
Attn: MEPA Coordinator
10 Park Plaza, 6th Floor
Boston, MA 02216-3966

Annie Harris
Essex National Heritage Commission
221 Essex Street
Salem, MA 01970

Barbara Cleary
Historic Salem, Inc.
9 North Street
Salem, MA 01970

Meg Twohey
Federal Street Neighborhood Alliance
122 Federal Street
Salem, MA 01970

Joseph Correnti
Serafini, Serafini, Darling & Correnti
63 Federal Street
Salem, MA 01970

Patricia Zaido
Executive Director
Salem Partnership
6 Central Street
Salem, MA 01970

Sumner Jones
Eastern Investment Advisors
605 Broadway, LF41
Saugus, MA 01906

Richard L'Heureux
Administrative Office of the Trial Court
Court Capital Projects
Two Center Plaza
Boston, MA 02108

Joan Goody
Goody Clancy Architects
440 Boylston Street
Boston, MA 02116

A3.2 Certificate of the Secretary of Environmental Affairs on the Environmental Notification Form

February 22, 2007

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Deval L. Patrick
GOVERNOR

Timothy P. Murray
LIEUTENANT GOVERNOR

Ian A. Bowles
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1181
http://www.mass.gov/envir

February 22, 2007

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS
ON THE
ENVIRONMENTAL NOTIFICATION FORM

PROJECT NAME	: J. Michael Ruane Judicial Center/Salem Trial Courts
PROJECT MUNICIPALITY	: Salem
PROJECT WATERSHED	: North Coastal
EOEA NUMBER	: 13944
PROJECT PROPONENT	: Massachusetts Division of Capital Asset Management
DATE NOTICED IN MONITOR	: January 9, 2007

Pursuant to the Massachusetts Environmental Policy Act (G. L. c. 30, ss. 61-62H) and Section 11.06 of the MEPA regulations (301 CMR 11.00), I hereby determine that this project **does not require** the preparation of an Environmental Impact Report (EIR).

Project Description

The project consists of re-development of a 3.8 acre site in downtown Salem. It includes construction of a 190,000 square foot (sf) consolidated Trial Court Facility by the Division of Capital Asset Management (DCAM). The facility will consolidate Superior Court, District Court, Housing Court, Juvenile Court and the Law Library (Probate and Family Court operations will continue within the existing building). The County Commissioner and Superior Court buildings will be vacated by the courts. The ENF does not identify planned uses for the vacated buildings although it does indicate that restrictions will be placed on the structures to ensure their maintenance and preservation. The project proposal includes removal of the loop ramp located in the southeast quadrant of the North Street/Bridge Street interchange.

The ENF identifies and describes three on-site alternatives considered by DCAM, which are summarized below. The ENF identifies Plan A as the Preferred Alternative.

Plan A: relocation and reuse of the 1805 portion of the Baptist Church, demolition or relocation off site of the wood-frame houses and construction of a new building on the northwest corner of the parcel. The Registry of Deeds/Probate building would be renovated and reused.

Plan B: relocation off-site or demolition of the three houses and retention of the Baptist Church. Construction of a larger building to accommodate the court functions that would be included in the Church building under Plan A.

Plan C: relocation and reuse of the Baptist Church and retention of the houses in their current location.

The site is bounded by Bridge Street and the Massachusetts Bay Transportation Authority (MBTA) train station and parking lot to the north, Washington Street to the east, Federal Street to the south and North Street to the west. The site is located within two historic districts, including the Federal Street Historic District which is listed in the Sate and National Registers of Historic Places and the Essex County Court Building Complex. Existing buildings on the site include the 1841 County Commissioner's Building (also known as the Old Essex County Courthouse), the 1862/1889 Superior Courthouse and the 1090 Clarence Blackall courthouse (the Registry of Deeds and Probate and Family Courthouse), the 1805 First Baptist Church, and three historic wood-frame properties at 58, 60 and 62 Federal Street. Approximately 2.2 acres of the site is owned by the Commonwealth, .8 acres is owned by private owners and .8 acres is owned by the City of Salem.

Impacts associated with the Preferred Alternative include alteration of 1.9 acres of land, creation of an additional .3 acres of new, impervious surfaces and generation of approximately 1,884 new vehicle trips per day.[1] It includes the vacating of two historic buildings, construction of a new building in a historic district and demolition (or transfer) of three historic buildings.

Efforts to avoid, minimize and mitigate project impacts include: re-development of an existing site in an urban area with close proximity to transit; design of a high-efficiency, sustainable building that will comply with the Massachusetts LEED Plus standard (and could be certified at the Silver level by the U.S. Building Council's Leadership in Environmental and Energy Design (LEED); development of a stormwater management system to address the increase in impervious surfaces; and development of appropriate roadway mitigation and pedestrian infrastructure.

Permitting and Jurisdiction

The project is undergoing MEPA review pursuant to Section 11.03 (10)(b) because it consists of demolition of all or any exterior part of any Historic Structure listed in or located in

[1] This estimate is based on additional information submitted by the proponent on February 7, 2007 and includes a higher trip generation associated with the re-use of the court buildings.

any Historic District listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth and it requires a transfer of state land. The project requires review by the Massachusetts Historical Commission (MHC) and will include a land transfer by the Division of Capital Asset Management (DCAM).[2]

Because the project involves state funding and a transfer of state land, MEPA jurisdiction extends to all aspects of the project that may cause significant Damage to the Environment. These include historic resources, open space, transportation, stormwater and wastewater.

Based on a review of the comment letters, it is clear that they City of Salem and the community strongly support the retention of court uses at this site. In addition, most commentors have complimented DCAM on the open, public process that has been conducted to date. Senate Majority Leader Frederick E. Berry, Representative John D. Keenan, Mayor Kim Driscoll and many other commentors, including the Essex National Heritage Area and the Salem Partnership, strongly support the Preferred Alternative as proposed while identifying outstanding issues that must be addressed by DCAM and the City. Other commentors, including MHC, Historic Salem, the Federal Street Neighborhood Association and the Alliance of Salem Neighborhoods advocate for additional analysis of alternatives and express stronger concern with unresolved issues. Identification of other uses for the County Commissioner and Superior Court buildings, prior to vacancy of the building by the courts, has been identified as a particular concern. Other issues that have been identified are related to the provision of adequate roadway mitigation and safe pedestrian and bicycle access and coordination with ongoing projects in the vicinity. DCAM has stated that it will coordinate with the Massachusetts Highway Department (MHD) and the MBTA regarding roadway reconstruction, mitigation and the proposed parking garage. DCAM has also committed to work closely with the City and the community, including the abutting neighborhood, to develop a design appropriate to its context within designated historic districts. The City has indicated it will coordinate with state agencies regarding adaptive reuse of the court buildings and to continue developing plans to address roadway mitigation and parking.

Based on a review of the ENF, the additional materials submitted by the proponent on February 7, 2007, consultation with public agencies, and review of public comment letters, I have determined that no additional MEPA review is warranted. The proponent can address the development and/or refinement of appropriate mitigation for historic and environmental impacts through subsequent state and local review and permitting processes. I encourage the proponent to work cooperatively with MHC during the consultation process to further analyze its alternative development scenarios and develop appropriate mitigation for impacts. I expect DCAM to continue to collaborate with the City and the community on all aspects of the project. In particular, it would be beneficial for DCAM to organize a public meeting, in conjunction with the City, the MBTA and MassHighway, to provide a comprehensive overview of planned projects and provide assurance that these projects will be coordinated and vehicular, pedestrian and bicycle access will be maintained and enhanced during the construction period and over the long-term.

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[2] The land transfer consists of disposition of the Superior Court and County Commissioner's building by DCAM.

Historic Resources

MHC has indicated that Plan A and Plan B will have an "adverse effect" on the Baptist Church and on the properties at 58, 60 and 62 Federal Street through the demolition of all or part State Register properties. In addition, MHC indicates that all three project alternatives – with no imminent plan for state reuse or disposition and transfer of the facilities with adequate restrictions – will have an adverse effect on the County Commissioner's Building and the Superior Court. MHC further notes that the project may have indirect impacts through the design and construction of the new facility on the character and setting of the Essex County Courthouse Complex Historic District and Federal Street Historic District. MHC has requested the development of an EIR to further analyze potential re-use of the historic resources on the site, further planning for the reuse of the vacated court buildings and further details on design of the new building and its potential impact on affected historic districts.

I believe these issues will be addressed appropriately through the MHC consultation process. DCAM has indicated that it will review project alternatives in more detail during the historic review process. To ensure the preservation of the building during any vacancy, DCAM will develop a plan to provide adequate security, heating and ventilation and will attach historic preservation restrictions to the property prior to any transfer. In addition, DCAM and the City have expressed their commitment to identify appropriate uses for the vacated buildings consistent with the City's planning goals. I urge DCAM to accelerate the identification of appropriate uses for the vacated buildings to minimize the amount of time they may be vacated and to address comments by MHC and many others on this issue.

Transportation and Traffic

The proponent has completed a traffic study and developed mitigation to minimize traffic impacts. The ENF and traffic study describe mitigation that, in concert with improvements planned by MassHighway for North Street and Bridge Street, will improve traffic conditions and avoid exacerbating any existing problems. The project is located in close proximity to transit and the proponent has identified measures to improve pedestrian access and safety. The project includes installation of a signal at Federal Street, North Street and the ramps to Bridge Street and includes signalized pedestrian crosswalks at Federal Street and North Street. A new sidewalk will be constructed along the North Street and Bridge Street edges of the site to ensure adequate pedestrian circulation throughout the site. The reconstruction of Bridge Street by MassHighway will include a signal at the MBTA Drive/Bridge Street intersection and a signalized crosswalk.

DCAM has committed to continue consulting with the City and the community on the development of traffic mitigation and pedestrian access. Comment letters from the Salem City Council and Stanley Szwartz identify alternatives to proposed improvements that appear worthy of additional analysis although they could not be implemented solely by DCAM and would require support from MassHighway and/or the City of Salem. I encourage DCAM, MassHighway and the City to consider the feasibility and advisability of these alternatives as plans are developed and refined. To further minimize traffic impacts and parking associated with the project, I expect that DCAM will work with the MBTA on strategies to increase use of mass transit by employees and visitors to the site.

Construction Period Impacts

Because this project is located in a dense urban environment, I urge the proponent to consult with MassDEP regarding the development of a construction equipment retrofit program and use of on-road low sulfur diesel fuel in off-road construction equipment. These measures can reduce exposure to diesel exhaust fumes and particulate emissions for workers and abutters.

The review of the ENF has served to adequately disclose the potential environmental impacts associated with this project. Based on the information in the EENF and after consultation with relevant public agencies, I find that outstanding issues can be addressed adequately through state and local review. No further MEPA review is required.

February 22, 2007
Date

Ian A. Bowles

Comments Received:

1/25/07	Massachusetts Historical Commission
2/1/07	Frederick E. Berry, Senate Majority Leader
2/6/07	Representative John D. Keenan
2/8/07	Mayor Kimberly Driscoll, City of Salem
2/5/07	City of Salem/Engineering Division
1/26/07	City of Salem/City Council
1/29/07	Salem Historical Commission – no position
2/12/07	Salem Historical Commission (second letter)
2/8/07	Alliance of Salem Neighborhoods
2/10/07	Essex National Heritage Area
1/27/07	Federal Street Neighborhood Association
2/1/07	Historic Salem Incorporated
1/23/07	The Salem Partnership
1/26/07	Jane Curtis Arlander
1/28/07	Elizabeth M. Burns
1/12/07	David J. Goggin, A.S.
1/26/07	Ana M. Gordon
2/8/07	Darrow A. Lebovici
1/21/07	Richard Luecke and Perry McIntosh
1/29/07	Mickey Northcutt
1/24/07	Richard Pabich
2/5/07	Stanley H. Szwartz

IAB/CDB/cdb

BRIDGE STREET

EAST RAMPS

FEDERAL STREET

LYNDE STREET

MBTA DRIVE

NORTH STREET

NORTH STREET

WEST RAMPS

FEDERAL STREET

N/F CITY OF SALEM

N/F SIXTY FIVE FEDERAL ST. NOM. TRUST TH.

N/F TWENTY FOUR NORTH ST. REALTY TRUST

Conc. Wall

W/ Metal Rail

Conc.

Grass

Brick

Hedges

Bit. Drive

#109A-3

BRIDGE ABUTEMENT

1.3m IRON

EXPANSION JOINT

STAIRWELL

2.3m WOOD

FIGURE 1 - EXISTING PEDESTRIAN ACCOMMODATIONS

EXISTING SIGNALIZED MID-BLOCK CROSSWALK

EXISTING UNSIGNALIZED CROSSWALKS

EXISTING PATHWAY

EAST RAMPS SIDEWALK CONNECTION BETWEEN NORTH STREET & BRIDGE STREET

SIDEWALKS

EarthTech

A Tyco International Ltd. Company

NEW SIDEWALK TO WASHINGTON STREET

BRIDGE STREET

MBTA DRIVE

EAST RAMPS

PROP SALEM COURTHOUSE

N/F CITY OF SALEM

FEDERAL STREET

0+76.751

0+60

0+40

LIMIT OF PAVING STA 0+41.386

N/F SIXTY FIVE FEDERAL ST. NOM. TRUST TR.

N/F TWENTY FOUR NORTH ST. REALTY TRUST

NORTH STREET

LYNDE STREET

LOCATION 1

NORTH STREET

WEST RAMPS

PATH REMAINS

PROP TS2, TYPE 1 CONTROLLER

1950 CITY LAYOUT

N/F FRANCIS JOSEPH MURPHY

N/F GREGORY J. GORDON

LIMIT OF

Conc. Wall

W/ Metal Rail

Grass

Hedges

SWEL

BWLL

SYEL

SYCL

DYCL

SWLL–30m

SWLL–61m

SWLL–36.5m

15+60

+73.129 PT

15+80

16+00

16+20

16+40

16+60

17+00

17+20

+31.824 PT

+84.427

1+20

1+00

7.6m MA

12.2m MA

8.5m

8.0m

6.0m

4.5m

4.74m

2.3m WOOD

2.5m CW

3.5m

#109A–3

A

B

C

D

E

F

G

H

J

FIGURE 2 – PROPOSED PEDESTRIAN ACCOMMODATIONS & IMPROVEMENTS

PROPOSED SIDEWALK ALONG JUDICIAL CENTER (NORTH STREET TO BRIDGE STREET)

PROPOSED SIGNALIZED PEDESTRIAN CROSSINGS, NORTH STREET & FEDERAL STREET

PROPOSED UNSIGNALIZED PEDESTRIAN CROSSINGS

FUTURE SIGNALIZED PEDESTRIAN CROSSING BRIDGE STREET (M-D)

SIDEWALKS

EarthTech

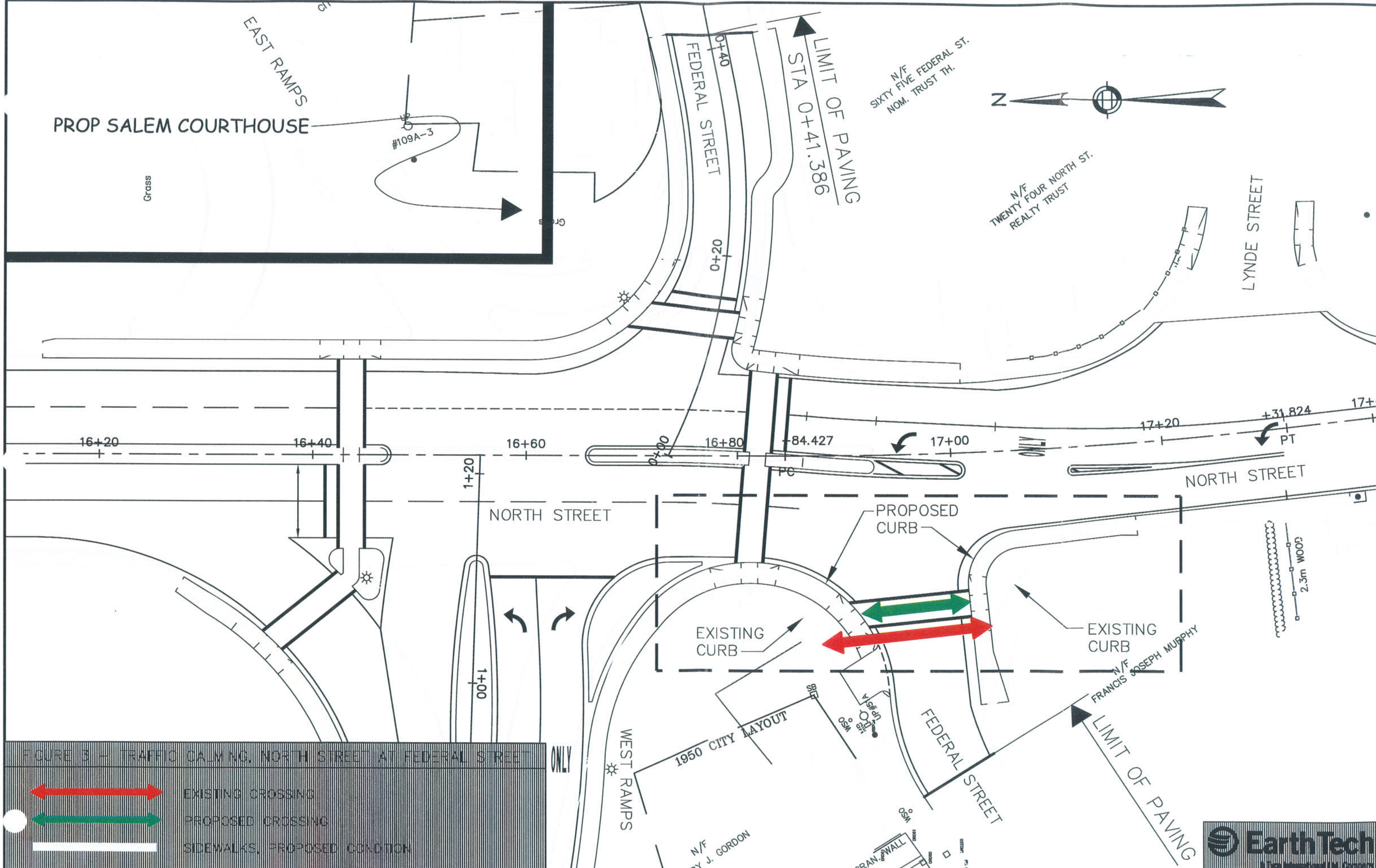

FIGURE 3 – TRAFFIC CALMING, NORTH STREET AT FEDERAL STREET

A3.3 Memo:
DCAM Proposed Trial Courts Expansion

Salem, Massachusetts
Pedestrian Improvement & Accommodations and Traffic Calming
February 7, 2007

M E M O

Date: February 7, 2007

To: Gail Rosenberg, DCAM

From: Nick Rubino, Earth Tech

Subject: DCAM, Proposed Trial Courts Expansion
Salem, MA
Pedestrian Improvement & Accommodations and Traffic Calming

The proposed Trial Courts Expansion in Salem, MA will involve the removal of the East Ramps at the interchange of North Street with Bridge Street. This will require a new traffic signal at the intersection of North Street, Federal Street, and the West Ramps. Included in the new traffic signal will be improved pedestrian accommodations. A fully-actuated traffic signal is being proposed to control the traffic movements at the intersection, and provide improved pedestrian accommodations across North Street and through the intersection. This memorandum will summarize and describe the proposed improvements and also explain how these improvements tie into pedestrian accommodations at adjacent intersections.

EXISTING CONDTIONS

The existing pedestrian amenities (see figure 1) within the North Street/Federal Street intersection and the North Street/Bridge Street interchange include the following:

- Sidewalks exists along both sides of North Street and Federal Street, and along the south sides of both the East Ramps and West Ramps to provide access from North Street to Bridge Street. Also, there is a sidewalk along both sides of Bridge Street at the existing MBTA Drive intersection. The sidewalk along the south side of Bridge Street extends east to Washington Street, while the sidewalk along the north side ends at the northbound Bridge Street ramp onto North Street.
- There is an existing mid-block pedestrian signal on North Street between Federal Street and Lynde Street. This signal is push button actuated, meaning that the signal will not accommodate pedestrians and stop the North Street traffic unless the button is pushed. It was to be replaced as part of the current North Street project by MassHighway.
- There is an unsignalized mid-block crosswalk on North Street between the Bridge Street ramps and Federal Street. This unsignalized crossing was to be removed as part of the North Street project by MassHighway.
- There are unsignalized crosswalks to cross both sides of Federal Street at North Street, as well as crosswalks to cross both the East Ramps and West Ramps at North Street.
- On Bridge Street there are two unsignalized mid-block crosswalks, one between the West Ramps and the overpass and one between the East Ramps and Washington Street.
- There is a pathway that connects the West Ramps to Bridge Street approximately 60 feet west of North Street. There is no sidewalk along the West Ramps to access the pathway.

PROPOSED MODIFICATIONS AND RESULTING CONDITIONS

As mentioned above the reconstruction of the North Street/Federal Street/West Ramps intersection will include a new traffic signal to control the vehicle movements through the intersection. Incorporated into the signal will be pedestrian signal heads and push buttons to allow pedestrians to safely cross North Street and Federal Street. Pedestrian signals and crosswalks will be provided to cross North Street on both sides of the new intersection. The existing mid-block pedestrian signal on North Street between Federal Street and Lynde Street will be removed and replaced by the crossing on the south side of the intersection. Pedestrian signals and a crosswalk will also be provided to cross the east leg of Federal Street at North Street. An additional crosswalk outside of the intersection will be installed to cross the west leg of Federal Street. As a result, the existing single pushbutton pedestrian signal across North Street will be replaced by three signalized pedestrian crossings in this area, thus improving overall pedestrian safety.

Along with the improvements at North Street, a walkway along the proposed courthouse site will be provided that will allow pedestrian access from the North Street/Federal Street Intersection to Bridge Street near the existing MBTA Driveway. This walkway will replace the existing East Ramps sidewalk that is being removed. It will provide a safer connection from North Street to Bridge Street as the walkway will no longer be immediately adjacent to vehicular traffic.

The pathway west of North Street will remain. It should be noted that to walk from the Federal Street neighborhood to the MBTA Station, the safer and shorter route is to use the new signalized crossing of North Street and the walkway from North Street to Bridge Street.

A separate MassHighway project that is currently under design (Bridge Street Reconstruction) involves the installation of a new traffic signal at the Bridge Street/MBTA Drive intersection. The proposed signal there will include pedestrian push buttons and signal heads as well as ramps and crosswalks to safely cross Bridge Street.

Based on the information above, in the future, pedestrians wanting to access the MBTA station from North Street will be able to safely cross North Street at the North Street/Federal Street/West Ramps signal, continue down the proposed walkway at the courthouse site and safely cross Bridge Street at the proposed Bridge Street/MBTA Drive signal. After the North Street Project is complete, and prior to completion of the Bridge Street Project, pedestrians from North Street will use the walkway to Bridge Street, then follow the existing sidewalk on the south side of Bridge Street to Washington Street, and safely cross Bridge Street and access the MBTA station at the recently completed signalized intersection of Bridge Street and Washington Street.

Figure 2 displays the proposed pedestrian accommodations and improvements.

The proposed pedestrian accommodations will result in an overall improvement from the existing features. Up to date technology, such as modernized push buttons and pedestrian signal heads with LED lenses will be provided at the signalized crossings. Also, this intersection will be coordinated with the signal at the intersection of North Street at Essex Street, which will better regulate the traffic flow in the area. Better regulated vehicle movements provide for the best pedestrian safety within roadways and intersections.

TRAFFIC CALMING

The North Street at Federal Street intersection along the west side of North Street currently has a wide opening that allows southbound traveling vehicles the ability to make right turns onto Federal Street at higher than appropriate speeds. This is a safety issue, particularly for pedestrians trying to cross Federal Street. Carrying this high rate of speed around the corner onto Federal Street can also lead to vehicles maintaining the excessive speed as they travel west on Federal Street.

This project proposes to narrow the intersection along both sides of Federal Street, which will physically force any right turning vehicles to travel at a slower, more appropriate speed through the turn.

In addition, the narrowing of the Federal Street opening provides a shorter crossing distance for pedestrians of about 20 feet. Shorter crossing distances are safer, as pedestrians return to the sidewalk faster.

This issue was first brought to our attention by the Federal Street neighborhood during the North Street Project. As part of the traffic signal improvements related to the Court House Project, this traffic calming measure has been maintained.

Figure 3 displays the proposed intersection layout, as well as the proposed geometry.

A3.4 Memo: DCAM Proposed Trial Courts Expansion

Salem, Massachusetts
MBTA Garage Data—Traffic Analysis
February 8, 2007

M E M O

Date: February 8, 2007

To: Gail Rosenberg, DCAM

From: Nick Rubino, Earth Tech

Subject: DCAM, Proposed Trial Courts Expansion
Salem, MA
MBTA Garage Data – Traffic Analysis

As requested, Earth Tech has conducted an additional traffic analysis that includes the impacts of the proposed MBTA parking garage to be located across Bridge Street from the proposed Trial Court expansion in Salem, MA. According to the August, 2004 TAMS/Howard Stein-Hudson report, *15% Design Report,* the proposed garage includes the expansion of the existing surface parking facility to 1,000 spaces, 750 to be open to general public parking and 250 to be reserved for Courthouse use during business hours. The report assumed that a second driveway will be required to access the proposed garage given the increase in demand. According to the report, the additional access will be at the Bridge Street/Washington Street intersection. This will result in a fourth leg being added to this signalized intersection. This memorandum summarizes the impacts of adding the traffic generated from the proposed garage onto the previously analyzed Build Analysis Scenario (2016 volumes with Court House) network covered in Earth Tech's November 2006 Functional Design Report for MassHighway on the proposed changes to the North Street/Bridge Street interchange. The proposed garage was added to the 2016 build with Court House scenario because the schedule for the garage is after the court house project is complete. Earth Tech's analysis includes an evaluation of the origins and destinations of the new trips, as well as properly distributing these trips through the traffic study area.

ORIGIN AND DESTINATION

According to the TAMS/Howard Stein-Hudson report, the new parking garage will generate an additional 278 vehicle trips during both the AM and PM peak hours. This is the net increase in parking spaces from the existing lot (472) to the proposed lot (750). The majority of traffic generated by the Trial Courts occurs off peak, therefore no additional peak hour trips were assumed due to the increased 250 DCAM/Courthouse spaces. Also, traffic generated by the expanded Trial Court is already included in the 2016 Build Analysis Scenario. It was assumed that 278 trips would be entering the garage during the AM peak hour and 278 trips would be exiting the garage during the PM peak hour. Each of the assumptions above came from the TAMS/Howard Stein-Hudson report. A license plate survey was conducted in September, 2003 at the existing Salem MBTA Commuter Station parking lot, to gain an understanding of the origins of the commuters. The table below summarizes the results of the survey in terms of the percent from each community to the commuter lot.

Salem MBTA Station Commuter Origins

	Beverly	Danvers	Peabody	Salem	Other	Total
Percent	4	11	26	44	15	100

This information was used to distribute the new 278 trips within the roadway network for both peak hours. The additional trips were distributed as follows:

- 106 trips to/from the north traveling along North Street (Route 114).
- 45 trips to/from the west traveling along Bridge Street and Boston Street.
- 49 trips to/from the east traveling along Bridge Street (Route 1A).
- 39 trips to/from the southwest traveling along Essex Street (Route 107).
- 39 trips to/from the southeast traveling along Washington Street (Route 114).

These trips were added to the turning movements at the appropriate intersections to properly distribute them within the study area, to/from the proposed parking garage.

TRAFFIC CAPACITY ANALYSIS

Capacity and simulation analyses were performed with the additional 278 trips included in the 2016 Build with courthouse scenario for both the AM and PM peak hours.

Utilizing the proposed MHD Bridge Street improvement plans, the following assumptions/modifications were made to lane usage regarding both the access to the garage, and the roadway network:

- Left turns into the garage from Bridge Street would only be made at the existing Bridge Street/MBTA Drive access. The proposed lane usage at the Bridge Street/MBTA Drive intersection was revised to include an eastbound left turning lane.

- The lane configuration for the proposed second driveway exiting the garage at the Bridge Street/Washington Street intersection will consist of an exclusive left turning lane and a thru/right turning lane. Figure 1 displays the intersection layout before the garage is built and proposed layout once the garage is in place.

- No additional capacity (lanes) were added beyond what is already in place or what is being proposed (by MassHighway). We only changed lane usage and did not add any lanes.

These assumptions came from both Earth Tech, as well as the TAMS/Howard Stein-Hudson report.

As mentioned above, the traffic analysis and evaluation involved adding the new trips from the proposed MBTA parking garage into the 2016 Build with court house Scenario. The primary findings and resolutions from the analyses were as follows:

AM Peak Hour

- The additional 106 vehicles traveling south along North Street resulted in a somewhat longer queue approaching the West Ramps intersection. The simulation analysis revealed

that the queue will not back up to Mason Street; therefore no modifications were required.

- The additional 39 vehicles traveling north along North Street make a left turn at the New North Street/Federal Street/West Ramps intersection onto the West Ramps. This resulted in a somewhat longer queue that occasionally exceeded the storage length of the proposed left turning lane. Additional green time was then provided to the northbound left turn to resolve this and prevent the queue from impacting the adjacent signal at Essex Street. This additional green time was taken away from the Federal Street westbound approach. The delay for the Federal Street westbound approach will be somewhat higher, but the queue will still be a manageable length.

- There will be an additional 145 vehicles traveling down the West Ramps towards Bridge Street making a right turn onto Bridge Street. The 145 is the result of the 106 and 39 vehicles previously mentioned. In order to offset the impact of this additional traffic and to prevent a back up along the ramp to North Street, additional green time was given to the ramp approach. This required less green time to be given to the Bridge Street approach, resulting in a somewhat higher delay for the Bridge Street approaches. Given the two lane capacity for the eastbound approach, the queuing will not be problematic and most vehicles will travel through the intersection in one signal cycle.

- There will be an additional 190 vehicles making a left turn into the MBTA Drive from eastbound Bridge Street. The 190 is a result of the 145 vehicles from the West Ramps and 45 additional vehicles traveling east along Bridge Street. As mentioned above, an exclusive left turning lane was included for the eastbound approach. This was done to accommodate the increase in left turning traffic. The proposed MHD improvements for the Bridge Street project allows for the left turning lane to be installed within the proposed curb to curb width without any new physical widening of Bridge Street. This will require the westbound left turning lane at the Bridge Street/West Ramps intersection to be shortened to about half of its length. The simulation analysis reveals that there will still be sufficient storage for the westbound left turns at the Bridge Street/West Ramps intersection.

- The addition of the second MBTA garage access at the Bridge Street/Washington Street intersection will result in 15 exiting vehicles, and 88 entering vehicles. The 88 is a result of 49 right turns from Bridge Street and 39 straight through movements from Washington Street. It was assumed that almost all of the garage exiting vehicles would continue to use the existing Bridge Street/MBTA Drive. An additional phase for the Bridge Street/Washington Street signal will be required for the exiting vehicles, but given the low volume during this peak hour, the intersection will operate similar to the 2016 build with Court House condition without the access.

PM Peak Hour

- The main impact during the PM peak hour will be the 106 vehicles traveling north along North Street. It was assumed that 100 of these vehicles would turn right out of the second MBTA driveway at the Bridge Street/Washington Street intersection and then continue up the existing Bridge Street ramp onto North Street. This means that most of

the traffic generated from the new MBTA garage will not travel through North Street/West Ramps/Federal Street intersection during the PM peak hour. The simulation analysis reveals that traffic will occasionally back up from North Street onto Bridge Street, blocking the westbound Bridge Street traffic. This negative impact is directly related to the additional MBTA garage traffic and would have occurred without the DCAM project.

- In addition to the 100 vehicles exiting the new MBTA garage driveway to the right, it was assumed that 88 vehicles would exit straight and to the left. Of the 88 vehicles, 39 will go straight onto Washington Street and 49 will go left heading eastbound on Bridge Street. As previously mentioned, an additional phase will be required at the Bridge Street/Washington Street intersection. The higher exiting traffic during the PM peak hour results in the signal at the intersection operating less efficiently. This will result in longer queues along Bridge Street in both directions. The simulation analysis reveals that the eastbound queue occasionally backs up as far as the existing MBTA Drive access, and almost always backs up past the existing East Ramps intersection. Based on these results, it was determined that the removal of the East Ramps intersection, will provide much better operations along Bridge Street than if the intersection remained and was signalized, as proposed by the MassHighway project.

SUMMARY

The results of Earth Tech's analysis reveals that even with the additional traffic generated from the new MBTA parking garage, the proposed mitigation improvements from the DCAM project will provide the same or improved operations in the study area.

Certain modifications (described above) will need to be made by the MBTA or MHD to both the existing and proposed intersections and roadways in order to provide the optimal traffic flow through the study area. The most notable impact (backups along Bridge Street and the northbound Bridge Street ramp onto North Street) are directly related to the proposed MBTA garage traffic and they are not a result of the proposed improvements from the DCAM project.

Ultimately, even with the MBTA Garage, the removal of the East Ramps intersection has a positive impact for the study area, particularly along Bridge Street.

Even though additional traffic and some delays for some of the intersection approaches in the study area result from adding the MBTA Garage to the 2016 build with Court House scenario, the overall traffic flow will be still be much better with the East Ramps removed, and the proposed mitigation improvements at the West Ramps.

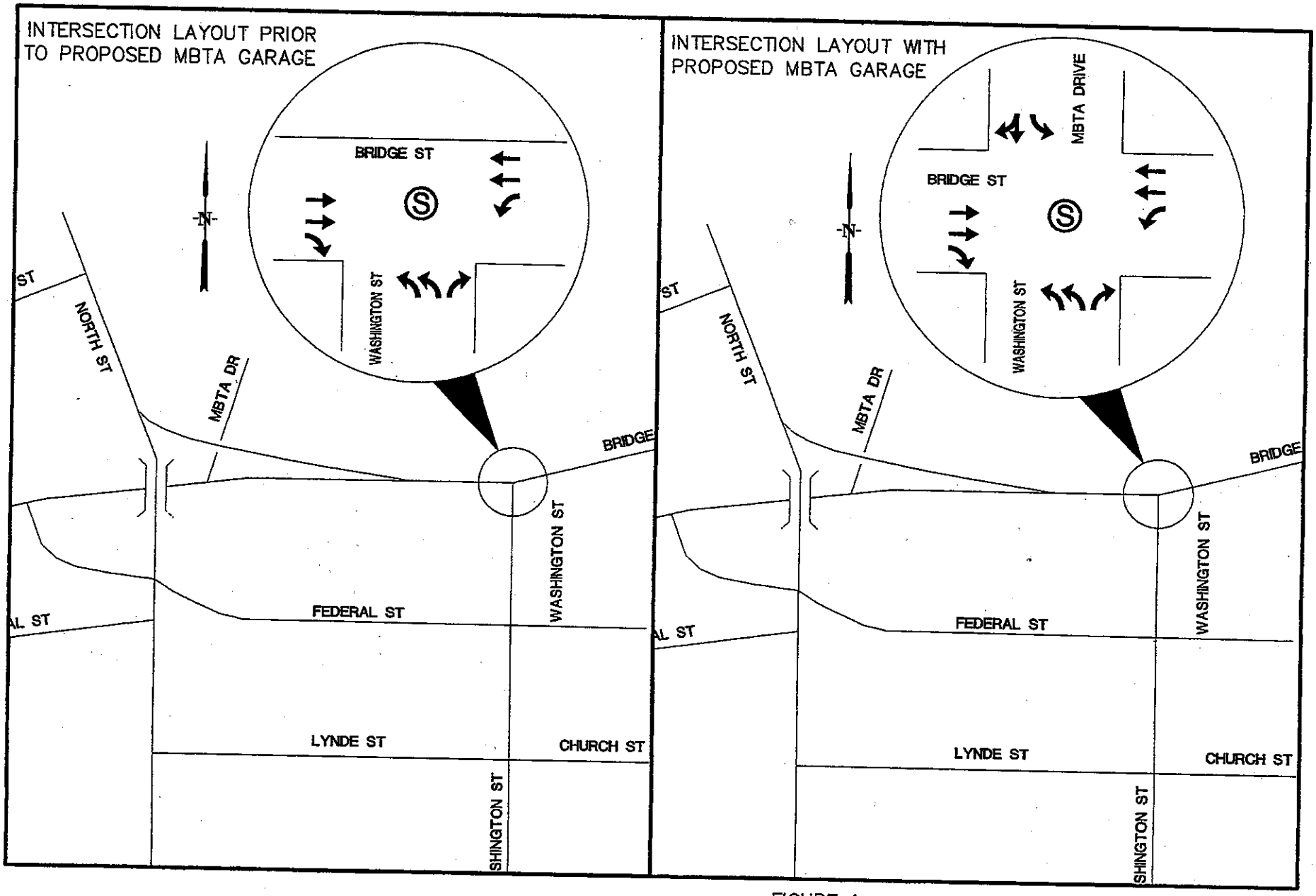

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FIGURE 1
BRIDGE STREET/WASHINGTON STREET LAYOUT
WITH AND WITHOUT MBTA GARAGE

A3.5 Functional Design Report: Proposed Construction of a New Trial Court Facility

J. Michael Ruane Judicial Center
Salem, Massachusetts
Earth Tech, Inc.
November 2006

FUNCTIONAL DESIGN REPORT

PROPOSED CONSTUCTION OF A NEW TRIAL COURT FACILITY
J. MICHAEL RUANE JUDICIAL CENTER
SALEM, MA

Prepared for:
Massachusetts Highway Department

Prepared by:
Earth Tech, Inc.
300 Baker Avenue
Concord, MA 01742

November 2006

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1.0 INTRODUCTION

The Massachusetts Division of Capital Asset Management (DCAM) is proposing to expand the Trial Court facilities within Salem, Massachusetts. The expansion includes the construction of a new building approximately 190,000 square feet that will house the Superior, District, Housing and Juvenile courts. This area could accommodate a small growth in staff and court use, but neither is anticipated to occur. The increase in the building area is due to complying with the latest design standards and safety regulations, not because of an increase usage or additional court facilities. Currently, the Superior Court is located on Federal Street and will be moved into the new court building. The Registry of Deeds currently shares the building on Federal Street with the Probate and Family Court. This building is being renovated. The Registry of Deeds is being relocated from its courthouse site to another site within Salem.

The proposed location of the new building is the southeast corner of the Bridge Street/North Street (Route 114) interchange, which will result in the elimination of the East Ramps that connect the two roadways. These ramps currently allow for northbound North Street traffic to access Bridge Street, and for eastbound Bridge Street traffic to access northbound North Street. North Street currently overpasses Bridge Street to form the grade separated interchange.

This Functional Design Report was prepared to evaluate the impacts of removing the East Ramps and reassigning the affected ramp movements within the interchange. The evaluation included an analysis of the impacts to the interchange itself, as well as to the key surrounding intersections within the North Street/Bridge Street influence area.

To properly determine the impacts to the North Street/Bridge Street influence area, a study area was defined that included surrounding intersections along Bridge Street and North Street, as well as intersections within Salem's Central Business District (CBD) along Washington Street and Norman Street. Figure 1 shows the project study intersections, which are also listed below:

- Bridge Street at Flint Street
- Bridge Street at North Street SB Ramps
- Bridge Street at North Street NB Ramps
- Bridge Street at MBTA Driveway
- Bridge Street at Washington Street
- Bridge Street at Saint Peter Street
- North Street at Mason Street
- North Street at Bridge Street Ramps (Both Directions)
- North Street at Federal Street

- North Street at Lynde Street
- North Street at Essex Street
- Summer Street at Chestnut Street/Norman Street
- Norman Street at Crombie Street
- Norman Street at Margin Street
- Washington Street at Federal Street
- Washington Street at Lynde Street/Church Street
- Washington Street at Essex Street
- Washington Street at Norman Street/New Derby Street

Due to its proximity to the courthouse site, the North Street/Federal Street intersection was examined closely.

The project study area is a fairly large area that surrounds the Court facilities around both Bridge Street and North Street. Many of the intersections will be impacted by the various roadway improvement projects planned for the city, each at different levels of design. Specific projects and their impacts on the study intersections were incorporated into this study based on the level of certainty towards the completion of a particular project. Information regarding the status of a project was obtained from multiple sources, including MassHighway, the City of Salem and the MBTA.

The primary analysis conducted in this study was directed at the impacts the Trial Court project has on the reassignment of traffic due to new travel patterns that result from circulation changes. A key part of the analysis, though, was combining the various proposed projects to evaluate the different impacts each had in conjunction with one another.

An earlier DCAM report, *Draft Functional Design Report, Proposed Trial Court Expansion,* prepared by Edwards and Kelcey, Inc. in 2005 evaluated different alternatives at the North Street and Bridge Street ramps intersection to determine the optimal roadway configuration and traffic control. The preferred alternative included the following general features:

- A left turning lane on North Street to allow northbound traffic to turn left onto the West Ramps to access Bridge Street.
- Realigning Federal Street to allow the westbound approach to travel across North Street to access the West Ramps, and to go right to travel northbound on North Street. This alternative did not allow for left turns onto southbound North Street.
- Widening of the West Ramps to provide left and right turning lanes to allow the ramp traffic from Bridge Street to access both directions of North Street.

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FIGURE NO. 1
LOCUS MAP
DCAM/SALEM COURTHOUSE

- Signal control at the North Street/Federal Street intersection to regulate all of the movements.

Along with operational considerations, the preferred alternative was selected based on discussions with DCAM and Salem officials to satisfy their criteria and needs for this project. This alternative, with some minor modifications, was evaluated as part of this study. More detail as to the exact geometric layout and operations of the intersection is described later in this report.

This study included field observations of existing roadway and traffic conditions; a review of previous studies/reports and data; and traffic capacity analyses and recommendations.

2.0 EXISTING CONDITIONS

Roadway Characteristics

The following section describes the characteristics of the major roadways within the study area.

North Street (Route 114) is functionally classified as an urban arterial that connects the downtown area of Salem to the City of Peabody to the northwest. Within the area of the project site, the total roadway width is around 17 meters, which includes four +/- 4.3 meter wide lanes (two in each direction) and no defined shoulders. South of the project site there is an outdated pedestrian signal between Federal Street and Lynde Street. Between Lynde Street and Essex Street, parking is allowed along the east side of the roadway. The roadway pavement is in fair condition and the pavement markings appear to be in good condition. In addition to the pedestrian signal, there is an unsignalized mid-block crosswalk between the Bridge Street ramps and Federal Street. The posted speed limit on North Street is 50 kph (30 mph) within the project area.

Bridge Street is functionally classified as an urban arterial west of Washington Street and a primary arterial east of Washington Street. Within the project area Bridge Street consists of two 6.1 meter wide travel lanes, one in each direction. On street parking is generally not permitted on Bridge Street within the project study area, but west of the project site several vehicles park within the unpaved area off of the roadway along the north side of the street. Most of these vehicles are parked in this area to use the MBTA commuter rail station. Curb side parallel parking occurs adjacent to the West Ramp intersection also along the north side of the street. There are several utility poles located on both sides of Bridge Street many of them are within 0.15 meters of the roadway. The roadway pavement is in fair to good condition with some cracked and uneven sections. The pavement markings along the roadway, with the exception of the double yellow center line, are generally faded.

Federal Street is functionally classified as a local roadway that connects the downtown area of Salem with North Street east of the project area, and is primarily residential west of the project. It is a one way street in the east to west direction. The pavement width varies between 6.1 and 12.2 meters within the project area, and the pavement is generally in fair condition.

Intersection Characteristics

The following section describes the characteristics of the key intersections within the study area. Even though many intersections were included and evaluated as part of the study because of the make-up of the area, only those intersections felt to be directly impacted by the project are described in great detail.

North Street at Federal Street

This intersection is a four-legged unsignalized intersection with stop sign control for the Federal Street westbound approach. The North Street northbound approach is a 6.7 meter wide shared through/left lane that begins to open up from one lane to two lanes through the intersection. The North Street southbound approach provides a 3.6 meter wide through lane and a 3.6 meter wide shared through/right turn lane. The Federal Street westbound approach is a 7.6 meter wide lane that only allows right turns onto northbound North Street. There is also an exclusive slip lane near the intersection for the Federal Street westbound traffic to turn onto the East Ramps to access Bridge Street. The west leg of Federal Street is a 7.5 meter wide lane that is one way away from the intersection. A median on North Street prevents westbound Federal Street vehicles from making a left onto North Street or from crossing North Street to continue onto Federal Street. Immediately south of the intersection is a pedestrian signal that flashes green for the North Street approaches until actuated by a pedestrian at which time it displays a steady red and yellow indication. There are also crosswalks to cross both legs of Federal Street and a crosswalk just north of the intersection to cross North Street.

North Street at East Ramps

The East Ramps provide access to Bridge Street for northbound North Street traffic and westbound Federal Street traffic. They also provide access from Bridge Street onto northbound North Street. Only right turns are allowed onto and off of the ramps at this intersection. The East Ramps approach to North Street is controlled by a stop sign. North Street consists of two northbound lanes at the intersection with each lane being around 4.0 meters wide. Both the approach and departure lanes of the ramp are approximately 6.0 meters wide. Sidewalks exist along North Street and along the east side of the Ramps.

North Street at West Ramps

The West Ramps provide access to Bridge Street for southbound North Street traffic, as well as access from Bridge Street onto southbound North Street. Similar to the East Ramps, only right turns are allowed onto and off of the ramps. The West Ramps approach to North Street is under stop sign control. North Street consists of two southbound lanes at the intersection with each lane being around 4.0 meters wide. The ramp approach is around 6.0 meters wide, while the departure lane is around 8.5 meters wide. Sidewalks exist along North Street and along the west side of the Ramps.

Bridge Street at West Ramps

As mentioned above the West Ramps provide access from southbound North Street onto Bridge Street. The West Ramps intersect Bridge Street to form an unsignalized T-intersection. The West Ramps approach consists of a left turn lane and a channelized right turn lane both under stop sign control. The left turn lane is approximately 6.0 meters wide, while the right turn lane is approximately 7.0 meters wide. The eastbound and westbound approaches to Bridge Street consist of two 6.1 meter wide lanes. The westbound approach is a shared through left turn lane, and the eastbound approach is a shared through/right turn lane. Given the width of the lanes, the westbound through traffic is able to pass the vehicles waiting to turn left onto the ramp. The eastbound right turn onto the ramp is channelized and is around 6.5 meters wide. Sidewalks exist along both sides of Bridge Street.

Bridge Street at East Ramps

The East Ramps provide access from northbound North Street to Bridge Street. The East Ramps approach to Bridge Street consists of a 6.0 meter shared left/right turn lane under stop sign control. The eastbound and westbound approaches to Bridge Street consist of two 6.1 meter wide lanes. Westbound left turns onto the ramp from Bridge Street are permitted, but are very difficult to make given the geometry of the intersection. Sidewalks are provided along both sides of Bridge Street.

Sight distance deficiencies exist at this intersection due to the North Street overpass bridge abutments to the west of the intersection. Drivers on the ramp approach to Bridge Street do not have adequate sight distance to the west to make a safe maneuver from the intersection and avoid a possible collision.

Bridge Street at MBTA Commuter Parking Lot Driveway

The MBTA access driveway for the Salem station intersects Bridge Street to form a T-intersection with the driveway approach under stop sign control. This intersection is located only about 30 meters west of the Bridge Street/East Ramps intersection. The commuter rail access road consists of one travel lane in each direction. The Bridge Street approaches consist of two 6.1 meter wide lanes. The eastbound approach is a shared through/right turn lane and the westbound approach is a shared through/left turn lane. Sidewalks exist along both sides of Bridge Street and along the access driveway.

Similar to the Bridge Street/East Ramps intersection, sight deficiencies to the west exists due to the North Street overpass bridge abutments.

The exact location of these key intersections is shown in Figure 2.

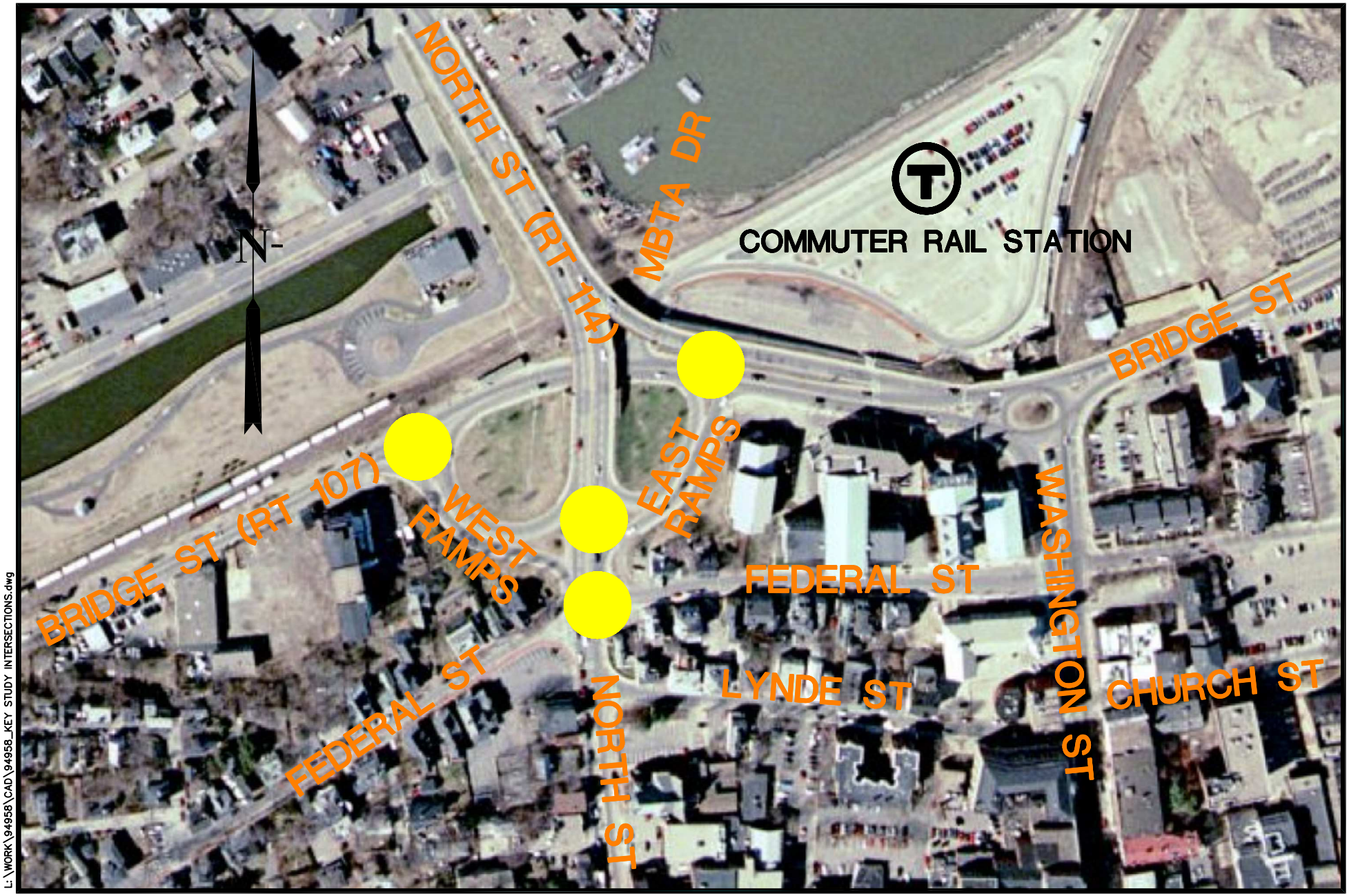

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FIGURE NO. 2
KEY STUDY INTERSECTIONS
DCAM/SALEM COURTHOUSE

2.3 Existing Traffic Volume Data

Traffic volume data were collected to assess the operational characteristics within the study area. The data also provide a basis for justifying traffic control measures such as signs, channelization, and traffic signals.

Automatic Traffic Recorder (ATR) counts and Manual Turning Movement (MTM) counts at the key study intersections were taken were taken in the fall of 2005 and projected one year ahead to 2006. Based on historical data, the volumes were projected with a 1% growth rate. For this area this is considered to be fairly conservative. The ATR counts were conducted to record weekday traffic volumes and the MTM counts were performed from 7:00 to 9:00 AM and 4:00 to 6:00 PM on a weekday to obtain the peak period data. The ATR counts were taken at the following locations:

- North Street, north of Bridge Street
- Bridge Street, west of North Street
- Bridge Street, east of Flint Street

The Average Daily Traffic (ADT) for an average 24-hour period is shown in Table 1. Complete ATR data are shown in the Appendix.

Table 1: Average Daily Traffic (2006)

LOCATION	PEAK HOUR VOLUME	24-HOUR VOLUME
North Street, north of Bridge Street	AM: 3005 PM: 3093	38,140
Bridge Street, west of North Street	AM: 1913 PM: 1750	25,381
Bridge Street, east of Flint Street	AM: 1403 PM: 1332	19,806

Since MTM counts were only collected for about half of the study intersections, additional resources were utilized to obtain count data for the other locations. For the most part, this consisted of the intersections within Salem's central business district.

The November 2005 CTPS study, *Transportation Improvement Study for Routes 1A, 114, and 107 and Other Major Roadways in Downtown Salem,* was used to obtain the necessary data. The CTPS counts were conducted in December 2003 and May 2004 and were balanced and seasonally adjusted as part of the study. These volumes were also adjusted with a growth rate of 1% per year to obtain 2006 volumes.

To determine if any of the data needed to be adjusted to account for seasonal fluctuation within the area, MassHighway data were researched. The MassHighway data revealed that during October and early November (Halloween season) traffic volumes are approximately four percent higher than the average month conditions. Based on this, the counts conducted in October 2005 were compared to historical counts, and those that showed a significant increase were recounted after the Halloween season.

The observed volumes were not adjusted, since this provided a conservative or above average 2006 analysis condition. These volumes were then compared with the CTPS volumes and where necessary they were balanced to properly represent the peak hour conditions throughout the entire study area. The existing weekday AM and PM peak hour traffic volumes are shown in Figures 3 and 4.

2.4 Accident Data

Accident reports were obtained from MassHighway for the key study intersections for 2003, 2004 and 2005. This data is summarized in Table 2. Accident rates were calculated per MassHighway methods, which are shown in the Appendix.

Table 2: Accident Data Summary (2003 – 2005)

Location	Total	Average per Year	Crash Rate
North Street/Federal Street	30	10.0	0.97
North Street/Bridge Street	44	14.7	0.57
Bridge Street/MBTA Drive	4	1.3	0.18
Total	**78**	**26**	

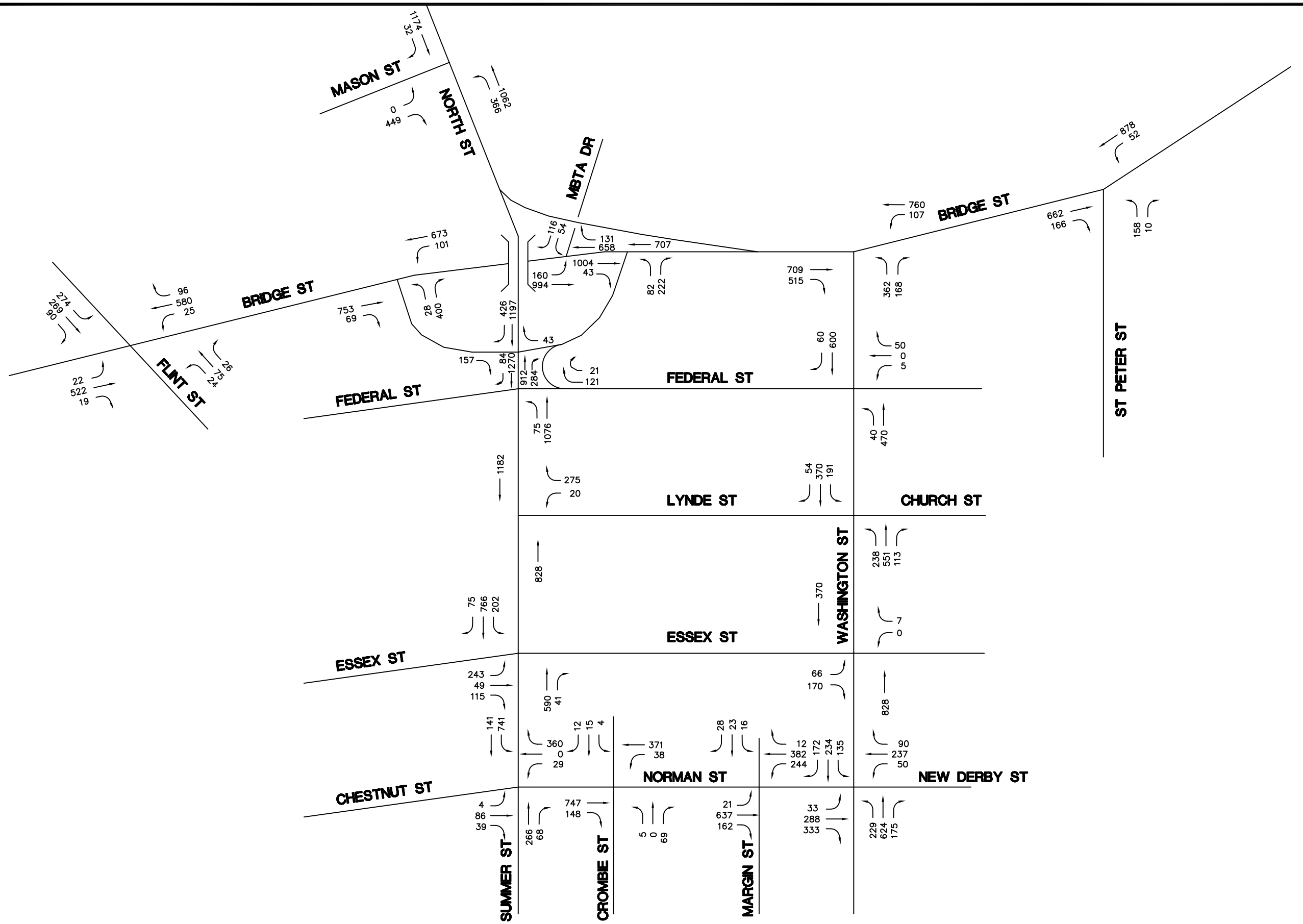

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FIGURE NO. 3
EXISTING 2006 AM PEAK VOLUMES
DCAM/SALEM COURTHOUSE

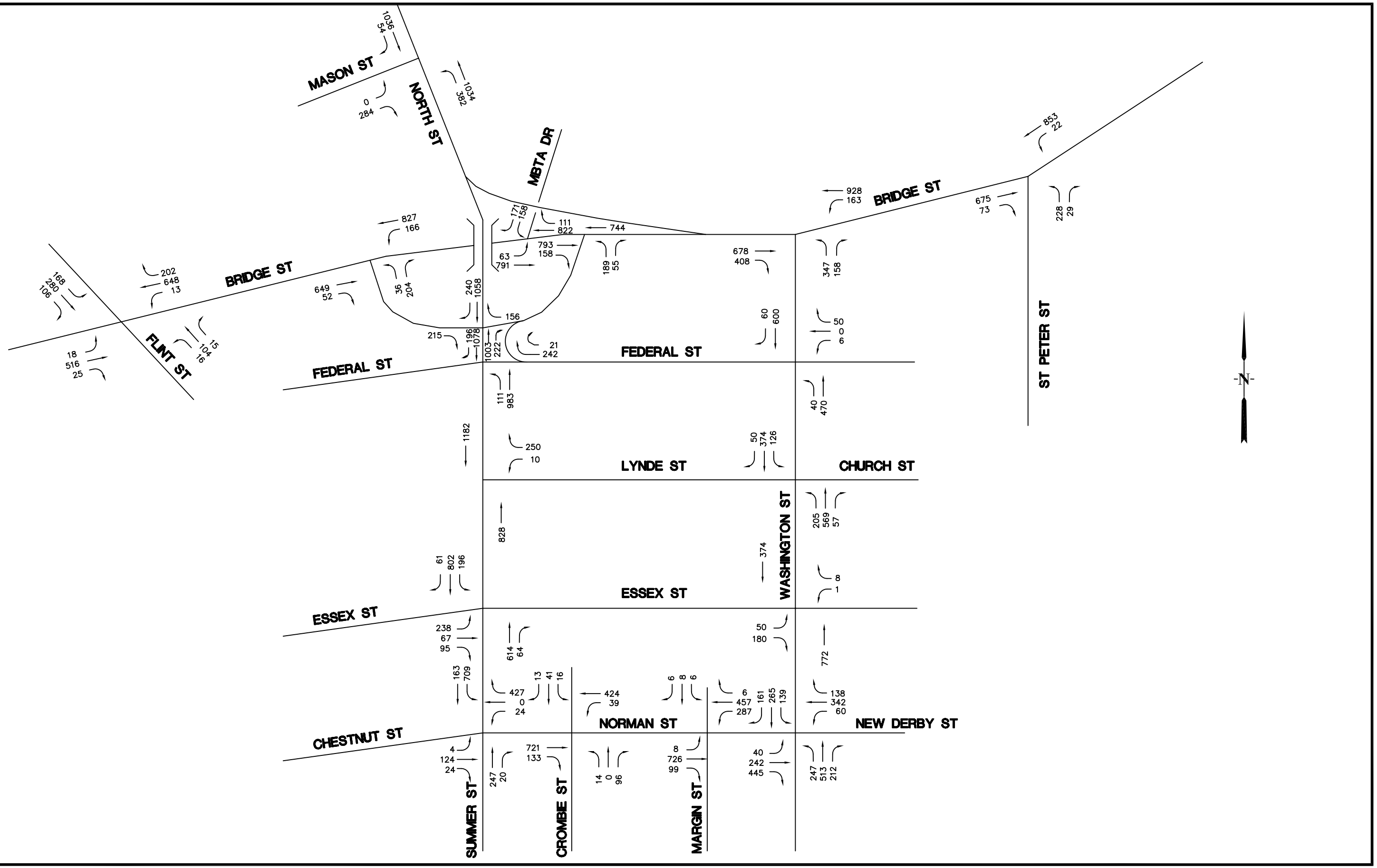

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FIGURE NO. 4
EXISTING 2006 PM PEAK VOLUMES
DCAM/SALEM COURTHOUSE

As shown in Table 2 there are approximately 15 accidents per year at the Bridge Street and North Street intersection, which is on the State's list of "Top 1000 Crash Locations." It should be noted that this intersection/interchange consists of multiple intersections, including Bridge Street at the East and West Ramps, as well as North Street at the East and West Ramps. These intersections combined have a high volume of traffic traveling through them, which results in a lower crash rate than expected for such a high number of accidents. Given this high number accidents, it is reasonable to conclude there are significant safety deficiencies at this intersection/interchange location. Various projects (including this one) are being proposed that should address these safety concerns.

The North Street and Federal Street intersection also has a high number of accidents, as well as a crash rate that is above both the MassHighway District 4 and statewide average crash rates for an unsignalized intersection. Given Federal Street's proximity to Lynde Street, accidents that occurred at North Street and Lynde Street were included as part as part of the North Street and Federal Street data. There were only a few accidents at Lynde Street. This intersection appears to have safety deficiencies as well, that should also be addressed by the various proposed projects.

A more detailed description of these projects is described later in this report.

3.0 FUTURE TRAFFIC VOLUMES AND CONDITIONS

3.1 Future Volumes

To evaluate potential improvement measures for roadways or intersections, accepted engineering design practice requires that the new design be based on expected future traffic flows through the facility. Typically, the horizon used is 10 or 20 years. For this study, the base year is 2006 and design year is 2016.

The Metropolitan Planning Council (MAPC) predicted that over the next two decades the North Shore region around Salem would experience steady growth in employment, negative growth in population and a minor increase in households. Even though these forecasts point to little or no growth in the region over the next 20 years, a review of the historical traffic data combined with recent transportation studies and the significant investment in transportation infrastructure in the area suggest a more conservative approach. Traffic flow is expected to increase as a result of improving the capacity within the study area; therefore the traffic volumes should increase.

For this study, a traffic growth rate of 1.0% percent per year was used for all traffic based on the historical data and information from previous studies. In addition to the growth rate, specific planned or approved development projects that would generate traffic through the study area were included. According to city officials, a handful of small projects including mixed use and residential developments are being proposed in the area. The traffic generated from these projects should be fairly low, but was still included in the general background growth for this study to account for all potential traffic impacts. Based on the 1.0% annual traffic growth rate and the traffic generated from the proposed developments, the manual turning movement counts were projected to 2016. This provides an approximation of future conditions on which to base an assessment of future operations.

3.2 No Build Conditions

There are several transportation improvement projects that have been proposed for Salem that will impact the downtown, as well as the immediate surrounding vicinity. Each of these projects was included for evaluation and analysis in this study, and all are assumed to be complete by the 2016 design year. Results of the evaluation are described later in this report. The following is a brief summary of the transportation projects:

<u>Bridge Street By-Pass Project</u>

Construction has begun on this MassHighway project that includes a new by-pass road that will provide a direct connection between downtown Salem to Beverly. The

new roadway will run adjacent to the MBTA commuter rail lines from the bridge into Beverly to Bridge Street just west of Saint Peter Street. The project also includes replacing the existing rotary at the Bridge Street/Washington Street intersection with a fully-actuated traffic signal and increasing capacity. At the Bridge Street/Saint Peter Street intersection, Bridge Street is being widened to provide additional capacity and a fully-actuated traffic signal is being installed.

Bridge Street (Route 107) Reconstruction Project between Washington Street and Flint Street

This is another MassHighway project that is currently at the 25% design stage. This project includes widening Bridge Street to provide two travel lanes in each direction and signalizing both the Bridge Street at MBTA Drive and East Ramps intersections. Increased capacity and upgraded signal operations are proposed for the Bridge Street and Flint Street intersection, as well.

North Street (Route 114)

This project includes the reconstruction of North Street from Essex Street to the Peabody city line. No capacity improvements are proposed, as this project will maintain the existing two lane cross section. A number of traffic signals are proposed to be upgraded and installed as part of the project, including one at the intersection of North Street and Mason Street and a pedestrian signal just north of Federal Street. Also, interconnection is proposed between the project signals, including a connection between the proposed pedestrian signal north of Federal Street and the existing signal at the North Street/Essex Street intersection.

The projected turning movement volumes for the 2016 No Build Conditions are shown in Figures 5 and 6.

3.3 Build Conditions

As mentioned above, the proposed location of the new courthouse is the southeast corner of the Bridge Street/North Street (Route 114) interchange. Building the courthouse at this location requires the elimination of the East Ramps. These ramps currently allow for northbound North Street traffic to access Bridge Street, and for eastbound Bridge Street traffic to access northbound North Street. To accommodate the traffic that will be impacted by the ramp removal, the North Street/Federal Street/West Ramps intersection will need to be reconfigured. As mentioned above, a feasibility study was conducted that determined the best layout and control for the intersection. The following is a description of the features for the proposed redesign of the intersection:

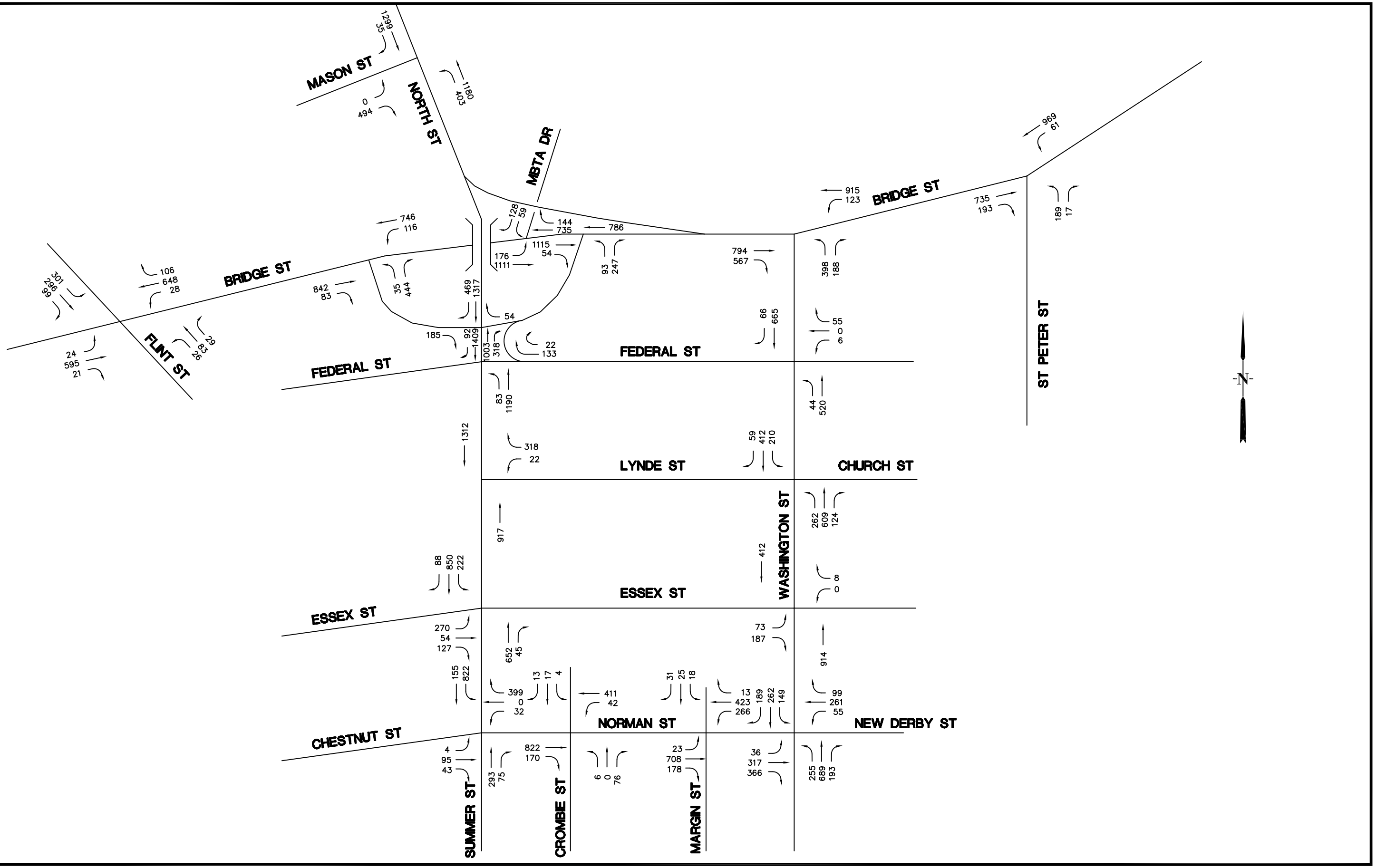

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FIGURE NO. 5
NO BUILD 2016 AM PEAK VOLUMES
DCAM/SALEM COURTHOUSE

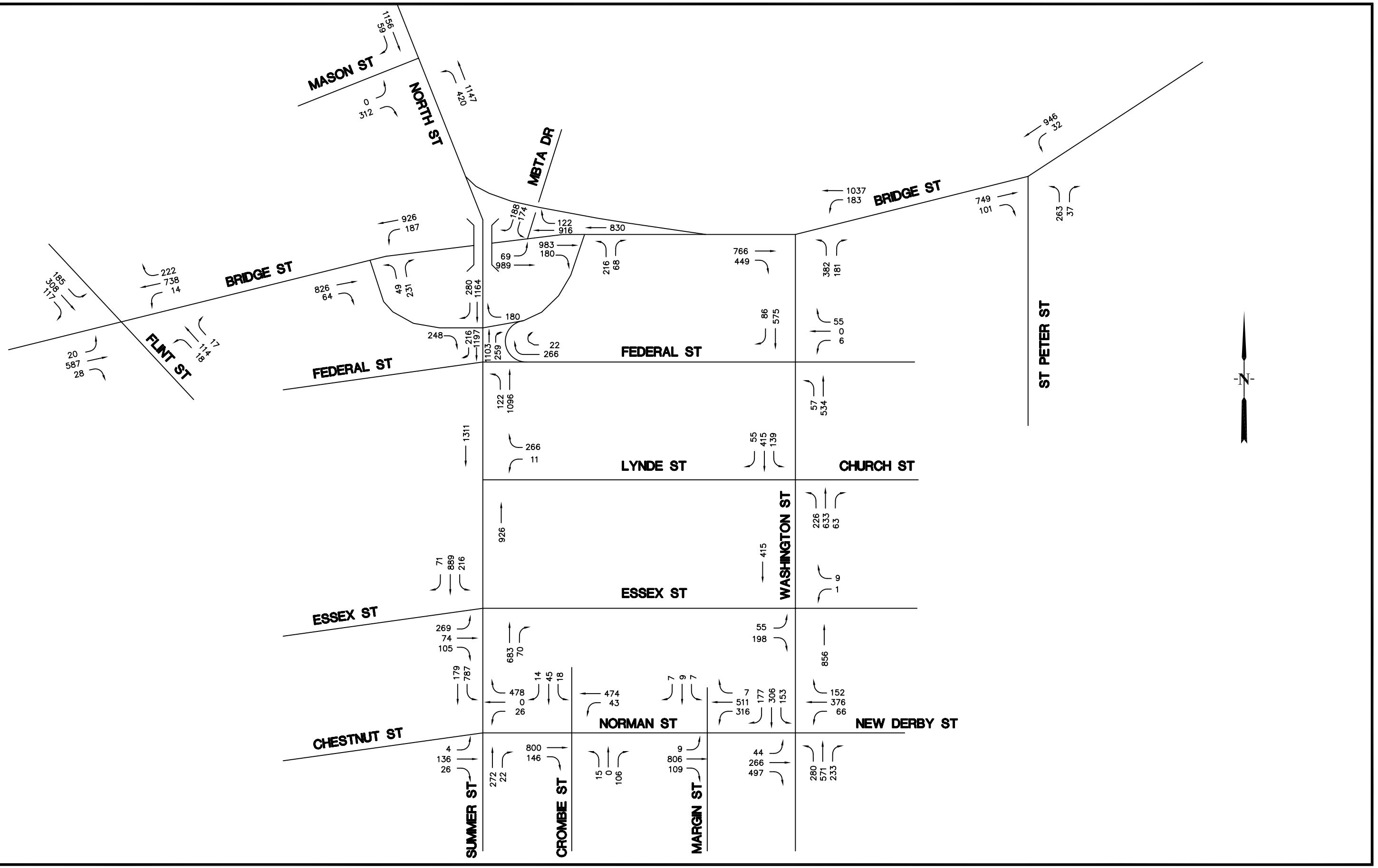

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FIGURE NO. 6
NO BUILD 2016 PM PEAK VOLUMES
DCAM/SALEM COURTHOUSE

- Realigning northbound North Street to provide a 61 meter left turning lane to allow northbound traffic to turn left onto the West Ramps to access Bridge Street. This will accommodate the northbound traffic that currently turns right onto the East Ramps to access Bridge Street. The northbound lane arrangement will consists of a through only lane and a left turn only lane.

- Realigning Federal Street and eliminating approximately 19 meters of the North Street center median to allow the westbound Federal Street traffic to travel across North Street to access the West Ramps. This traffic will also be permitted to go right to travel northbound on North Street, but will not be permitted to make left turns onto southbound North Street. Given land constraints, Federal Street cannot be realigned to be directly across the West Ramps. Therefore, an offset maneuver will need to be made for the Federal Street traffic to access the West Ramps.

- Widening of the West Ramps to provide left and right turning lanes to allow the eastbound ramp traffic from Bridge Street to access both directions of North Street. Also, the widened ramp will include two receiving lanes for traffic traveling from North Street to access Bridge Street.

- Signal control at the North Street/Federal Street/West Ramps intersection to regulate all of the movements. Three pedestrian crossings within the intersection are being proposed that will run concurrent with vehicular movements. One crossing Federal Street, and two crossing North Street on either side of Federal Street. The signal phasing will be as follows:
  - Northbound left turn advance; concurrent northbound/southbound with a permitted northbound left turn; eastbound ramp approach; and westbound Federal Street approach.

  As mentioned above, the Federal Street approach cannot be lined up with the West Ramps, therefore eastbound and westbound approaches must run as a split phase to maximize safety.

The Build Condition was evaluated and included the improvement projects that were described in the No Build Condition. The Build Condition also included signalization at the Bridge Street and West Ramps intersection, which will require traffic signal control to accommodate the additional traffic that will be traveling through the intersection. The results of the evaluation are described later in this report.

It should be noted that according to a 2001 DCAM study, *Salem Trial Courts Transportation Study*, prepared by Howard/Stein Hudson Associates, no additional

traffic is anticipated to occur during the peak hours, due to the new court facilities. Therefore, the Build Condition did not include new traffic distributed onto the roadway network as a result of the relocation of the Trial Court facilities. In addition, no reduction in the traffic volume and movements was included to reflect the relocation of the Registry of Deeds. The projected turning movement volumes for the 2016 Build Conditions are shown in Figures 7 and 8.

Traffic Signal Warrant Analysis

An analysis was performed to determine if traffic signal control is warranted at the project intersections under the criteria set forth in the Manual on Uniform Traffic Control Devices (MUTCD 2003 Edition). The MUTCD criteria reflects the results of significant research over the years as well as the collective experience of traffic engineers, and is used to evaluate the need or desirability of traffic signal control throughout the United States. It should be noted, however, that the criteria identifies conditions where traffic signal control may be appropriate rather than mandating such an installation. The criteria involve traffic volumes on the major and minor street over certain time periods, accident records, and delays. There are eight warrants for the installation of a traffic signal, which include three traffic volume related and five non-traffic volume related.

Results from a previous report, *Functional Design Report, Bridge Street Reconstruction, Salem MA* prepared by Rizzo Associates in 2003 showed that the intersection of Bridge Street and the East Ramps meets Warrants 1A (Eight-Hour Minimum Vehicle Volume), 1B (Eight-Hour Interruption of Continuous Traffic), 2 (Four-Hour Vehicle Volumes), and 3 (Peak Hour). The intersection of Bridge Street and the MBTA Drive meets Warrants 2 and 3. The report also recommends signalization at both intersections.

A separate warrant analysis was performed for the intersection of Bridge Street and the West Ramps under 2006 traffic volumes. The results of the analysis show that the intersection satisfies the criteria for Warrants 1A, 1B, 2 and 3.

Given that traffic will be rerouted through the North Street/Federal Street/West Ramps intersection due to this project, the peak hour warrant (Warrant 3) was analyzed to confirm the need for signalization. The results of the analysis show that the intersection meets the warrant.

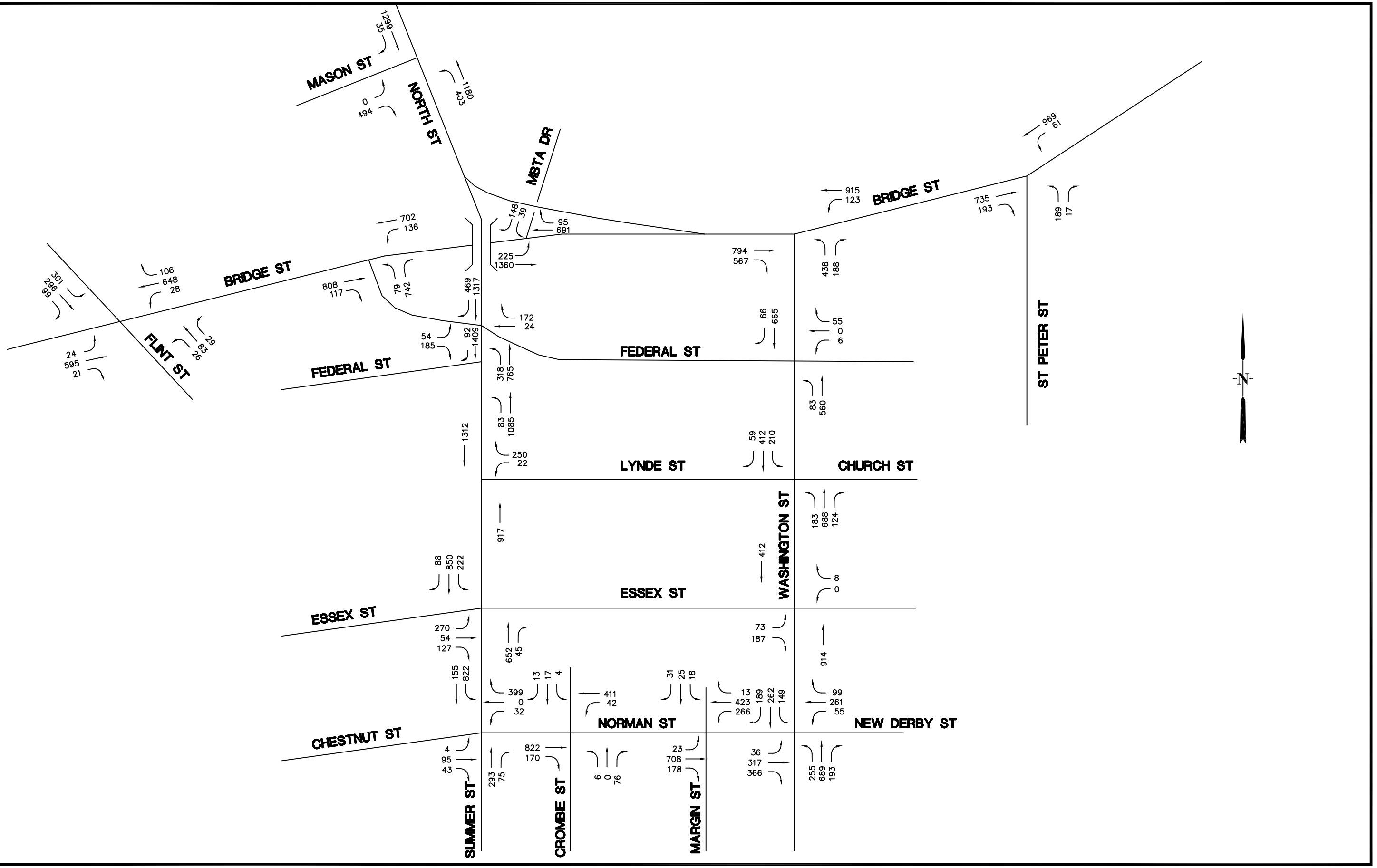

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FIGURE NO. 7
BUILD 2016 AM PEAK VOLUMES
DCAM/SALEM COURTHOUSE

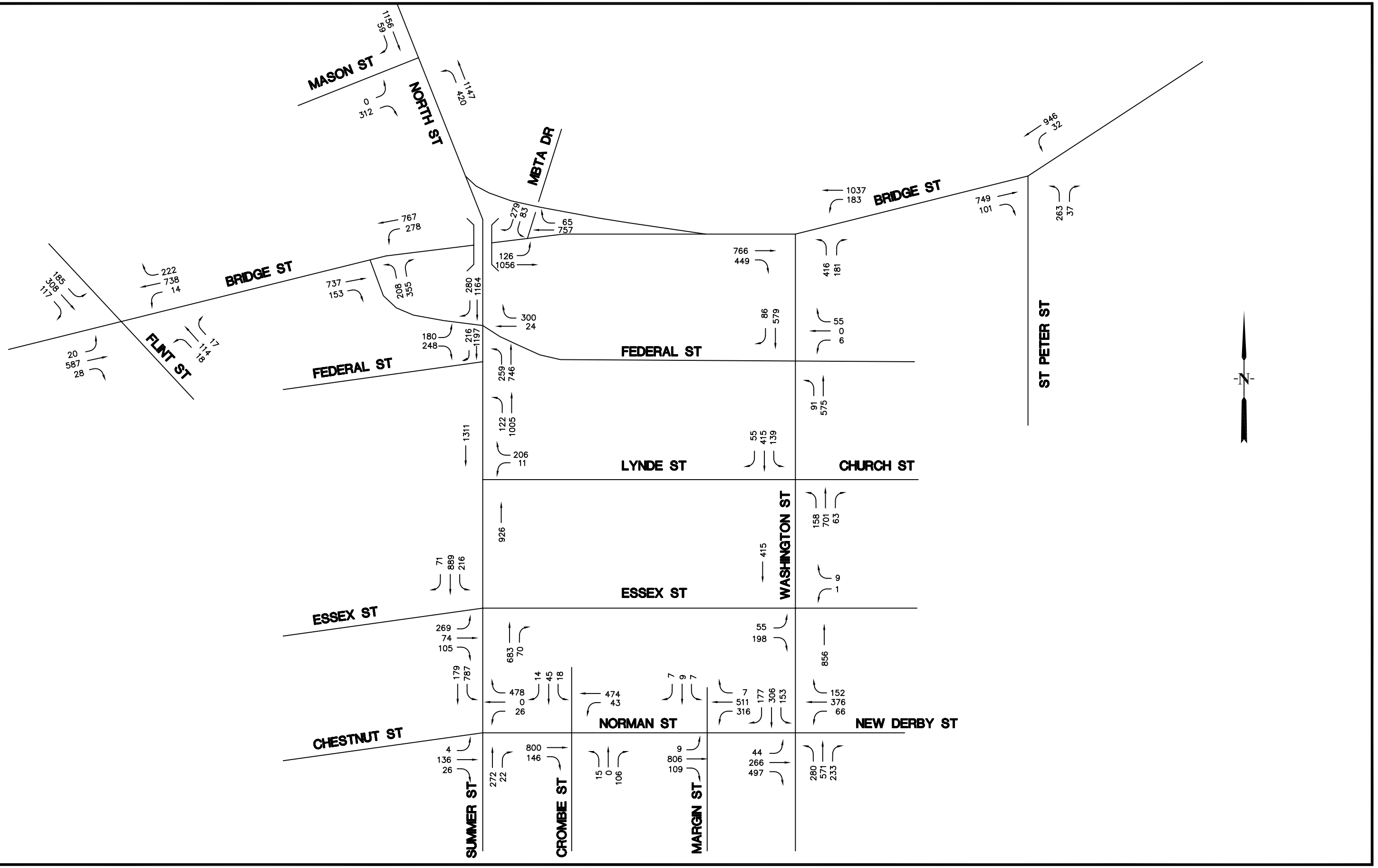

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FIGURE NO. 8
BUILD 2016 PM PEAK VOLUMES
DCAM/SALEM COURTHOUSE

4.0 TRAFFIC CAPACITY ANALYSIS

Capacity analysis was conducted to assess the quality of traffic flow at the key project intersections. This was performed for the Existing 2006 conditions, No-Build 2016 conditions (future volumes without courthouse project) and Build 2016 conditions (future volumes with courthouse project).

4.1 Level of Service Criteria

The capacity analysis was conducted using the procedures of the *2000 Highway Capacity Manual* (HCM) using the latest Synchro/SimTraffic software. The capacity analysis utilizes traffic volumes, geometrics, and traffic controls at the intersection to determine a Level of Service (LOS) rating from A through F indicating how the intersection is expected to operate, or the quality of the driving conditions. LOS A represents the best operating conditions or little to no delay, while LOS F represents the worst operating conditions or very high delay, traffic jam conditions. LOS E represents an intersection operating at capacity or at the limit of acceptable delay.

Level of service for signalized intersections is based on the average control delay in seconds per vehicle approaching the intersection. The methodology takes into consideration the effects of signal type, timing and phasing, and geometrics when determining the delay for the intersection approaches and the intersection as a whole.

Level of service at an unsignalized intersection is defined as the delay experienced by each minor movement, since the major movements are considered to be uninterrupted. The LOS for unsignalized intersections is not defined for the intersection as a whole.

Table 3 provides the level of service and the delay threshold criteria for both signalized and unsignalized intersections.

Table 3: Level of Service Criteria

	Average Delay per Vehicle (seconds)	
Level of Service	**Signalized Intersections**	**Unsignalized Intersections**
A	0 – 10.0	0 – 10.0
B	10.1 – 20.0	10.1 – 15.0
C	20.1 – 35.0	15.1 – 25.0
D	35.1 – 55.0	25.1 – 35.0
E	55.1 – 80.0	35.1 – 50.0
F	> 80	> 50

The traffic capacity results are shown in Tables 4 through 6 and the complete analyses are shown in the Appendix. The results also provide the queue lengths for each approach movement. The queue length represents the maximum back distance where vehicles stop during a signal cycle. The reported queue is the 95th percentile queue, which is the maximum backing of vehicles based on the 95th percentile traffic volumes.

Table 4: Summary of Capacity Analysis – Existing Conditions (2006 Volumes)

Study Location	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Level of Service	Delay (sec per veh)	Queue Length (feet)	Level of Service	Delay (sec per veh)	Queue Length (feet)
North Street/East Ramps						
East Ramps WB Right	C	15.5	13	D	25.5	85
North Street/West Ramps						
West Ramps EB Right	D	32.0	85	D	27.6	97
North Street/Federal Street						
North Street NB Left	B	14.1	16	B	14.2	23
Federal Street WB Right	F	320.1	262	F	670.7	613
Bridge Street/West Ramps						
Bridge Street WB Left	A	3.5	12	A	5.4	19
West Ramps NB Right	F	223.4	603	F	68.3	208
West Ramps NB Left	F	223.4	603	F	68.3	208
Bridge Street/East Ramps						
West Ramps NB Right	F	347.1	553	D	31.1	122
West Ramps NB Left	F	347.1	553	D	31.1	122
Bridge Street/MBTA Drive						
Bridge Street, EB Left	B	10.8	20	B	10.8	8
MBTA Drive, SB	F	576.8	462	F	941.7	972

Table 5: Summary of Capacity Analysis – No Build Conditions (2016 Volumes)

Study Location	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Level of Service	Delay (sec per veh)	Queue Length (feet)	Level of Service	Delay (sec per veh)	Queue Length (feet)
North Street/East Ramps						
East Ramps WB Right	C	17.6	20	E	39.0	140
North Street/West Ramps						
West Ramps EB Right	F	53.6	146	E	45.0	165
North Street/Federal Street						
North Street NB Left	C	16.1	21	C	16.3	31
Federal Street WB Right	F	806.6	386	F	973.9	747
Bridge Street/West Ramps						
Bridge Street WB Left	A	5.0	16	A	4.0	28
West Ramps NB Right	F	65.2	333	F	269.8	461
West Ramps NB Left	F	65.2	333	F	269.8	461
Signalized Locations:						
Bridge Street/East Ramps						
Bridge Street EB	D	35.2	4	B	11.5	0
Bridge Street WB	C	23.8	720	C	21.8	933
West Ramps NB	F	84.4	460	F	138.3	454
OVERALL	**D**	**38.8**		**C**	**31.8**	
Bridge Street/MBTA Drive						
Bridge Street, EB	F	125.3	862	E	58.7	701
Bridge Street WB	A	3.5	41	A	5.6	53
MBTA Drive SB	D	46.8	177	F	170.2	504
OVERALL	**E**	**72.6**		**E**	**55.9**	

Table 6: Build Conditions (2016 Volumes) – Summary of Capacity Analysis

Study Location	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Level of Service	Delay (sec per veh)	Queue Length (feet)	Level of Service	Delay (sec per veh)	Queue Length (feet)
Signalized Locations:						
North Street/West Ramps/Federal Street						
North Street NB Left	F	106.4	369	F	93.4	229
North Street NB Through	B	14.8	458	C	31.4	616
North Street SB	E	72.3	427	E	64.8	796
West Ramps EB Left	E	64.1	91	E	78.2	232
West Ramps EB Right	C	28.5	159	C	31.1	213
Federal Street WB	F	111.4	337	F	140.7	527
OVERALL	**E**	**61.6**		**E**	**65.0**	
Bridge Street/West Ramps						
Bridge Street WB Left	B	12.7	79	C	26.0	176
Bridge Street WB Through	B	15.0	261	B	10.1	380
Bridge Street EB	C	22.9	309	B	15.4	353
West Ramps NB Left	B	18.1	60	D	41.8	183
West Ramps NB Right	E	74.6	455	B	14.8	77
OVERALL	**D**	**35.1**		**B**	**17.1**	
Bridge Street/MBTA Drive						
Bridge Street, EB	E	58.0	702	E	67.4	804
Bridge Street WB	A	7.1	348	A	8.1	344
MBTA Drive SB	B	17.1	57	F	145.6	431
OVERALL	**D**	**38.8**		**E**	**61.2**	

As shown in Table 4, under the Existing Conditions several approach movements experience failing levels of service, with very high delays, during both existing peak hours. Most of the movements have very long queues as well.

Various assumptions were made for the No Build Condition analysis regarding the proposed improvement projects. Since the two projects along Bridge Street (By Pass and Reconstruction) are independent of one another and each includes two signalized

intersections, it was assumed that the four traffic signals on Bridge Street would be coordinated with optimal timings. The four locations are the intersections of Bridge Street at MBTA Drive; East Ramps, Washington Street; and Saint Peter Street.

As shown in Table 5, under the No Build Conditions the Federal Street westbound approach at North Street is still expected to fail during both peak hours. The West Ramps approach to Bridge Street also continues to experience a LOS F, with very high delays. Even with the Bridge Street at East Ramps and MBTA Drive intersections operating under signalized control, certain approaches experience a LOS F.

The Build Condition (Table 6) required various improvements and modifications to certain study area intersections to provide for the best overall traffic flow through the area. The adjustments made are as follows:

- Coordination between the new traffic signal at the North Street/West Ramps/Federal Street intersection with the existing traffic signal at the North Street/Essex Street intersection, with optimal timings.

- As mentioned above, the intersection of Bridge Street at the West Ramps will be signalized. The westbound approach requires reconfiguration to include an exclusive left turning lane and a through lane with a westbound left turn advance.

- Coordination between the four signals along Bridge Street at West Ramps; MBTA Drive; Washington Street; and Saint Peter Street.

As shown in Table 6, under the Build Condition the North Street/West Ramps/Federal Street intersection operates at an overall LOS E during both the AM and PM peak hours. This intersection has different phasing based upon pedestrian actuations. Concurrent pedestrian phasing is being proposed to provide for the best operation. For this analysis it was assumed that the pedestrian calls to cross Federal Street occurred every other cycle. This was based primarily on the pedestrian count information for the area. With the Bridge Street at West Ramps intersection operating under signalized control, none of the movements experience a failing LOS during either peak hour. The overall LOS is D during the AM peak hour and B during the PM peak hour. Also, during the PM peak hour the southbound MBTA Drive approach shows improved delay and queue lengths with the removal of the East Ramps approach from the signal.

4.2 Simulation Analysis

A simulation analysis of the study area was conducted utilizing the simulation component of Synchro, which is known as SimTraffic. The simulation was used to

evaluate the operation of an intersection relative to adjacent intersections. The Highway Capacity Manual methodology analyzed in Synchro fails to properly address the impacts that long queues and insufficient capacity may have on nearby intersections. Simulations were run to evaluate these impacts.

Under the No Build Condition the simulations revealed that during the PM peak hour, long queues were occurring along westbound Bridge Street at its intersection with the East Ramps. This resulted in problems at the Bridge Street/Washington Street intersection since the queue was backing up into this location. The reason for the long queue was because the split phasing needed at the Bridge Street/MBTA Drive/East Ramps signal was causing long delays on Bridge Street. The split phasing, which is needed due to the offset nature of the intersection, causes the signal operation to be less efficient.

Under the Build Condition the simulations revealed that the removal of the East Ramps signal resulted in a much better progression and operation for the Bridge Street signals. Since the East Ramps phase will no longer be needed, more green time can be given to the Bridge Street approaches, which prevents the eastbound queue from backing into the Bridge Street/Washington Street intersection. The Build Condition simulations also revealed that the new signal at the North Street/West Ramps/Federal Street intersection will result in long southbound queues towards Mason Street that will require vehicles to wait through a couple of cycles at times to get through the intersection. However, the Essex Street/Summer Street intersection showed a marked improvement.

5.0 INTERIM CONDITION

Due to the fact that construction on the courthouse project is expected to begin in September 2007, and the Bridge Street Reconstruction project is only at the 25% design stage, an Interim Condition was evaluated. The Interim Condition included all of the projects described under the No Build Conditions (with the exception of the Bridge Street Reconstruction project), as well as the courthouse project. Traffic volumes were projected to 2011 for the Interim Condition and a capacity analysis and simulation analysis was performed for the study area. The Interim Condition was evaluated to ensure that traffic flows and operating conditions throughout the study area would not breakdown without the Bridge Street project improvements in place.

Based on the projected volumes and the results of the analysis, it was determined that signalization was required at the Bridge Street/West Ramps intersection to maintain a satisfactory level of operation. The projected turning movement volumes for the 2011 Interim Conditions are shown in Figures 9 and 10. The traffic capacity results are shown in Table 7 and the complete analyses are shown in the Appendix.

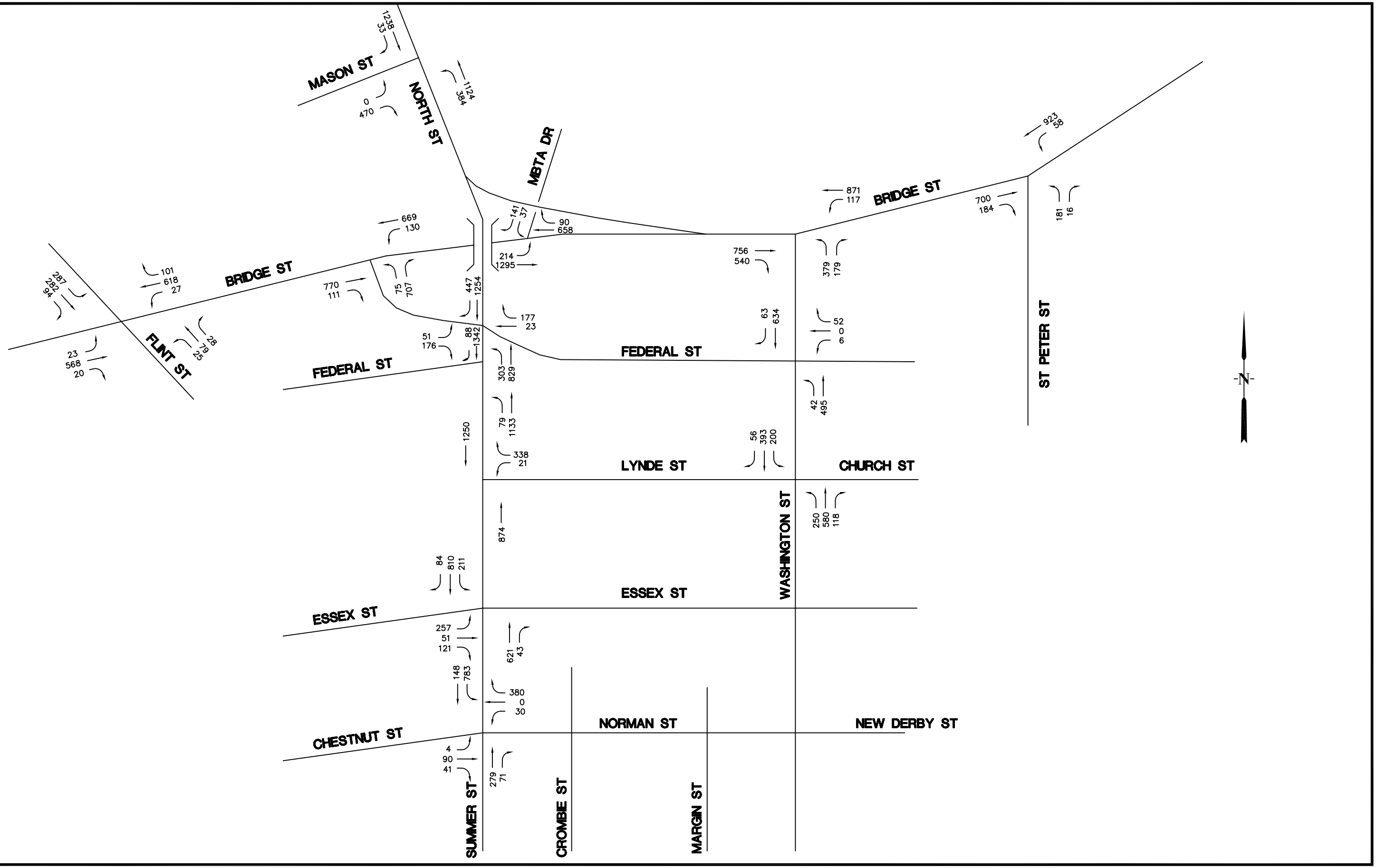

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FIGURE NO. 9
BUILD 2011 (INTERIM) AM PEAK VOLUMES
DCAM/SALEM COURTHOUSE

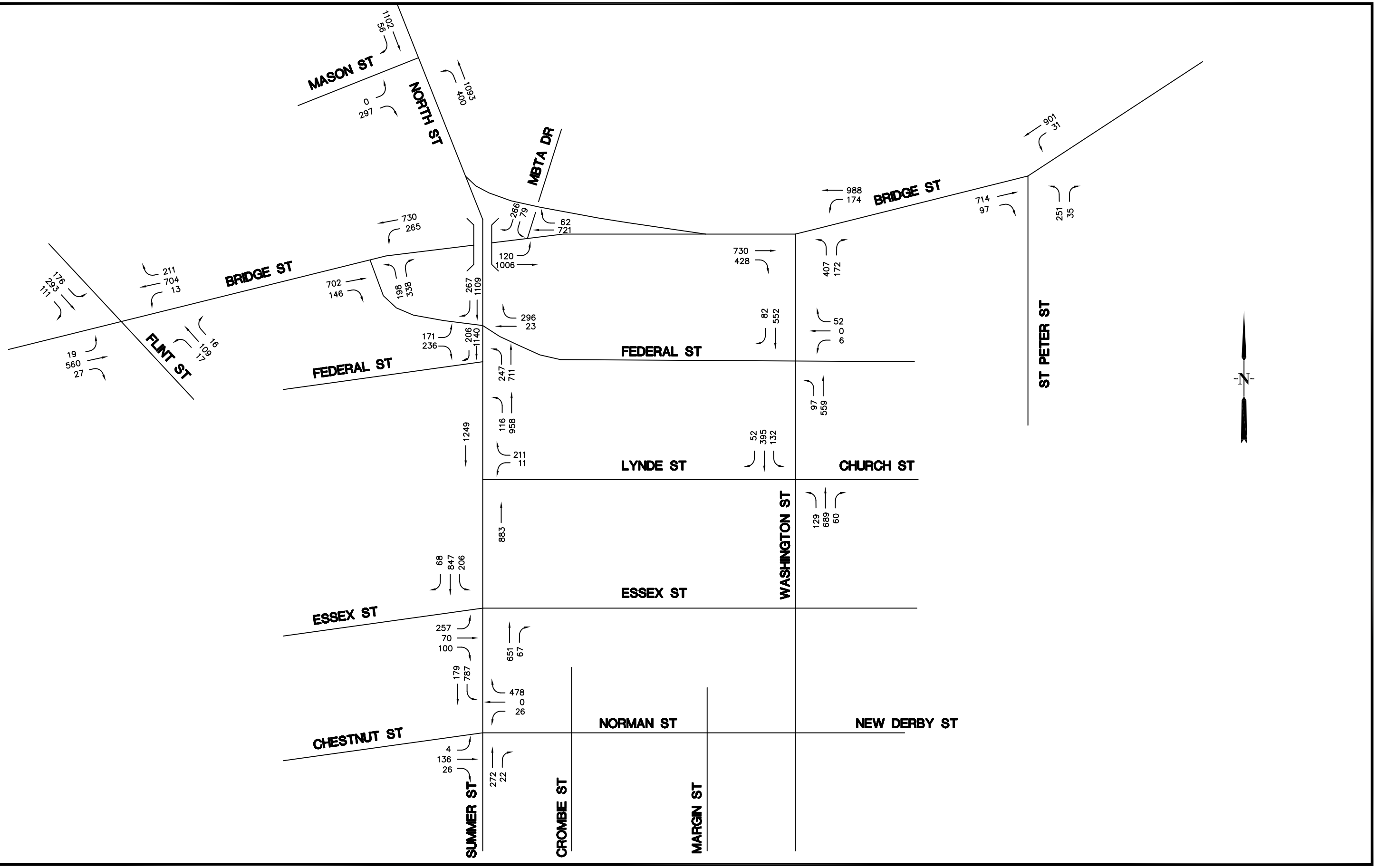

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FIGURE NO. 10
BUILD 2011 (INTERIM) PM PEAK VOLUMES
DCAM/SALEM COURTHOUSE

Table 7: Interim Conditions (2011 Volumes) – Summary of Capacity Analysis

Study Location	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Level of Service	Delay (sec per veh)	Queue Length (feet)	Level of Service	Delay (sec per veh)	Queue Length (feet)
Bridge Street/MBTA Drive						
Bridge Street, EB Left	B	11.0	28	B	10.4	14
MBTA Drive, SB	F	997.6	566	F	848.1	985
Signalized Locations:						
North Street/West Ramps/Federal Street						
North Street NB Left	F	84.9	310	D	54.2	151
North Street NB Through	B	17.8	505	C	25.4	501
North Street SB	D	36.5	440	D	39.7	343
West Ramps EB Left	E	65.4	54	F	97.1	257
West Ramps EB Right	A	4.3	23	C	25.0	159
Federal Street WB	F	103.2	337	F	102.9	416
OVERALL	**D**	**39.0**		**D**	**46.2**	
Bridge Street/West Ramps						
Bridge Street WB Left	C	26.1	111	C	31.4	213
Bridge Street WB Through	B	16.3	457	A	7.9	266
Bridge Street, EB	D	49.4	1064	C	29.9	689
West Ramps NB Right	F	176.4	378	B	11.3	97
West Ramps NB Left	D	24.7	39	D	44.0	196
OVERALL	**E**	**75.3**		**C**	**21.9**	

Even though the MBTA Drive will experience very high delays, the safety for this approach movement should improve with the removal of the East Ramps, allowing it to operate more like a traditional T-intersection.

The most notable operating condition revealed during the analysis of the Interim Condition is the longer queues experienced on Bridge Street, particularly at the Bridge Street/West Ramps intersection. The single lane capacity at the intersection is the main reason for the longer queues. The evaluation of the simulations showed that none of the queues back into adjacent intersections.

The evaluation of the Interim Condition revealed that overall there will not be degradation in traffic flows through the study area. The key study intersections will experience comparable delays, and the resulting queues will not create congestion problems. The operation of the other study area intersections will be similar to that experienced under the Build Condition.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The purpose of this Functional Design Report was to evaluate the impacts to traffic of removing the East Ramps at the North Street and Bridge Street interchange, due to construction of the new Trial Court Facility. Even though the new court building will have a greater square footage than exists today, no additional traffic will be generated from the new facility. The impacts of redistributing the traffic were analyzed for the interchange, as well as for critical surrounding intersections. The report also determined and analyzed the best improvement features to incorporate into the area to achieve optimal traffic flow. The evaluation included analyzing the study area using both the Highway Capacity Manual methodology, as well as a simulation analysis.

Traffic is currently very heavy and congested through many parts of Salem during the peak hours, particularly within in the project study area. One of the primary objectives of the evaluation was to ensure that the traffic flow through the study area would not degrade as a result of the interchange reconstruction.

Based on the results of our evaluation, traffic flow will be maintained and in some cases will even be improved due to the project. The following is a list of notable improvements expected to occur due to the removal of the Bridge Street/East Ramps intersection:

- Improved flow and progression through the Bridge Street signals. The East Ramps approach will no longer be incorporated into the signal with the MBTA Drive, thereby allowing more green time to be given to Bridge Street. This will allow the signalized intersection of Bridge Street and MBTA Drive to run more efficiently.

- Improved capacity delay for both the Federal Street westbound approach to North Street and the West Ramps eastbound right turn onto North Street. Compared to the No Build Condition, these approach movements will experience less delay due to the modifications at the North Street/Federal Street/West Ramps intersection.

- Improved safety. As mentioned above there are sight distance deficiencies at the North Street/East Ramps intersection due to the North Street bridge abutments. Removing the East Ramps eliminates the safety issue.

These improvements and others are dependent on the modifications described under the Traffic Capacity Analysis section being implemented, such as the proper signal coordination along North Street and Bridge Street.

7.0 RIGHT OF WAY IMPACTS

No additional right of way impacts are anticipated due to this work.

8.0 DESIGN WAIVERS

No additional design waivers are anticipated as a result of this new work.

9.0 ESTIMATED QUANTITIES AND COSTS

The total new construction cost due to this work is approximately $470,000. This results in additional cost of approximately $400,000 to the existing North Street project.

A3.6 Salem Trial Courts Transportation Study

Howard/Stein-Hudson Associates, Inc.
May 2002

Salem Trial Courts

Transportation Study

Howard/Stein-Hudson Associates, Inc.
May 2002

Introduction

Purpose of the Report

This report describes the transportation-related impacts of relocating the Salem Trial Courts from their existing locations to a specific location adjacent to the MBTA commuter rail station at Bridge Street in the City of Salem. It addresses the issues detailed in the scope of work outlined by the Massachusetts Division of Capital Asset Management (DCAM), as summarized below.

Existing Conditions: A detailed parking analysis of on-street parking within a five-minute walking radius and off-street parking facilities within a ten-minute walking radius of the existing courthouse buildings will be conducted during the morning, midday, and evening peak periods. This will result in the determination of both the total supply of spaces and the availability at the peak periods. Pedestrian and bicycle access to the proposed site will be noted from a site visit.

Trip Generation/Trip Distribution: A survey of employees and visitors to the current court facilities will be used to generate trip generation and distribution data, and in turn used to project future trip generation for the proposed project.

Future Conditions: Planned infrastructure improvements and new developments in the vicinity of the Bridge Street project site will be documented. The trip generation and distribution for the project will be evaluated with regard to the adjacent projects.

Mitigation Measures: Appropriate traffic mitigation will be proposed that will seek to maximize the operational efficiency of the intersections within the study area.

Project Description

The project involves the study of a potential site for relocation of all or a portion of the existing court facilities located in the City of Salem. They include the existing Superior Court, District Court, Probate and Family Court (including the Registry of Deeds), and Juvenile Court. The site under examination is located adjacent to the Salem commuter rail station. The site is currently used as a parking lot with capacity for 123 parking spaces. The MBTA is in the process of examining the feasibility of constructing a parking garage for a minimum of 1,000 vehicles at the site. The site is bordered by Bridge Street to the south, North River to the west, and the MBTA commuter rail lot to the north and east, as shown in **Figure 1.** The opening and closing times of the existing courthouse buildings are 8:30 A.M. to 4:30 P.M. for the District and Juvenile courts and 8:00 A.M. to 4:30 P.M. for the Superior and Probate and Family courts. All buildings and transaction counters are open continuously through lunchtime.

Figure 1. Locus Map

The estimated number of employees by building is shown in **Table 1.**

Table 1. Employees by Building

Building	Court Staff	Registry of Deeds	Law Library	District Attorney	Adjudicated Dispute Resolution	Total
Superior Court*	45	0	3	4	0	52
District Court**	62	0	0	15	0	77
Probate and Family Court	86	54	0	0	8	148
Juvenile Court	18	0	0	4	0	299

*Superior Court staff includes about 17 probation officers who are mostly in the field.
**District Court staff includes about 27 probation officers who are mostly in the field.

The preliminary development program entails construction of a three- or four-story building with an approximate anticipated footprint of at least 50,000 square feet, with the lobby entrance to the north of the site. Similarly, handicapped-plate (HC-P) parking and the pick-up/drop-off area will be oriented towards the north of the site. The loading dock will be located on the west side of the building at grade level. The preliminary development plan incorporates a pedestrian walkway to and from Bridge Street to the river front along the east side of the building.

Methodology

This section describes the proposed project in accordance with the DCAM scope of work. The study is presented in three sections:

The first comprises an inventory of ***existing transportation conditions,*** including parking, pedestrian and bicycle, loading, and site conditions.

The second provides an evaluation of ***future transportation conditions*** and an assessment of potential traffic impacts associated with the project. Expected roadway, intersection, parking, transit, pedestrian, and loading capacities and deficiencies are identified. This section of the transportation impact study includes a determination of the vehicle-trip generation and the subsequent assignment of the vehicle trips through the study area.

The final section identifies appropriate measures to ***mitigate*** project-related deficiencies identified in the Build Scenario.

Study Area

The study area is bounded by the North River to the west, Earl Street and Collins Cove to the north, a point at the intersection of Derby and Bentley streets to the east, and Harbor, Porter, and Hawthorne

streets to the south. In general, the study area is defined as an area within a 10-minute walking radius of the proposed project site.

Existing Transportation Conditions

This section includes a description of study area transit availability, parking supply, and loading conditions.

Roadway Conditions

Bridge Street, the only roadway within the study area, is functionally classified by the Massachusetts Highway Department's Bureau of Transportation Planning and Development as an urban arterial west of Washington Street and as a primary arterial east of Washington Street. Bridge Street, in the area of the site, runs parallel to the North River. The roadway serves as a connection between the City of Beverly to the north and the City of Salem. The 2 travel lanes run in a north-south direction, and sidewalks are provided on both sides. Pedestrian access from downtown Salem across Bridge Street at the intersection with Washington Street is via a signalized crosswalk.

Parking

Off-street Parking Inventory

Existing Inventory

The off-street parking inventory covered the area of Salem within a 10-minute walking radius of the existing courthouse buildings, as shown in **Figure 2.** Within that radius, 2 garages—Museum Place, with an entrance on New Liberty Street, and South Harbor, with an entrance on Congress Street—have a total capacity of 1,039 spaces. The 11 surface lots in the area (at Bridge Street beside the MBTA commuter rail parking lot, Bridge Street by the old rail line, Crombie Street, two on Church Street, Klop Alley, MBTA Commuter Rail Lot, Riley Plaza East and West, Salem Green, and Sewall Street) offer a total of 1,138 spaces.

In the A.M. peak, the garages were 68 percent occupied, and the lots were 87 percent occupied. In the midday peak, the garages and lots had an occupancy rate of 70 percent and 89 percent, respectively. In the P.M. peak, the garages were 38 percent occupied, and the lots 64 percent occupied.

The combined availability of spaces in the garages and lots is:

- **P** morning peak: 483 spaces (22 percent)
- **P** afternoon peak: 437 spaces (20 percent)
- **P** evening peak: 995 spaces (46 percent)

The distribution of the total supply of spaces and the availability during the A.M., midday, and P.M. peak periods for each garage and lot are shown in **Table 2.**

Figure 2. Off-street Parking

Table 2. Inventory of Off-street Parking in Study Area (10-minute walking radius)

Garage/Lot	Total Number of Spaces	A.M. Availability		Mid-day Availability		P.M. Availability		Rates
		#	%	#	%	#	%	
Garages								
Museum Place	830	162	20%	154	19%	473	57%	Municipal rate structure: $1.50/hour $9 max./8 hrs. $7 overnight $13 for 24 hours
South Harbor	182	149	82%	150	82%	163	90%	Municipal rate structure
	27	22	81%	10	37%	7	26%	2-hour metered limit
Total Garage Use	**1039**	**333**	**32%**	**314**	**30%**	**643**	**62%**	
Lots								
Bridge St. municipal	123	0	0%	0	0%	15	12%	$1/day
Bridge St. old rail line	120	0	0%	0	0%	8	7%	Unrestricted
Crombie St.	42	29	69%	14	33%	18	43%	2-hour metered limit
Church St.	46	0	0%	4	9%	24	52%	1-hour metered limit
Church St. municipal	132	0	0%	41	31%	88	67%	Municipal rate structure
Klop Alley	66	15	23%	5	8%	10	15%	2-hour metered limit
MBTA Lot	340*	0	0%	0	0%	90	26%	$1/day
Riley Plaza East	55	30	55%	17	31%	31	56%	2-hour metered limit
	9	2	22%	2	22%	2	22%	1-hour metered limit
Riley Plaza West	94	19	20%	23	24%	46	49%	2-hour metered limit
Salem Green	21	9	43%	3	14%	3	14%	1-hour metered limit
Seawall St.	90	46	51%	14	16%	17	19%	2-hour metered limit
Total Lot Use	**1138**	**150**	**13%**	**123**	**11%**	**352**	**31%**	
Total Off-street Parking	**2177**	**483**	**22%**	**437**	**20%**	**995**	**46%**	

* Source: MBTA Web site.

The rates for the garages and lots are a combination of set rates: 2-hour metered limit and 1-hour metered limit. The lot on Bridge Street at the old rail line is a private site, and the vehicles parking there belong primarily to commuters who fail to find parking in either the MBTA lot or the City-owned lot next to it. Shrubbery restricts the number of parking spaces to approximately 120 vehicles (Source: Salem Planning Office), but there is no rate for parking here. All metered parking is 25¢ per hour, and both lots at the MBTA commuter rail station charge a daily rate of $1. Both garages, South Harbor and Museum Place, as well as the Church Street municipal lot, are owned by the City of Salem and therefore have the same pricing structure of $1.50 per hour, up to a maximum 8 hours for $9.00. Overnight parking is $7.00, and 24-hour parking is $13.00. These City facilities also offer a monthly pass for $45.00, parking ticket purchases of 20 12-hour stamps for $35.00, or merchant purchases at $25.00 for 100 1-hour stamps. The Church Street lot does not accept 12-hour stamps; drivers using these stamps must park in one of the garages.

The MBTA promotes the new MBTA garage in Lynn to commuters as an alternative parking facility. This garage has 1,000 spaces and is located next to the Lynn MBTA commuter rail station. Currently, there is no charge to park in this garage.

On-street Parking Inventory

Existing Inventory

The on-street parking inventory covered the area of Salem within a 5-minute walking radius of the proposed site and the existing courthouse buildings, as shown in **Figure 3.**

The total supply of on-street parking spaces is approximately 326, 13 percent of the total supply of off-street and on-street parking. The greatest supply of parking can be found along Washington Street, followed by Derby Street, Federal Street, and Essex Street West, which combine for a total supply of 180 spaces. Washington Street has several different types of parking restrictions, which include 4-hour metered limit, 4-hour unmetered limit, 2-hour metered limit, 2-hour unmetered limit, 1-hour metered limit, 1-hour unmetered limit, and 30-minute limit; however, availability is only 11 percent in the A.M. peak period, 12 percent in the midday peak period, and 18 percent in the P.M. peak period. Derby Street has the greatest number of spaces available throughout the entire day; however, when the time periods are analyzed separately, the A.M. availability is greatest on Essex Street West, at 63 percent (17 spaces). During the midday and P.M. peak periods, Derby Street has the most spaces available, at 49 percent (20 spaces), and 59 percent (24 spaces), respectively.

The total availability of spaces on streets with permit parking is 21 percent, or approximately 68 spaces, in the A.M.; 20 percent, or approximately 65 spaces, at midday; and 31 percent, or approximately 101 spaces, in the P.M. The distribution of the total supply of spaces and the availability during the A.M., midday, and P.M. peak periods for each street are shown in **Table 3.**

Figure 3. On-street Parking

Table 3. Inventory of On-street Parking in Study Area (5-minute walking radius)

Street	Total Number of Spaces	A.M. Availability		Mid-day Availability		P.M. Availability		Rates
		#	%	#	%	#	%	
Ash St.	8	0	0%	0	0%	5	63%	Unrestricted
Barton Sq.	7	1	14%	3	43%	5	71%	Metered
Central St.	5	2	40%	1	20%	1	20%	2-hour metered limit
	20	3	15%	6	30%	7	35%	1-hour metered limit
Church St.	5	0	0%	0	0%	2	40%	1-hour metered limit
Derby St.	41	16	39%	20	49%	24	59%	2-hour metered limit
	8	0	0%	0	0%	0	0%	Unrestricted
Essex St. West	27	17	63%	3	11%	3	11%	1-hour metered limit
Federal St. East	19	0	0%	2	11%	4	21%	2-hour metered limit
Federal St. West	19	0	0%	0	0%	2	11%	2-hour metered limit
Holyoke Sq.	11	1	9%	2	18%	2	18%	2-hour limit
Lafayette St.	16	3	19%	2	13%	3	19%	2-hour metered limit
Lynde St.	8	0	0%	0	0%	3	38%	2-hour metered limit
New Derby St.	13	6	46%	6	46%	11	85%	2-hour metered limit
	1	0	0%	0	0%	1	100%	1-hour metered limit
Norman St.	24	8	33%	5	21%	4	17%	Metered
North St.	8	4	50%	2	25%	4	50%	Metered
Summer St.	20	0	0%	5	25%	8	40%	Metered
Washington St. (total 66)	8	1	13%	0	0%	4	50%	4-hour metered limit
	8	0	0%	0	0%	3	38%	4-hour limit
	8	0	0%	0	0%	1	13%	2-hour metered limit
	30	5	17%	7	23%	4	13%	1-hour metered limit

Street	Total Number of Spaces	A.M. Availability		Mid-day Availability		P.M. Availability		Rates
		#	%	#	%	#	%	
	3	0	0%	0	0%	0	0%	2-hour limit
	9	1	11%	1	11%	0	0%	1-hour limit
Total On-street Parking	**326**	**68**	**21%**	**65**	**20%**	**101**	**31%**	

Different parking rate structures apply to each street, and often different parking types are combined along the same street; for example, on Washington Street, Central Street, Derby Street, and New Derby Street. All metered parking is 25¢ per hour.

In total, approximately 2,503 spaces are provided in garages, lots, and on-street in Salem within the study area. Percentage of availability is approximately 22 percent (551 spaces) in the A.M. peak period, 20 percent (502 spaces) during the midday peak period, and 44 percent (1,096) in the P.M. peak period. During the site visit, it was also noted that there is sufficient available HC-P parking both on-street and off-street.

Public Transportation

In addition to accessibility to the MBTA's commuter rail service, the project site has access to MBTA bus service. The following sections highlight the transportation routes, schedules, and capacity for public transportation within close proximity of the site.

Commuter Rail

Currently, the MBTA operates 58 inbound and outbound trains between Boston and Salem Station on weekdays. These trains generally travel on one of two commuter rail lines: Newburyport or Rockport. The frequency at Salem Station is approximately 15 minutes at peak times to typically 1 hour at off-peak times. The stations serviced on this commuter rail line from Salem inbound to North Station, Boston, are as follows: Swampscott, Lynn, River Works, and Chelsea. The trip duration between Salem and North Station is between 25 and 30 minutes.

At North Station, passengers can make connections to the Orange and Green lines. The Orange Line connects Oak Grove in the north to Forest Hills in the south, with rush-hour frequency of 5 minutes. The Green Line connects Lechmere in East Cambridge to Government Center, where it divides into 4 lines: B, making connections with Boston College; C, connecting with Cleveland Circle; D, connecting with Riverside; and E, connecting with Heath Street. Each line operates as a rush-hour frequency of a minimum of 2 minutes. Both lines connect with the Red and Blue lines.

Bus Service

The MBTA provides five bus routes from the Salem commuter rail depot in the vicinity of the site, as shown in **Table 4.**

Table 4. MBTA Bus Service in the Study Area

Bus Route	Origin	Destination	Frequency
#450	Salem Depot	Haymarket (Boston)	7–90 minutes
#451	Salem Depot	North Beverly	30–90 minutes
#455	Salem Depot	Haymarket (Boston)	30 minutes
#459	Salem Depot	Downtown Crossing (Boston)	30 minutes
#458/#468	Salem Depot	Danvers Square	60 minutes

Source: MBTA.

Pedestrian Conditions

Current pedestrian access to the proposed site is via the sidewalk from under North Ramp, or the two bridges that connect Bridge Street with the Salem MBTA commuter rail station, one stepped and the other a ramp to facilitate wheelchairs and strollers.

On the approach to the pedestrian access points to the station, one signalized crosswalk is provided on the west side of the intersection of Bridge Street and Washington Street, connecting to a crosswalk traversing Washington Street at the intersection of Federal Street.

It was observed during a period of the P.M. peak that approximately 50 percent of passengers alighting from the trains are pedestrians; it was further observed that two other travel modes used are roller blades and bicycles.

Bicycle Facilities

One unsheltered bike rack is provided at the existing MBTA commuter rail parking lot to the north of the site, although bikes were observed to be chained to the railings along the platform also.

Loading

Based on consultation with the Courts Facilities Manager, little loading activity takes place at the Courthouse, as shown in **Table 5.** Trash pick-up is daily between 5.00 and 5.30 A.M. Vending machine deliveries occur once a day, and filtered water deliveries occur every other day. Postal deliveries occur twice a day, on average. On occasions, trailer trucks deliver stationery, custodial supplies, and cleaning equipment, but these deliveries are limited to a few times per year.

Table 5. Loading Activity

Loading Activity	Daily # of Trips	Time of Day	Type of Vehicle
Trash pickup	1	5:00–5:30 A.M.	Remove dumpster
Food services	2	8:00–4:30 P.M.	SU-30
UPS/Fed Ex	3	8:00–4:30 P.M.	SU-30

Evaluation of Long-term Impacts

This section presents a description and evaluation of the 2006 No-Build and Build Conditions.

No-Build Condition

The No-Build Condition is used to describe the study area regardless of the Trial Court relocation. It describes all public and private projects that are forecast to be in place at the planning horizon of 2006. The following is a description of the projects that are scheduled to be in place at the 2006 design year.

Bridge Street Reconstruction

Massachusetts Highway Department plans to construct a Bridge Street bypass in two phases. The first phase, currently at 75 percent design stage, is a $12.3 million project that will relocate Bridge Street from the current alignment to a new alignment running adjacent to the Railroad right-of-way and the North River. The project is programmed for funding on the Transportation Improvement Plan (TIP) for fiscal year 2002. The second phase of the Bridge Street relocation runs from Washington Street to Flint Street. This $3 million project is currently at the pre-25 percent stage.

North Street (Route 114) Reconstruction

The reconstruction of North Street (Route 114) primarily involves improvements to the signalized intersections at North Street/Mason Street and North Street/School Street. Additionally, the project involves rehabilitation of the existing pavement and upgrading of traffic control devices such as signs and pavement markings.

Jefferson at Salem Mixed-use Development

This project involves construction of a 265-unit apartment complex within six buildings and a 12,000-square-foot retail building, including an ATM machine, on a vacant site. Access to the retail building will be via a driveway on Bridge Street, opposite St. Peter Street. Access to the remainder of the site will be via a driveway opposite St. Peter Street and another opposite Howard Street.

MBTA Parking Garage

The proposed expansion of the MBTA parking facility at Salem commuter rail station involves construction of a new parking garage with approximately 1,000 spaces on the site of the existing surface parking lot. The project is in the preliminary planning stage.

Build Condition

The Build Condition describes the impact of the relocation of the Trial Court on transportation resources within the study area.

The development program involves construction of a new court facility. The composition of the individual courthouses that will make up the new facility has not been finalized. As a result, this report addresses the transportation impacts of relocating the individual courts—namely, the Superior Court, the District Court, the Probate and Family Court, and the Juvenile Court—to the new site.

Methodology

To assess the transportation impacts of the proposed project, a determination of the trip generation, mode split, trip distribution, and trip assignment is needed. The standard methodology is to compare the proposed land use to similar developments that are operational and whose trip characteristics have been documented. A review of publications such as the Institute of Transportation Engineers *Trip Generation* shows that data describing the trip characteristics associated with trial court land use are not available. To assess the impacts of the relocation of the trial courts, a transportation survey of the existing court was undertaken by the City of Salem Planning Department.

Employee and Visitor Transportation Survey

The current plan is to relocate some or all of the existing court facilities from their existing locations in the City of Salem to the new site. The Superior, District, and Probate and Family courts are currently located within a short walking distance of the proposed site. The Juvenile Court is located approximately one mile from the site at Pingree Street. Since all existing sites are located within a relatively short distance of the proposed site, a survey of trends associated with the transportation demands of the existing court operation can be used to forecast the demand on the new facility.

The transportation survey was carried out by the City of Salem Planning Department in August 2001. Each of the four courthouse locations was surveyed to determine the transportation demands during the normal operation of the courthouses. The courthouses were surveyed from 8:30 A.M. to 4:00 P.M. The survey comprised two components: (i) the surveyor counted the number and time of day of users entering and existing the individual courthouse; and (ii) some users were asked to respond to a more detailed questionnaire related to their trip to the courthouse. The first component of the survey yielded trip generation rates at each courthouse facility through determination of the number of daily and hourly arrivals and departures. The peaking characteristics were also determined. The second component identified the user travel patterns, the mode of travel, the origin of the trip, and—in the case of the vehicular mode—the occupancy of the vehicle. The origin of trip component allows us to determine the trip distribution for the facility. The questionnaire also describes the respondent as an employee, a visitor, or a juror and the particular destination of the respondent within the court. The results of the transportation survey are given in the following section. Additional supporting data are given in **Appendix A** of the report. Since the survey was undertaken from 8:30 A.M. to 4:30 P.M. and suspended during lunchtime, the total number of daily trips cannot be determined. To make use of the data, the information was extrapolated to estimate the number of daily trips. The second phase of the survey, however, yields the mode share, trip distribution, and vehicle occupancy of court employees and visitors.

Trip Generation

Table 6 summarizes the results of the survey for users entering and existing each of the courthouses for the period from 8:30 A.M. to 4:00 P.M. with a break from 12:00 to 1:00 P.M. Additionally, the peak hour of demand is also given. **Figure 4** shows the hourly variation of vehicle demand at the composite of all four courthouse locations. The figure includes an estimate of vehicle trips for time intervals outside the survey duration.

As the table shows, the period from 9:00 to 10:00 A.M. is the peak hour for the four courthouses. This time period reflects the peak hour for the new consolidated facility. The morning peak period coincides with the adjacent roadway peak period and therefore reflects the worst case for traffic operation at study area intersections. The number of entering and exiting trips generated for each courthouse during the peak hour for the survey was 167 for the District Court, 121 for the Probate and Family Court, 117 for the Juvenile Court, and 72 for the Superior Court.

Table 6. Trip Generation

LANDSCAPE TABLE GOES HERE.

Figure 4. Daily Vehicle Trip Variation at Composite of Courthouses

Mode Split

Table 7 and **Figure 5** show the means of transportation survey respondents used to access individual courts. The table shows that the predominant mode of travel, with a mode share of 88 percent, is by private automobile. Public transportation was found to have a share of 1 percent, and walking a share of 9 percent. The mode was not stated by 2 percent of respondents.

Table 7. Transportation Modes Used by Survey Respondents

Mode	Superior Court		District Court		Probate/Family Court		Juvenile Court		Totals	
	#	%	#	%	#	%	#	%	#	%
Car	33	85%	29	83%	18	100%	18	95%	98	88%
Public Transport	0	0%	1	3%	0	0%	0	0%	1	1%
Walk	5	13%	4	11%	0	0%	1	5%	10	9%
No Response	1	3%	1	3%	0	0%	0	0%	2	2%
Totals	**39**	**100%**	**35**	**100%**	**18**	**100%**	**19**	**100%**	**111**	**100%**

Of those who traveled by private automobile, the average vehicle occupancy was 1.4.

Trip Distribution

Figure 6 shows the place of origin of the trips to the courthouses. The majority of trips are from the cities of Salem (21 percent), Lynn (15 percent), and Peabody and Beverly (13 percent), for a total of 62 percent. **Table 8** and **Figure 7** give a detailed account of the trip distribution. Trips to the courthouses are further distributed by region, with 43 percent from the west and 18 percent from the north and south, while 21 percent are local trips from within the City of Salem. Assuming that visitors took the most direct or major route, the analysis assigned each town in the area to a major arterial:

- All traffic coming from the west travels into Salem via Route 114, coming from Route 1, Route 128, or I–95.
- All traffic coming from the north travels into Salem via Route 1A.
- All traffic from the south travels into Salem via Route 114, Route 1A, or Route 107.

Figure 5. Mode Split

Figure 6. Place of Origin of Trips to the Courthouse

Table 8. Origins of Travelers to the Salem Courts

Figure 7. Trip Distribution

Access

Sharing the site with the new MBTA Salem commuter rail parking garage and the realignment of Bridge Street has significant impacts on both vehicular and pedestrian access to and from the relocated courthouses. The current Bridge Street Relocation Plan show a signalized three-way intersection with Bridge Street and Washington Street. It is expected that the existing site access to Bridge Street will be retained under the MBTA plan.

Future Access Needs

In the future, construction of an approximately 1,000-car MBTA garage will significantly increase public parking capacity on the site, with a corresponding increase in site ingress and egress activity. Since this is intended as a commuter garage, site access demands would be concentrated in the early morning and evening, rather than spread evenly across the day. In addition to the present site access by pedestrians, bicycles, cars, taxis, buses, and maintenance vehicles, the courthouse will require access for trash and delivery trucks, Sheriff's Department vans, and package delivery vehicles. The number of court service vehicles is anticipated to be small relative to garage traffic. The courthouse will increase the number of pedestrians accessing the site from downtown, other Trial Court Buildings, and nearby attorneys' offices.

Although the MBTA Parking Garage plan has not yet been developed, it appears that adding an approach that serves the garage, under control of the new three-way signalized intersection, will provide the most efficient access to and from the new garage and court-houses. In this way, the intersection will become a four-way, signalized intersection. Traffic entering and leaving the parking garage will be under the control of the new traffic signal system. Traffic leaving the garage will be assigned green time based on arrival at the intersection. Queuing will be minimized on the approach from the proposed garage. In retaining the existing site access, traffic entering and leaving the site will have two access/ egress points. This is significant, since the surges and queuing associated with commuter rail parking garages, due to train arrivals and departures, will be minimized.

It is anticipated that a pedestrian access in the vicinity of the Washington Street/Bridge Street intersection will remain the most heavily used pedestrian access to the site. Since this location coincides with a desirable vehicle access to a 4-way intersection of Bridge Street and Washington Street, it is recommended that pedestrian desire lines be considered in the layout of vehicle and pedestrian access so that main pedestrian flows to the courthouse do not cross the garage entrance. Due to restricted clearance and sight lines at the present site access beneath the viaduct, a 4-way intersection of Bridge Street and Washington Street may also provide the best opportunity for bicycle access.

All regional traffic using the garage will be retained on the arterial roadways such as Route 1A and Route 114, and the impact on City of Salem streets will be minimal.

The Bridge Street Relocation Plan also includes new sidewalks throughout the new Bridge Street/Washington Street intersection. Pedestrian access to and from downtown Salem from the proposed courthouse and garage will be enhanced by using the exclusive pedestrian phase in the new traffic signal timing strategy. Push button actuation will permit pedestrians to safely cross Bridge Street. Additionally, the Bridge Street project includes bicycle

accommodation with adequate roadway width for bikes and signing alerting motorists and bicyclists to share the roadway. However, a full capacity analysis is needed for confirmation.

Traffic Operation Analysis

Since the proposed project is located with direct access to regional roadways, Route 1A and Route 114, the intersections of interest are the new signalized intersection at Bridge Street and Washington Street and at Bridge Street and the existing site drive. The new intersection at Bridge Street and Washington Street has been designed under MassHighway guidelines that require the intersection to operate with acceptable level of service D or better throughout the 20-year planning horizon. Although traffic projections associated with the new parking garage have not been developed, it is expected that the intersection will operate efficiently with the addition of a fourth approach that serves the parking garage. The main reason is that the garage approach will be assigned green time in the same phase as the Washington Street traffic; thus, no green time is taken from the Bridge Street mainline traffic flow.

The existing site drive and Bridge Street unsignalized intersection operates today with level of service F. Although traffic projections associated with the parking garage have not been developed, the demand may be reduced and the resulting traffic flow at the intersection improved due to the new access/egress point at Bridge Street and Washington Street.

Parking Demand

To accurately assess the parking demand for the proposed facility, a definitive development program is needed. The composition of the overall facility is currently under review. Parking demand is composed of court staff parking, other staff parking (Registry of Deeds, Law Library, District Attorney, and Adjudicated Dispute Resolution staff parking), and visitor parking (jurors, observers, counsel, parties to cases, and transaction visitors).

Demand estimates for court staff and other staff parking are given below in **Tables 9 and 10.** The parking demand is determined using a mode share of 88 percent and a vehicle occupancy of 1.2. The staff members are assumed to park for an average of 8 hours with a turnover rate of 1. As a result, the staff parking demand is 0.73 spaces per employee.

Table 9. Court Staff Parking Demand

Building	Court Staff	Parking Demand	Comments
Superior Court	28*	21*	*excludes 17 probation officers
District Court	35**	26**	**excludes 27 probation officers
Probate and Family Court	86	63	
Juvenile	18	13	
Total	**167**	**122*** **	***0.73 spaces per employee**

Table 10. Other Staff Parking Demand

Building	Registry of Deeds	Law Library	District Attorney	Adjudicated Dispute Resolution	Total	Parking Demand
Superior Court	0	3	4	0	7	5
District Court	0	0	15	0	15	11
Probate and Family Court	54	0	0	8	62	45
Juvenile	0	0	4	0	4	3
Total	**54**	**2.75**	**23**	**8**	**88**	**64**

Courtroom and transaction visitor parking demand is determined using a vehicular mode share of 88 percent and a vehicle occupancy of 1.4. For a prior study of the Middlesex County courthouse, Justice Planning Associates, a national courtroom planning company, forecast an average of 25 visitors per courtroom, 4 jurors per courtroom, and transaction visitors to be 125 percent of total courtroom volume. The average visitor parking space turns over every 2 hours, while the juror parking turns over every 8 hours, and transaction visitor parking turns over every 30 minutes.

A development program currently under discussion involves relocation of the Superior and District courts to the proposed site and renovation of the existing facilities to include the remaining courts. Under this scenario, the Superior and District courts include 8 courtrooms. Under the above assumptions, the parking demand for this scenario results in the need for 47 employee spaces, 24 juror spaces, 32 visitor spaces, and 12 transaction visitor spaces, for a total of 115 parking spaces.

Public Transportation

Relocation of the courthouses to the proposed location adjacent to the MBTA Salem Commuter Rail Station will offer additional convenience and proximity to the commuter rail and bus service. However, since the existing courthouse locations are within close proximity to the transit service, it is unlikely that relocation will affect public transportation in the area.

Pedestrian and Bicycle Impacts

The transportation survey presented earlier shows a mode share of 9 percent for the pedestrian mode. Relocation of the courthouses to the northerly side of Bridge Street will increase travel time for pedestrians and car users who have parked in the off- and on-street facilities in the downtown areas. However, relocation of Bridge Street, mentioned in the No-Build Condition, incorporates reconstruction of the existing Bridge Street/Washington Street intersection with a fully signalized intersection that provides a pedestrian phase for improved pedestrian access to the proposed site. The project also incorporates MassHighway's Bicycle Standards, which provides bicycle signing, bicycle pavement markings, and bicycle detectors throughout the project. As a result, bicycle access to the site is also improved.

Mitigation Measures

The transportation survey shows that employees and visitors predominantly drive to the existing courthouses. To minimize the impact of single-occupant vehicles on traffic operations at adjacent intersections and to promote the use of modes other than single-occupant automobile such as transit, walk, bicycle, and high-occupancy automobile, the following transportation demand management strategies may be implemented.

Transit

MBTA transit subsidies may be offered to full-time employees of the Trial Courts. Transit passes may be sold on-site and be sold by payroll deduction.

Carpooling

Coordination with Caravan for Commuters, Massachusetts' statewide commuter services organization, to furnish employees with free ridesharing and commuting options such as vanpools, carpools, and transit may be instituted. Additionally, preferential parking and parking subsidies may be offered to carpools and vanpools.

Bicycle Use

Secure bicycle storage may be made available to encourage bicycling as an alternative mode of transportation. Bike room storage within the building for employees who choose to bike to work may be provided. Additionally, shower/locker facilities may also be provided on-site for employees.

Transportation Coordinator

A transportation coordinator may be designated to supervise and administer the elements of the programs outlined above. The coordinator's duties will include highlighting the varied transportation options and programs available to employees and visitors. Additionally, the coordinator will examine ways to share services with similar employers in the area.

Summary

The Division of Capital Asset Management proposes reconfiguration of all existing trial courts in the City of Salem. The existing courthouses are located in the downtown area of Salem. Although the development program has not yet identified which courthouses will be relocated and which will be renovated, the courthouses will either remain at their existing location or be moved to a new location adjacent to the Salem commuter rail station. As a result, the mode of transport used by employees and visitors will remain essentially the same as the current share, which is predominantly auto (88 percent). Over the next five years, numerous transportation improvements are planned. In addition to capacity and safety improvements to the principal roadways in the study area, the Salem commuter rail station will be upgraded and a new parking garage with a capacity of 1,000 vehicles erected. The parking garage will be constructed by the MBTA and is aimed at serving the needs of commuters.

The on- and off-street parking supply was found to be limited in the downtown area. Since the MBTA garage and the relocated courthouses will be located within the same parcel, it is prudent that a portion of the spaces be designated for use of trial courts employees and visitors. In this way, all courthouse traffic will use the expected primary access at the proposed four-way signalized Bridge Street/Washington Street intersection. This will reduce traffic on City of Salem streets and free up parking spaces.

In an effort to reduce single-occupant vehicle use, DCAM will promote transit, alternative transportation, and carpools.

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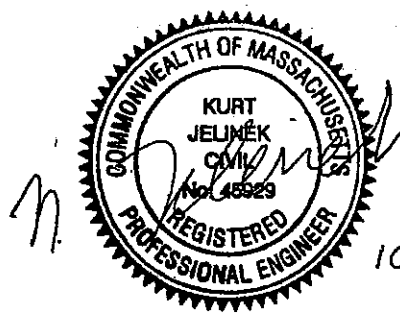
Appendix A. Summary of Transportation Survey Results for Individual Courts

A3.7 Final Geotechnical Data Report North Street and Bridge Street Ramp Re-Alignment

Salem, Massachusetts
Nobis Engineering
October 14, 2005



10/14/2005

FINAL
GEOTECHNICAL DATA REPORT

NORTH STREET AND
BRIDGE STREET RAMP RE-ALIGNMENT
SALEM, MASSACHUSETTS

Prepared for:

Commonwealth of Massachusetts
Executive Office for Administration and Finance
Division of Capital Asset Management
One Ashburton Place, 15th Floor
Boston, MA 02108
DCAM Project No. TRC9910-ST2
DCAM Task No. : TRC9910-ST2/NOB-5

Prepared by:

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Lawrence, MA 01843-2800

October 14, 2005
File No. 77210.00

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

This report presents the results of our investigation for the proposed development at the North Street and Bridge Street Intersection in Salem, Massachusetts. It is proposed to re-align the existing off-ramp from North Street to eastbound Bridge Street and relocate existing buildings and constructing a new state judicial facility.

A total of eight borings were drilled as per boring layout provided by the Department of Capital Asset Management (DCAM) from August 22, 2005 to August 25, 2005. Monitoring wells were installed in three of the borings.

In general, the subsurface conditions encountered in the borings consisted of three overburden strata consisting of fill, alluvial sands and marine clays. Bedrock was not encountered in any of the eight borings. Limited laboratory testing was conducted on the samples retrieved from the borings. Photo-ionization detector (PID) testing was conducted in the field on the samples retrieved and results are presented in the boring logs. An elevated PID reading was encountered at one location.

Some of the marine clay deposits exhibited extremely low bearing capacities and are highly susceptible to consolidation settlements if additional loads are applied. In order to determine the settlement characteristics of the marine clays, two consolidation tests as well as Atterberg Limit tests were performed.

2.0 INTRODUCTION

Nobis Engineering Inc. (Nobis) has been retained by the Division of Capital Assets Management to co-ordinate field and laboratory investigation, and to prepare a geotechnical data report for the subject site. This report is based on your Notice to Proceed dated August 1, 2005 and your Supplemental Notice to Proceed dated September 13, 2005. This report is subject to the limitations attached in Appendix A.

2.1 Objectives and Scope of Work

The objective of the geotechnical investigation is to provide information regarding subsurface conditions, soil properties, and to present preliminary assessment of the site for the proposed re-development. In order to achieve the above-stated objective, Nobis' scope of work included the following items:

- Perform a site reconnaissance and pre-mark the boring locations for DIGSAFE utility clearance.
- Coordinate a subsurface exploration program consisting of up to ten (10) test borings advanced to 30 feet depths or refusal. To install three monitoring wells at locations determined by DCAM.
- Measure groundwater levels within the monitoring wells.
- Coordinate a preliminary soil laboratory analysis program for the cohesive soils.
- Prepare this geotechnical data report presenting the results of the subsurface exploration program, subsurface conditions, and implications of subsurface conditions.

2.2 Project and Site Description

The subject of this geotechnical investigation and report is the southeast corner of the North Street and Bridge Street intersection. The project site consists of the existing off ramp from North Street, a First Baptist Church and three residential homes located at the intersection of North Street and Federal Street as shown on the Figure 1. The topography slopes from south to north with a total elevation difference of approximately twelve feet.

The current design concept calls for re-alignment of the off-ramp from North Street to Bridge Street, widening of Federal Street, relocation of existing buildings and construction of a state judicial facility on the site. The structure type and locations were not finalized at the time this report is prepared. Additionally, the Massachusetts Highway Department (Mass Highway) is considering renovations to Bridge Street.

3.0 SUBSURFACE EXPLORATION

Primary purpose of the boring exploration program was for the proposed re-alignment of the off-ramp. However, the borings will also be used in the preliminary design of the proposed judicial complex. The location and depths of the borings were determined by DCAM based on the above stated objectives. At the direction of DCAM, two borings near the First Baptist Church were not drilled because of right-of-access issues. The borings were performed during the time period between August 22 and August 25, 2005. A total of eight (8) borings were drilled as per the scope of work. Majority of the borings were drilled to a depth of 30 feet, however, two borings were extended to greater depths to determine the thickness of the encountered marine deposits. The boring logs are attached hereto in Appendix B. Boring locations are shown on the Boring Location Plan attached hereto as Figure 2. The boring elevations were determined by measuring the elevation difference with a laser level relative to nearby known catch basin or manhole elevations.

The borings were drilled by Geosearch of Fitchburg, Massachusetts utilizing a 4-1/4 inch ID hollow stem auger and 4-inch (HW) flush-joint drill casings employing drive-and-wash drilling techniques. The subsurface explorations were observed by an experienced geologist, environmental scientist, or geotechnical engineer from Nobis. The rig inspector documented the drilling procedure, classified soil samples, and any other relevant observations on boring logs, while providing technical direction to the drilling crew. Soils were classified in the field in general accordance with the Unified Soil Classification System (USCS) Soil Classification System. Standard penetration testing (SPT) was performed continuously or at 5-foot intervals in general conformance with American Society for Testing and Materials (ASTM) D1586. Two (2) representative undisturbed samples were collected from the marine deposits with a Shelby tube. Photo ionization detector (PID) tests were also conducted in the field on the samples retrieved.

Monitoring wells were installed within three boreholes upon completion. The monitoring wells were constructed with a 1-inch slotted PVC pipe several feet below and above the encountered ground water levels, with the remainder consisting of a solid riser pipe. Groundwater levels in the monitoring wells were allowed to equilibrate for a minimum of seven days prior to obtaining groundwater level measurements. Ground water levels in the other borings were measured at the time of the drilling.

The boring logs were typed using LogDraft™ version 4.0 by Geosystems Software of Fort Collins, Colorado. LogDraft™ soil profiles were exported directly into AUTOCAD™ format for inclusion in Figures 3 and 4. Existing contours and proposed roadways were taken from drawings provided by DCAM.

3.1 Laboratory Testing

Preliminary laboratory testing scheduled consisted of two one-dimensional consolidation tests and two Atterberg Limit tests on undisturbed shelby tube samples collected in Borings B-4 and B-7. The soil laboratory analyses were performed by GeoTesting Express of Boxborough, Massachusetts. The results of the tests are presented in Appendix C. The test results indicate that the coefficient of consolidation, Cv, ranges from 8.07 x 10^{-4} to 3.45 x 10^{-2} inch/sec. A summary of the laboratory testing results is included in Table 1 and Table 2.

Table 1: Summary of Soil Laboratory Analysis Results
Consolidation Test Results

Boring No.	Sample	Depth (ft)	Moisture Content (%)	Dry Unit Weight pcf	Saturation (%)	Voids Ratio Initial	Voids Ratio Final
B-4	Shelby Tube	8 – 10	26.63	86.23	74.22	0.98	0.67
B-7	Shelby Tube	15 – 17	30.32	92.75	96.17	0.88	0.79

Table 2: Summary of Soil Laboratory Analysis Results

Atterberg Limit Test Results

Boring No.	Sample	Depth (ft)	Moisture Content (%)	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Liquidity Index (LI)
B-4	Shelby Tube	8 – 10	25	32	17	15	1
B-7	Shelby Tube	15 – 17	33	49	20	29	0

4.0 SUBSURFACE CONDITIONS

4.1 Regional Geology

The surficial geology within the project limits is dominated by high-level marine deposits of late-glacial and post-glacial age. In lower parts, beds of clay and layers of fine to medium sand range from a few inches to five feet in thickness. Upper part is predominantly sand containing minor amounts of gravel. In the vicinity of Bridge Street, the surficial deposits are constituted of artificial fill. For a detailed discussion of surficial geology of the Salem quadrangle, refer to R. N. Oldale, 1964. Published bedrock geology of the Salem quadrangle indicates the presence of Salem Gabbro-Diorite, a highly variable fine to medium-grained, generally massive dark-gray to green augite-biotite-hornblende diorite and gabbro.

4.2 Subsurface Conditions

The subsurface conditions encountered in the borings consisted of three overburden strata consisting of fill, alluvium deposit of poorly graded sand and marine deposit of normally consolidated clays. A summary of subsurface conditions encountered in each boring is included as Table 3.

Fill – Varying depths of fills were encountered in the borings. Fill typically consisted of light brown silty fine to medium sand to silt with some organics and roots near surface. Organics were observed only in four borings at B-2MW, B-4, B-5MW, and B-6MW, and was found to be up to 6 inches thick. One-foot thick asphalt layer was encountered in Boring B-7. SPT 'N' values varied from 2 to 76 blows per foot indicating very loose to very dense fill with highly variable consistency. The possibility exists that locally deeper fills may be unearthed during construction, particularly in the vicinity of Bridge Street and North Street.

Alluvium Sand – Alluvial Sand deposits were encountered in borings B-1 thru B-5MW underlying the near surface fill, and in Boring B-8 underlying the marine clay deposit. The deposits typically consisted of poorly graded, wet, and loose to medium dense, fine to medium sand with little silt. SPT 'N' values in the sand deposits typically ranged from 6 to 34 blows per foot indicating loose to dense sand deposits with two instances of very loose deposit with SPT 'N' values of 1 blow per foot. The low blow count of 1 blow per foot obtained twice can be attributed to running sand conditions causing a reduction in blow counts.

Marine Clay – Marine clay deposits were encountered in borings B-6MW thru B-8 underlying the near surface fill. The deposits typically consisted of very soft to soft light gray clay with occasional pockets of medium stiff clay. SPT 'N' values in the clay deposits typically ranged from 0 to 4 blows per foot with occasional blow counts of 5 and 7 blows per foot. No shell fragments were encountered in the retrieved soil samples. Pocket penetrometer test results typically ranged from 0.5 to 2.0 tons per square feet (TSF) with occasional strength of 3.5 TSF.

Groundwater – Groundwater was encountered at depths between 7± to 10± feet below the existing ground surface, corresponding to elevations from 2.7 feet to 15.1 feet.

Table 3: Summary of Subsurface Conditions

Boring No.	Elevation (ft)	Total Depth (ft)	Fill (ft)	Sand/Gravel (ft)	Clay (ft)	Ground Water Depth (ft)
B-1	12.06	30.0	0.0 – 4.0	4.0 – 32.0	-	8.0
B-2MW	10.79	32.0	0.0 – 10.0	10.0 – 32.0	-	8.09
B-3	10.05	32.0	0.0 – 6.0	6.0 – 32.0	-	7.0
B-4	15.38	50.0	0.0 – 6.0	15.0 – 50.0	6.0 – 15.0	10.0
B-5MW	13.22	32.0	0.0 – 4.0	15.0 – 32.0	4.0 – 15.0	10.56
B-6MW	22.03	32.0	0.0 – 21.0	-	21.0 – 32.0	9.12
B-7	24.09	42.0	0.0 – 7.0	7.0 – 10.0	10.0 – 42.0	9.0
B-8	23.15	57.0	0.0 – 7.0	50.0 – 57.0	7.0 – 50.0	-

Note: All elevations are based on National Geodetic Vertical Datum (NGVD) 1929.

5.0 IMPLICATIONS OF SUBSURFACE CONDITIONS

Three overburden strata were encountered at the subject site; man-made fill, alluvial sand, and marine clays. Fill material typically is not suitable for use as a foundation subgrade and needs to be excavated and replaced before any construction work can progress. Alluvial sand appears to be a competent bearing surface, however, detailed analysis for bearing capacity and settlement should be conducted after finalizing structure type, location and loads. Most of the settlement in the alluvial sand deposit is expected to be immediate and elastic.

Marine clay presents a challenging foundation subgrade. Typically structures built on clay deposits could experience long term settlement if not founded properly. In order to determine the settlement characteristics of the marine clay deposits at the site, two consolidation tests were conducted. The results of these tests are presented in Appendix C. Preliminary compressibility analysis conducted on the two consolidation test results indicates the presence of two different clay deposits with possibly different geologic origins. The clay deposits found in Boring B-4 at a depth of 8 feet is mostly normally consolidated with an over-consolidation ratio (OCR) of 1, whereas the clay deposits found in Boring B-7 at a depth of 15 feet is over-consolidated with an OCR of approximately 3.0. The results of the compressibility analysis are summarized below in Table 4 and presented in Appendix D.

Table 4: Summary Compressibility Analysis

Sample ID		Overburden Pressure	Pre-Consolidation Pressure	Cc	Cr
Boring	Depth				
B-4	8 ft	0.44 tsf	0.5 tsf	0.259	0.014
B-7	15 ft	0.9 tsf	3.0 tsf	0.176	0.028

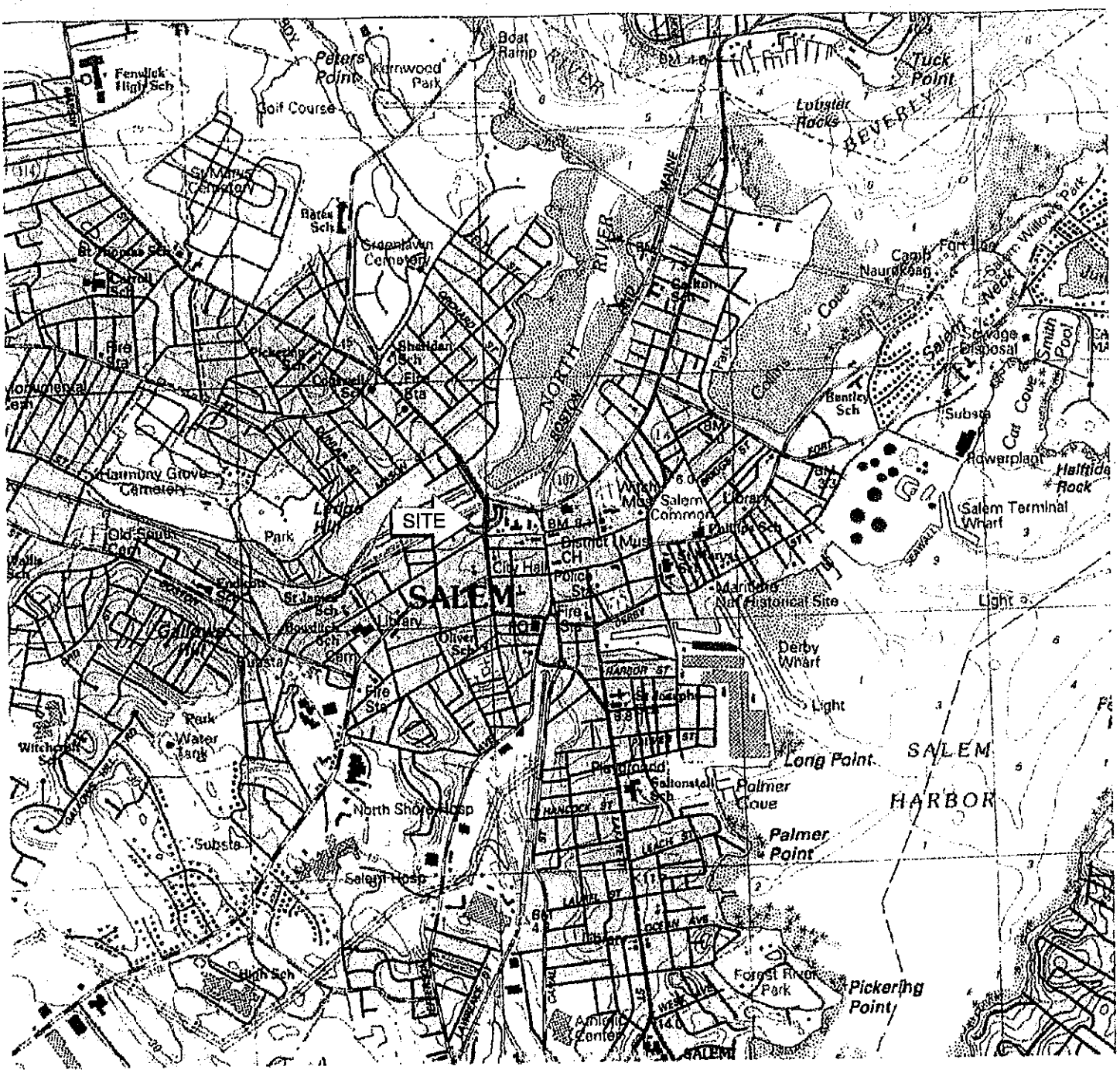
Notes: The results presented in Table 4 are Nobis' interpretation of the consolidation test results. Cc represents the compression index for the virgin compression line. Cr represents the recompression index.

Additionally, tests to determine the Atterberg Limits were conducted on the two undisturbed soil samples. The test results are presented in Appendix D. The test results indicate that the marine clay samples tested ranged from normally consolidated to over-consolidated with low plasticity and high to very high dry strength.

We recommend that a detailed time and settlement analysis for the clay deposits should be completed after finalizing the structure type, loads and locations. Special attention should be devoted to determine an appropriate foundation system that prevents excessive total or differential settlements of the proposed structures. Further laboratory tests should be conducted to determine the bearing capacity and/or shear strength of the clay. The laboratory tests and analysis should be planned according to the proposed use and construction at the site.

PID testing was conducted for volatile organic compounds (VOC). Elevated PID readings were noted in boring B-6MW from 10 feet to 20 feet depth. No background variations were indicated as seen in the other readings. The elevated readings are indicative of the possible presence of volatile organic compounds of unknown origin in the fill material. However, no floating products were retrieved with a bailer from the boring seven days after drilling.

FIGURES



NORTH

USGS TOPOGRAPHIC MAP

SALEM, MASSACHUSETTS

1985

APPROXIMATE SCALE
1 INCH = 2,000 FEET

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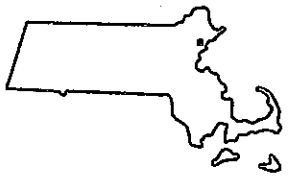

QUADRANGLE LOCATION

FIGURE 1

LOCUS PLAN

NORTH STREET/BRIDGE STREET
SALEM, MASSACHUSETTS

PROJECT: 77210

OCTOBER 2005

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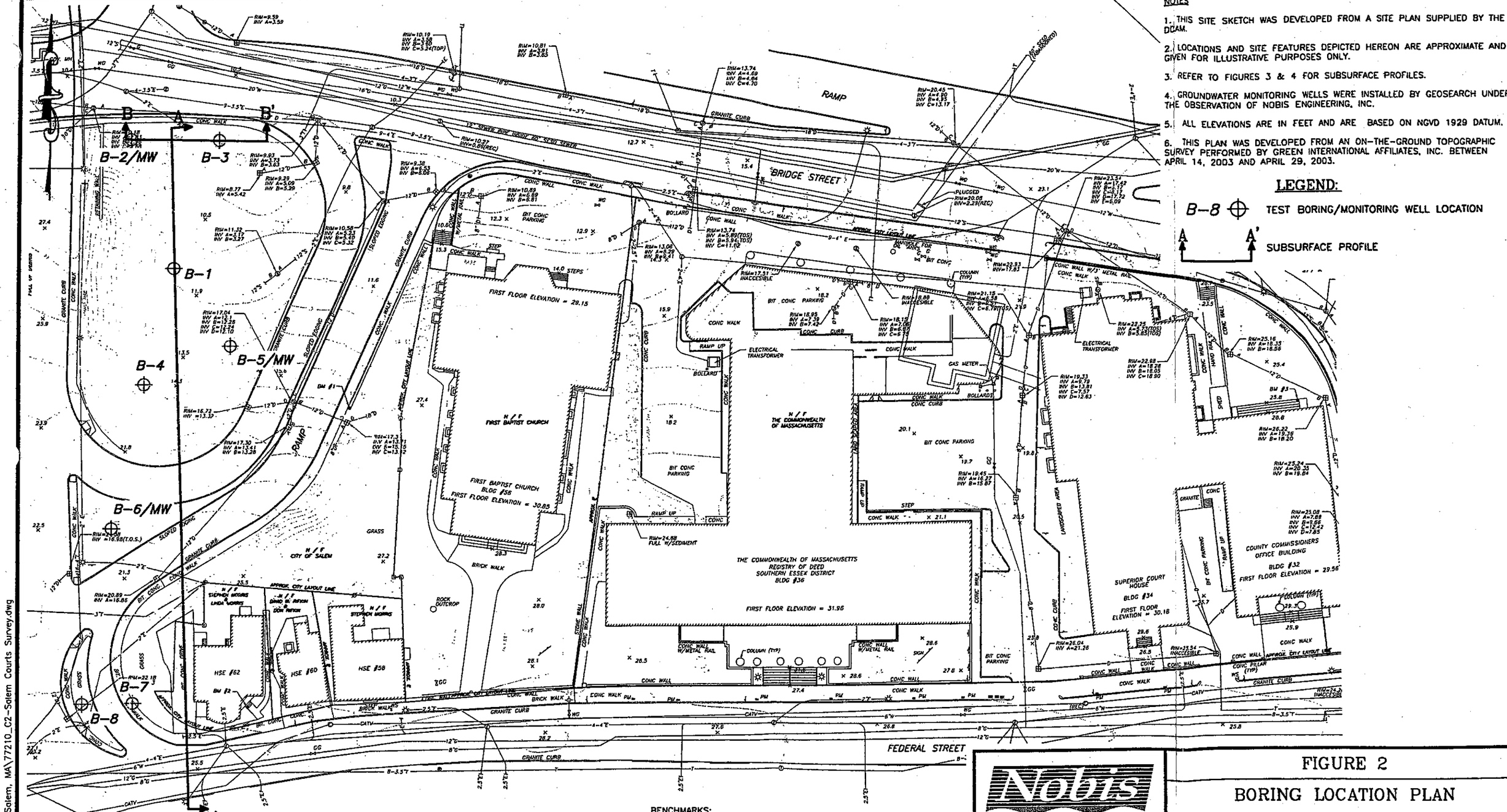

GRAPHIC SCALE

0 25' 50' 100'

BENCHMARKS:

BM #1:CHISEL SQUARE ON TOP OF CONCRETE RETAINING WALL, EL.=17.47

BM #2:TOP L.O.C OF FIRST BRICK STEP TO HSE #62 FEDERAL STREET, EL.=27.43

BM #3:TOP OF L.O.C OF FIRST GRANITE STEP OF BLDG #32 FEDERAL STREET (REAR SIDE ON BRIDGE STREET), EL.=26.07

NOTES

1. THIS SITE SKETCH WAS DEVELOPED FROM A SITE PLAN SUPPLIED BY THE DCAM.
2. LOCATIONS AND SITE FEATURES DEPICTED HEREON ARE APPROXIMATE AND GIVEN FOR ILLUSTRATIVE PURPOSES ONLY.
3. REFER TO FIGURES 3 & 4 FOR SUBSURFACE PROFILES.
4. GROUNDWATER MONITORING WELLS WERE INSTALLED BY GEOSEARCH UNDER THE OBSERVATION OF NOBIS ENGINEERING, INC.
5. ALL ELEVATIONS ARE IN FEET AND ARE BASED ON NGVD 1929 DATUM.
6. THIS PLAN WAS DEVELOPED FROM AN ON-THE-GROUND TOPOGRAPHIC SURVEY PERFORMED BY GREEN INTERNATIONAL AFFILIATES, INC. BETWEEN APRIL 14, 2003 AND APRIL 29, 2003.

LEGEND:

B-8 ⊕ TEST BORING/MONITORING WELL LOCATION

A A' SUBSURFACE PROFILE

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FIGURE 2

BORING LOCATION PLAN

NORTH STREET/BRIDGE STREET
SALEM, MASSACHUSETTS

DRAWN BY:	AS	APPROVED BY:	AP
PROJECT:	77210		OCTOBER 2005

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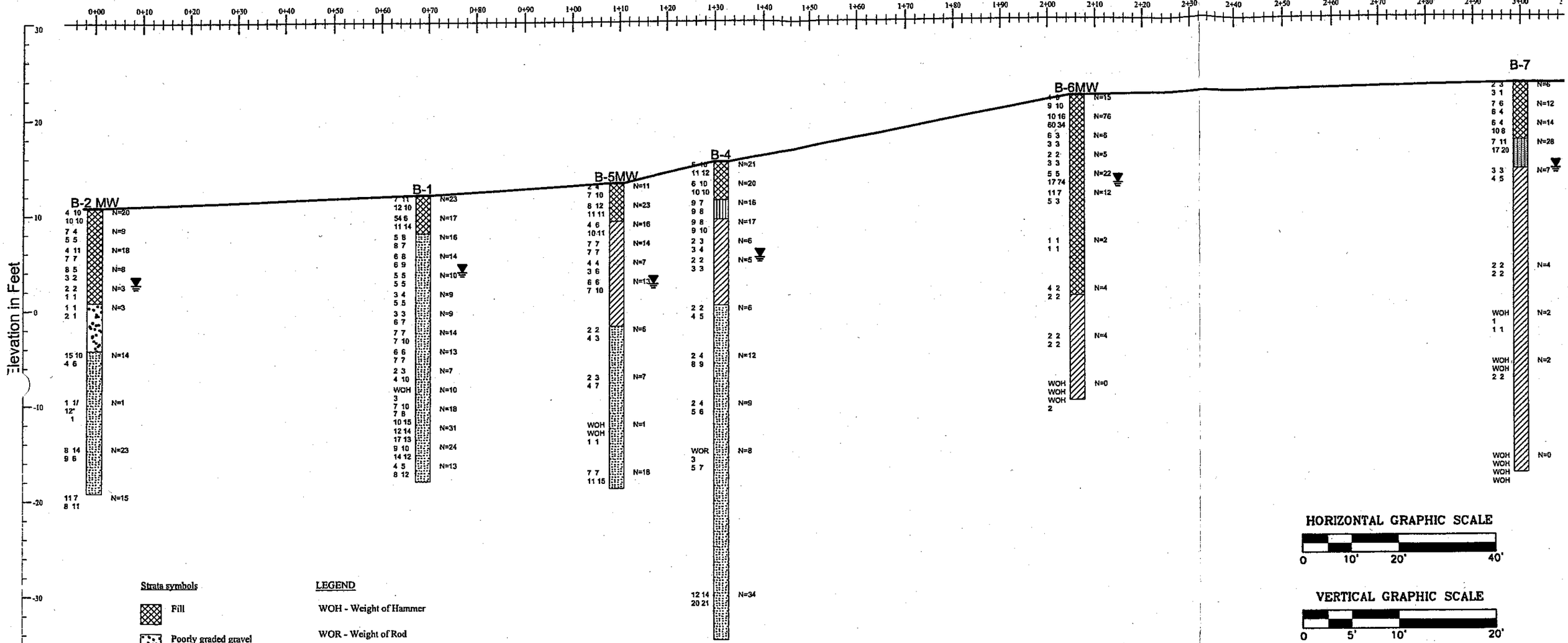
SUBSURFACE PROFILE A-A'

Division of Capital Asset Management
Ramp Re-Alignment Bridge Street and North Street



Strata symbols

- Fill
- Poorly graded gravel
- Poorly graded sand
- Low plasticity clay
- Silt
- Silty sand
- Water Elevation

LEGEND

WOH - Weight of Hammer

WOR - Weight of Rod

HORIZONTAL GRAPHIC SCALE

0 10' 20' 40'

VERTICAL GRAPHIC SCALE

0 5' 10' 20'

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FIGURE 3

CROSS-SECTION A-A'

NORTH STREET/BRIDGE STREET
SALEM, MASSACHUSETTS

DRAWN BY:	AS	APPROVED BY:	AP
PROJECT:	77210	OCTOBER 2005	

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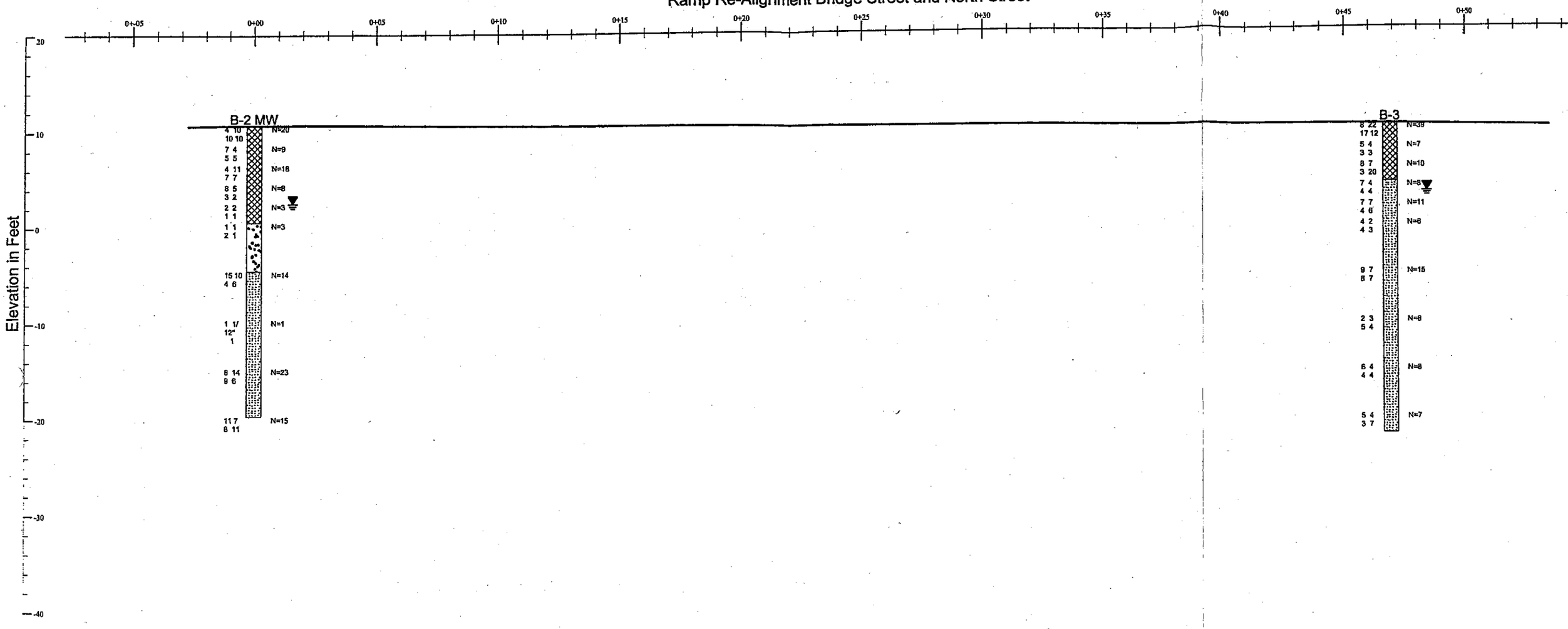
SUBSURFACE PROFILE B-B'

Division of Capital Asset Management
Ramp Re-Alignment Bridge Street and North Street



Strata symbols

- Fill
- Poorly graded gravel
- Poorly graded sand
- Water Elevation

HORIZONTAL GRAPHIC SCALE

0 2.0' 4.0' 8.0'

VERTICAL GRAPHIC SCALE

0 5' 10' 20'

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FIGURE 4

CROSS-SECTION B-B'
NORTH STREET/BRIDGE STREET
SALEM, MASSACHUSETTS

DRAWN BY:	AS	APPROVED BY:	AP
PROJECT:	77210	OCTOBER 2005	

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APPENDIX A

LIMITATIONS

Subsurface Conditions

1) The analyses and conclusions in this report are based in part upon data obtained from widely spaced subsurface explorations. The nature and extent of variations between these explorations may not become evident until further exploration. If variations or other talent conditions then appear evident, it will be necessary to re-evaluate the conclusions and recommendations of this report.

2) The generalized soil conditions described in the text are intended to convey trends in subsurface conditions and have been developed from widely spaced test borings. Actual soil conditions are likely to vary. Refer to the test boring logs for more specific information.

3) Water level readings have been made in the test borings at the times and under the conditions stated on the boring logs. Fluctuations in the level of groundwater will occur due to variations in rainfall and other factors different from those prevailing at the time measurements were made.

Review

1) In the event that any changes in the nature, design, or location of the proposed project are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by Nobis Engineering, Inc. It is recommended that this firm be provided the opportunity for a general review of final design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications.

Use of Report

1) This report provides the details of the subsurface exploration program prepared for the proposed North Street/Bridge Street Ramp Re-alignment, Salem, Massachusetts. This work has been completed in accordance with generally accepted geotechnical engineering practices and is for design purposes only. Contractors reviewing this report should do so with the understanding that its scope is limited to design considerations only. No other warranty, expressed or implied, is made.

APPENDIX B

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-1
FILE NO. 77210
Sheet No. 1 of 2
Checked by: K. Jelinek
Date Start 8/22/05
Date End 8/22/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan
Driller Justin Emma Inspector Adam Roy Ground Surface El. 12.06 Datum NGVD Top-of-Riser El.

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (Inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure	WELL DETAIL	Ground Water	STRATUM	REMARKS
1		S-1	8	0.0-2.0	7 11 12 10	23	<1	Silty sand (SM); dry, medium dense, 40% silt, 25% fine sand, 20% medium sand, 10% coarse sand, 5% gravel, light brown. (FILL)				
2												
3		S-2	14	2.0-4.0	54 6 11 14	17	<1	Silty sand (SM); dry, medium dense, 55% fine sand, 20% silt, 15% medium sand, 5% coarse sand, 5% gravel, brown. (FILL)				
4												
5		S-3	17	4.0-6.0	5 8 8 7	16	<1	Poorly graded sand (SP); dry, medium dense, 85% fine sand, 5% medium sand, 5% coarse sand, 5% silt. (ALLUVIUM)				
6												
7		S-4	18	6.0-8.0	6 8 6 9	14	<1	Poorly graded sand (SP); dry to moist, 85% fine sand, 10% medium sand, 5% silt, brown. (ALLUVIUM)				
8										▽		
9		S-5	16	8.0-10.0	5 5 5 5	10	<1	Poorly graded sand (SP); wet, loose, 55% fine sand, 40% medium sand, 5% silt, brown. (ALLUVIUM)				
10												
11		S-6	16	10.0-12.0	3 4 5 5	9	<1	Similar to S-5.				
12												
13		S-7	14	12.0-14.0	3 3 6 7	9	<1	Similar to S-5.				
14												
15		S-8	16	14.0-16.0	7 7 7 10	14	<1	Poorly graded sand (SP); wet, medium dense, 50% medium sand, 20% fine sand, 15% coarse sand, 10% gravel, 5% silt, brown. (ALLUVIUM)				
16												
17		S-9	17	16.0-18.0	6 6 7 7	13	<1	Similar to S-8.				
18												
19		S-10	24	18.0-20.0	2 3 4 10	7	<1	Poorly graded sand; wet, loose, 50% medium sand, 20% coarse sand, 20% fine sand, 10% gravel, 5% silt. (ALLUVIUM)				
20												
21		S-11	24	20.0-22.0	WOH 3 7 10	10	<1	Similar to S-10 but medium dense.				1
22												

GRANULAR SOILS (N-Value)

0 to 4 - Very Loose
5 to 10 - Loose
10 to 30 - Medium Dense
31 to 50 - Dense
Over 50 - Very Dense

COHESIVE SOILS (N-Value)

0 to 2 - Very Soft
3 to 4 - Soft
5 to 8 - Medium Stiff
9 to 15 - Stiff
15 to 30 - Very Stiff
Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 1/4 Inch ID Hollow Stem Auger.(HSA)

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
8/22/05		8		

REMARKS:
1) WOH = Weight of Hammer

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-1
FILE NO. 77210
Sheet No. 2 of 2
Checked by: K. Jelinek
Date Start 8/22/05
Date End 8/22/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan
Driller Justin Emma Inspector Adam Roy Ground Surface El. 12.06 Datum NGVD Top-of-Riser El.

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure	WELL DETAIL	Ground Water	STRATUM	REMARKS
23		S-12	24	22.0-24.0	7 8 10 15	18	<1	Poorly graded sand (SP); wet, medium dense, 65% medium sand, 15% coarse sand, 10% fine sand, 5% silt, 5% gravel, brown. (ALLUVIUM)				
24												
25		S-13	22	24.0-26.0	12 14 17 13	31		Poorly graded sand; wet, dense, 70% medium sand, 15% fine sand, 10% coarse sand, 5% gravel, 5% silt, brown. (ALLUVIUM)				
26												
27		S-14	21	26.0-28.0	9 10 14 12	24		Similar to S-13 but medium dense.				
28												
29		S-15	24	28.0-30.0	4 5 8 12	13	<1	S-15A: Similar to S-14. (18 in.) S-15B: Poorly graded sand (SP); wet, medium dense, 85% fine sand, 10% medium sand, 5% silt. (ALLUVIUM) (6 in.)				
30												
31								Boring terminated at 30 ft. Reached target depth.				
32												
33												
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												

GRANULAR SOILS (N-Value)

0 to 4 - Very Loose
5 to 10 - Loose
10 to 30 - Medium Dense
31 to 50 - Dense
Over 50 - Very Dense

COHESIVE SOILS (N-Value)

0 to 2 - Very Soft
3 to 4 - Soft
5 to 8 - Medium Stiff
9 to 15 - Stiff
15 to 30 - Very Stiff
Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 1/4 inch ID Hollow Stem Auger.(HSA)

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
8/22/05		8		

REMARKS:

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-2 MW

FILE NO. 77210

Sheet No. 1 of 2

Checked by: K. Jelinek

Date Start 8/22/05

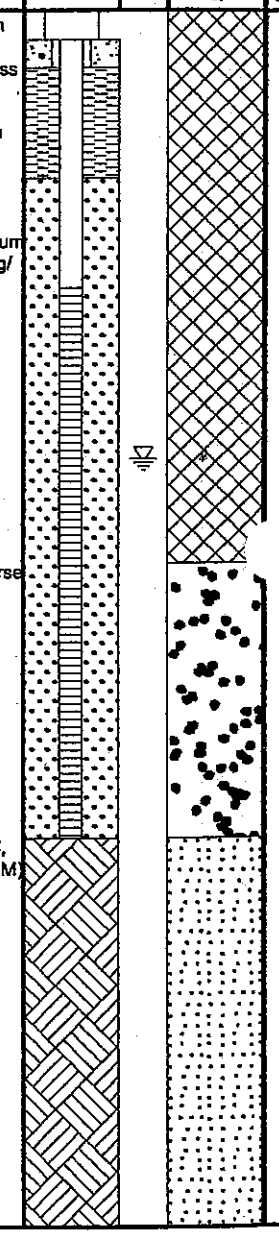
Date End 8/22/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan

Driller Justin Emma Inspector Adam Roy Ground Surface El. 10.79 Datum NGVD Top-of-Riser El. 10.43

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure
1		S-1	15	0.0-2.0	4 10 10 10	20	<1	Silty sand (SM); dry, medium dense, 40% fine sand, 25% medium sand, 15% silt, 10% coarse sand, 10% gravel, brown with black. (FILL) Brick and asphalt material noted in sample. Roots and grass noted in top 6 in.
2								
3		S-2	17	2.0-4.0	7 4 5 5	9	<1	Silty sand (SM); dry, loose, 40% silt, 35% fine sand, 10% medium sand, 10% gravel, 5% coarse sand, brown. (FILL)
4				3.0-3.0				
5		S-3	15	4.0-6.0	4 11 7 7	18	<1	Sandy silt (ML); dry, very stiff, 50% silt, 30% fine sand, 10% medium sand, 5% coarse sand, trace clay dark brown. (FILL) Possible slag/ coal ash and concrete noted in sample.
6								
7		S-4	2	6.0-8.0	8 5 3 2	8	<1	Poor recovery, similar to S-3 but medium stiff, rock in spoon tip.
8								
9		S-5	4	8.0-10.0	2 2 1 1	3	<1	Poor recovery similar to S-3 but wet.
10								
11		S-6	5	10.0-12.0	1 1 2 1	3	<1	Poorly graded gravel (GP), wet, very loose, 70% gravel, 15% coarse sand, 5% medium sand, 5% fine sand, 5% silt.
12								
13								
14								
15								
16		S-7	6	15.0-17.0	15 10 4 6	14	<1	Poorly graded sand (SP); wet, medium dense, 65% medium sand, 10% coarse sand, 10% fine sand, 10% gravel, 5% silt (ALLUVIUM)
17								
18								
19								
20								
21		S-8	14	20.0-22.0	1 1 0 1	1	<1	Poorly graded sand (SP); wet, very loose, 90% fine sand, 5% medium sand, 5% silt. (ALLUVIUM)
22								

WELL DETAIL | Ground Water | STRATUM | REMARKS



GRANULAR SOILS (N-Value)

0 to 4 - Very Loose
5 to 10 - Loose
10 to 30 - Medium Dense
31 to 50 - Dense
Over 50 - Very Dense

COHESIVE SOILS (N-Value)

0 to 2 - Very Soft
3 to 4 - Soft
5 to 8 - Medium Stiff
9 to 15 - Stiff
15 to 30 - Very Stiff
Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 1/4 Inch ID Hollow Stem Auger. (HSA)

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
9/1/05		8.09	7.73	9 days

REMARKS:

1) Boring is into groundwater table, change to standard sampling intervals.

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-2 MW

FILE NO. 77210

Sheet No. 2 of 2

Checked by: K. Jelinek

Date Start 8/22/05

Date End 8/22/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan

Driller Justin Emma Inspector Adam Roy Ground Surface El. 10.79 Datum NGVD Top-of-Riser El. 10.43

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure	WELL DETAIL	Ground Water	STRATUM	REMARKS
23												
24												
25												
26		S-9	15	25.0-27.0	8 14 9 6	23		S-9A: Similar to S-8. (7 in) S-9B: Poorly graded sand (SP); wet, medium dense, 60% medium sand, 20% coarse sand, 10% fine sand, 5% silt, 5% gravel. (ALLUVIUM)				
27												
28												
29												
30												
31		S-10	8	30.0-32.0	11 7 8 11	15		Poorly graded sand (SP); wet, medium dense, 45% medium sand, 30% coarse sand, 10% fine sand, 10% gravel, 5% silt. (ALLUVIUM)				
32												
33								Boring terminated at 32 feet depth. Monitoring well installed at depth of 15 feet.				
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												

GRANULAR SOILS (N-Value)

0 to 4 - Very Loose
5 to 10 - Loose
10 to 30 - Medium Dense
31 to 50 - Dense
Over 50 - Very Dense

COHESIVE SOILS (N-Value)

0 to 2 - Very Soft
3 to 4 - Soft
5 to 8 - Medium Stiff
9 to 15 - Stiff
15 to 30 - Very Stiff
Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 1/4 inch ID Hollow Stem Auger. (HSA)

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
9/1/05		8.09	7.73	9 days

REMARKS:

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-3
FILE NO. 77210
Sheet No. 1 of 2
Checked by: K. Jelinek
Date Start 8/22/05
Date End 8/22/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan
Driller Justin Emma Inspector Adam Roy Ground Surface El. 10.05 Datum NGVD Top-of-Riser El.

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (Inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure	WELL DETAIL	Ground Water	STRATUM	REMARKS
1		S-1	16	0.0-2.0	8 22 17 12	39	<1	Silty sand (SM); dry, dense, 40% fine sand, 20% medium sand, 15% silt, 10% coarse sand, 5% gravel, brown. (FILL)				
2												
3		S-2	15	2.0-4.0	5 4 3 3	7		Silty sand (SM); dry, loose, 60% fine sand, 15% silt, 10% coarse sand, 10% medium sand, 5% gravel, brown to light brown. Brick material and possible roofing material noted in sample. (FILL)				
4												
5		S-3	9	4.0-6.0	8 7 3 20	10	<1	Silty sand (SM); dry, loose, 60% fine sand, 20% silt, 10% medium sand, 5% coarse sand, 5% gravel, brown with black. (FILL) Trace brick material noted in sample.				
6												
7		S-4	12	6.0-8.0	7 4 4 4	8	<1	Poorly graded sand (SP); dry to wet (bottom 8 in.) 60% coarse sand 25% medium sand, 10% gravel, 5% fine sand, 5% silt, brown. (ALLUVIUM)		▽		
8												
9		S-5	0	8.0-10.0	7 7 4 6	11	<1	No recovery in spoon, possibly pushing a rock.				
10												
11		S-6	8	10.0-12.0	4 2 4 3	6	<1	Poorly graded sand with gravel (SP); wet, loose, 50% coarse sand, 25% medium sand, 15% gravel, 5% fine sand, 5% silt, brown. Rock lodged in spoon tip. (ALLUVIUM)				
12												
13												
14												
15												
16		S-7	7	15.0-17.0	9 7 8 7	15	<1	Poorly graded sand with gravel (SP); wet, medium dense, 40% medium sand, 20% coarse sand, 20% fine sand, 15% gravel, 5% silt, brown. (ALLUVIUM)				
17												
18												
19												
20												
21		S-8	5	20.0-22.0	2 3 5 4	8	<1	Poorly graded sand (SP); wet, loose, 40% coarse sand, 30% medium sand, 15% fine sand, 10% gravel, 5% silt, brown. (ALLUVIUM)				
22												

GRANULAR SOILS (N-Value)

0 to 4 - Very Loose
5 to 10 - Loose
10 to 30 - Medium Dense
31 to 50 - Dense
Over 50 - Very Dense

COHESIVE SOILS (N-Value)

0 to 2 - Very Soft
3 to 4 - Soft
5 to 8 - Medium Stiff
9 to 15 - Stiff
15 to 30 - Very Stiff
Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 1/4 inch ID Hollow Stem Auger. (HSA)

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
8/22/05		7		

REMARKS:
1) Boring is into groundwater table, switch to standard sampling intervals.

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-3
FILE NO. 77210
Sheet No. 2 of 2
Checked by: K. Jelinek
Date Start 8/22/05
Date End 8/22/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan
Driller Justin Emma Inspector Adam Roy Ground Surface El. 10.05 Datum NGVD Top-of-Riser El.

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure	WELL DETAIL	Ground Water	STRATUM	REMARKS
23												
24												
25												
26		S-9	9	25.0-27.0	6 4 4 4	8	<1	Poorly graded sand with gravel (SP); wet, loose, 40% fine sand, 30% medium sand, 15% gravel, 10% coarse sand, 5% silt, brown. (ALLUVIUM)				
27												
28												
29												
30												
31		S-10	18	30.0-32.0	5 4 3 7	7	<1	Poorly graded sand (SP); wet, loose, 90% fine sand, 5% medium sand, 5% silt, brown. Thin laminated layers of silt/clay noted in bottom of sample.				
32												
33								Boring terminated at 32 feet. Reached target depth.				
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												

GRANULAR SOILS (N-Value)

0 to 4 - Very Loose
5 to 10 - Loose
10 to 30 - Medium Dense
31 to 50 - Dense
Over 50 - Very Dense

COHESIVE SOILS (N-Value)

0 to 2 - Very Soft
3 to 4 - Soft
5 to 8 - Medium Stiff
9 to 15 - Stiff
15 to 30 - Very Stiff
Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 1/4 inch ID Hollow Stem Auger. (HSA)

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
8/22/05		7		

REMARKS:

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-4
FILE NO. 77210
Sheet No. 1 of 3
Checked by: K. Jelinek
Date Start 8/23/05
Date End 8/23/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan
Driller Justin Emma Inspector Adam Roy Ground Surface El. 15.38 Datum NGVD Top-of-Riser El.

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure	WELL DETAIL	Ground Water	STRATUM	REMARKS
1		S-1	15	0.0-2.0	6 10 11 12	21	<1	Sandy silt (ML); dry, very stiff, 50% silt, 15% medium sand, 25% fine sand, 5% coarse sand, 5% gravel, light brown. (FILL) Grass and organics noted in top 6 in. of sample.				
2												
3		S-2	21	2.0-4.0	6 10 10 10	20	<1	Silt (ML); dry, 80% silt, 10% fine sand, 10% clay, light brown. Clay is intermixed in sample. (FILL)				
4												
5		S-3	19	4.0-6.0	9 7 9 8	16	<1	Silt (ML); dry, very stiff, 75% silt, 20% clay, 5% fine sand. 2.25 to 4.75 TSF with pocket pentrometer.				1
6												
7		S-4	24	6.0-8.0	9 8 9 10	17	<1	Lean clay (CL); moist, very stiff, 80% clay, 20% silt. 1.25 to 2.75 TSF with pocket pentrometer.				
8												
9		S-5	24	8.0-10.0	2 3 3 4	6	<1	Lean clay (CL); moist, medium stiff, 80% clay, 15% silt, 5% fine sand. Thin laminated layers of fine sand noted in sample. 1.75 to 3.25 TSF with pocket pentrometer.				2
10										▽		
11		S-6	24	10.0-12.0	2 2 3 3	5	<1	Similar to S-5, wet. 1.75 to 4.0 TSF with pocket pentrometer.				
12												
13												
14												
15												
16		S-7	20	15.0-17.0	2 2 4 5	6	<1	Poorly graded sand with silt (SP-SM); wet, loose, 80% fine sand, 10% silt, 10% clay, light brown. Silt and clay are lensed within sample. (ALLUVIUM)				
17												
18												
19												
20												
21		S-8	24	20.0-22.0	2 4 8 9	12	<1	Poorly graded sand (SP); wet, medium dense, 95% fine sand, 5% medium sand, 5% silt, light brown. (ALLUVIUM)				
22												

GRANULAR SOILS (N-Value)

0 to 4 - Very Loose
5 to 10 - Loose
10 to 30 - Medium Dense
31 to 50 - Dense
Over 50 - Very Dense

COHESIVE SOILS (N-Value)

0 to 2 - Very Soft
3 to 4 - Soft
5 to 8 - Medium Stiff
9 to 15 - Stiff
15 to 30 - Very Stiff
Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 1/4 inch ID Hollow Stem Auger. (HSA)

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
8/23/05		10		

REMARKS:
1) TSF is tons per square foot.
2) Collected a shelby tube sample on 8/24/05 from 8-10 ft.
3) Below water table switch to standard sampling.

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-4
FILE NO. 77210
Sheet No. 2 of 3
Checked by: K. Jelinek
Date Start 8/23/05
Date End 8/23/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan
Driller Justin Emma Inspector Adam Roy Ground Surface El. 15.38 Datum NGVD Top-of-Riser El.

Depth (ft.)	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC (inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure	WELL DETAIL	Ground Water	STRATUM	REMARKS
23												
24												
25												
26		S-9	22	25.0-27.0	2 4 5 6	9	<1	Poorly graded sand (SP); wet, loose, 75% fine sand, 20% medium sand (only in bottom 6 in.), 5% silt, light brown. (ALLUVIUM)				
27												
28												
29												
30												
31		S-10	24	30.0-32.0	WOR 3 5 7	8	<1	Poorly graded sand (SP); wet, loose, 80% medium sand, 10% fine sand, 5% coarse sand, 5% silt. (ALLUVIUM) Iron staining noted in sample.				1
32												
33												
34												
35								No sample collected at 35. ft. Running sands condition is to severe to collect an accurate sample. Advance HSA to 40 ft.				
36												
37												
38												
39												
40								No sample collected, running sands condition. Advance HSA to 45 ft.				
41												
42												
43												
44												

GRANULAR SOILS (N-Value)	COHESIVE SOILS (N-Value)
0 to 4 - Very Loose	0 to 2 - Very Soft
5 to 10 - Loose	3 to 4 - Soft
10 to 30 - Medium Dense	5 to 8 - Medium Stiff
31 to 50 - Dense	9 to 15 - Stiff
Over 50 - Very Dense	15 to 30 - Very Stiff
	Over 30 - Hard

Sampler: 2-Inch O.D. split-spoon sampler.

Drilling Method: 4 1/4 Inch ID Hollow Stem Auger. (HSA)

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
8/23/05		10		

REMARKS:
1) WOR = Wight of Ram

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-4
FILE NO. 77210
Sheet No. 3 of 3
Checked by: K. Jelinek
Date Start 8/23/05
Date End 8/23/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan
Driller Justin Emma Inspector Adam Roy Ground Surface El. 15.38 Datum NGVD Top-of-Riser El.

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure	WELL DETAIL	Ground Water	STRATUM	REMARKS
45												
46		S-11	24	45.0-47.0	12 14 20 21	34	<1	Poorly graded sand (SP); wet, dense, 60% medium sand, 20% fine sand, 10% coarse sand, 5% silt, 5% gravel, brown. (ALLUVIUM)				
47												
48												
49												
50												
51								No sample collected, running sands condition. Boring terminated at 50 ft. reached target depth.				
52												
53												
54												
55												
56												
57												
58												
59												
60												
61												
62												
63												
64												
65												
66												

GRANULAR SOILS (N-Value)

0 to 4 - Very Loose
5 to 10 - Loose
10 to 30 - Medium Dense
31 to 50 - Dense
Over 50 - Very Dense

COHESIVE SOILS (N-Value)

0 to 2 - Very Soft
3 to 4 - Soft
5 to 8 - Medium Stiff
9 to 15 - Stiff
15 to 30 - Very Stiff
Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 1/4 inch ID Hollow Stem Auger. (HSA)

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
8/23/05		10		

REMARKS:

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-5MW

FILE NO. 77210

Sheet No. 1 of 2

Checked by: K. Jelinek

Date Start 8/23/05

Date End 8/23/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan

Driller Justin Emma Inspector Adam Roy Ground Surface El. 13.22 Datum NGVD Top-of-Riser El. 12.94

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure	WELL DETAIL	Ground Water	STRATUM	REMARKS
1		S-1	15	0.0-2.0	2 4 7 10	11	<1	Silt with sand (ML); dry, stiff, 80% silt, 10% fine sand, 5% medium sand, 5% clay, light brown. (FILL) Clay is intermixed, grass and organics noted in top 6 in. of sample.				
3		S-2	24	2.0-4.0	8 12 11 11	23	<1	Silt (ML); dry, very stiff, 80% silt, 15% clay, 5% fine sand. (FILL) Clay is intermixed throughout sample.				
5		S-3	24	4.0-6.0	4 6 10 11	16	<1	Lean clay (CL); moist, very stiff, 85% clay, 15% silt. Silt lenses noted in sample. 2.0 to 2.75 TSF on pocket pentrometer.				1
7		S-4	24	6.0-8.0	7 7 7 7	14	<1	Lean clay (CL); moist, wet at bottom, stiff, 80% clay, 10% silt, 5% fine sand, 5% gravel. 1.5 to 2.75 TSF on pocket pentrometer.				
9		S-5	24	8.0-10.0	4 4 3 6	7	<1	Lean clay (CL); moist to wet, medium stiff, 90% clay, 5% fine sand, 5% silt, brown. 1.5 to 2.5 TSF with pocket pentrometer.				
11		S-6	24	10.0-12.0	6 6 7 10	13	<1	Sandy lean clay (CL); wet, stiff, 80% clay, 20% fine sand, light brown/gray. Sand content increases with depth.		▽		2
16		S-7	15	15.0-17.0	2 2 4 3	6	<1	Poorly graded sand (SP); wet, loose, 45% fine sand, 45% medium sand, 5% coarse sand, 5% silt, brown. 2 in. stratified layer of silt and clay noted in top of sample. (ALLUVIUM)				
21		S-8	17	20.0-22.0	2 3 4 7	7	<1	Poorly graded sand (SP); wet, loose, 55% fine sand, 35% medium sand, 5% coarse sand, 5% silt, brown. (ALLUVIUM)				

GRANULAR SOILS (N-Value)

0 to 4 - Very Loose
5 to 10 - Loose
10 to 30 - Medium Dense
31 to 50 - Dense
Over 50 - Very Dense

COHESIVE SOILS (N-Value)

0 to 2 - Very Soft
3 to 4 - Soft
5 to 8 - Medium Stiff
9 to 15 - Stiff
15 to 30 - Very Stiff
Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 1/4 inch ID Hollow Stem Auger. (HSA)

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
9/1/05		10.56	10.28	8 days

REMARKS:

1) TSF is tons per square-foot.
2) Below groundwater table, start using standard sampling intervals.

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-5MW
FILE NO. 77210
Sheet No. 2 of 2
Checked by: K. Jelinek
Date Start 8/23/05
Date End 8/23/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan
Driller Justin Emma Inspector Adam Roy Ground Surface El. 13.22 Datum NGVD Top-of-Riser El. 12.94

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure	WELL DETAIL	Ground Water	STRATUM	REMARKS
23												
24												
25												
26		S-9	17	25.0-27.0	WOH WOH 1 1	NA	<1	Similar to S-7. 1 piece of gravel noted in spoon.				1
27												
28												
29												
30												
31		S-10	20	30.0-32.0	7 7 11 15	18	<1	Poorly graded sand (SP); wet, medium dense, 65% medium sand, 20% fine sand, 10% coarse sand, 5% silt, brown. (ALLUVIUM)				
32												
33								Boring terminated at 32 ft. Reached target depth. Monitoring well installed at depth of 15 feet.				
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												

GRANULAR SOILS (N-Value)

0 to 4 - Very Loose
5 to 10 - Loose
10 to 30 - Medium Dense
31 to 50 - Dense
Over 50 - Very Dense

COHESIVE SOILS (N-Value)

0 to 2 - Very Soft
3 to 4 - Soft
5 to 8 - Medium Stiff
9 to 15 - Stiff
15 to 30 - Very Stiff
Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 1/4 inch ID Hollow Stem Auger. (HSA)

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
9/1/05		10.56	10.28	8 days

REMARKS:
1) WOH = Weight of Hammer

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-6MW
FILE NO. 77210
Sheet No. 1 of 2
Checked by: K. Jelinek
Date Start 8/23/05
Date End 8/23/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan
Driller Justin Emma Inspector Adam Roy Ground Surface El. 22.03 Datum NGVD Top-of-Riser El. 21.66

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure
1		S-1	12	0.0-2.0	4 6 9 10	15	<1	Silty Sand (SM); dry, medium dense, 40% silt, 30% fine sand, 15% medium sand, 10% coarse sand, 5% gravel, brown. Grass and organics noted in top 6 in. (FILL)
2								
3		S-2	18	2.0-4.0	10 16 60 34	76	<	Poorly graded sand with silt (SP-SM); dry, very dense, 40% fine sand, 25% medium sand, 15% gravel, 10% coarse sand, 10% silt, brown. (FILL)
4								
5		S-3	14	4.0-6.0	6 3 3 3	6	<1	Silty sand (SM); dry, loose, 50% fine sand, 25% silt, 10% coarse sand, 10% medium sand, 5% gravel. Intermixed clay and brick material noted in sample. (FILL)
6								
7		S-4	14	6.0-8.0	2 2 3 3	5	<1	Similar to S-3, moist, possible slag and brick material noted in sample. (FILL)
8								
9		S-5	14	8.0-10.0	5 5 17 74	22	<1	Poorly graded sand with gravel (SP); moist to wet, 30% coarse sand, 30% medium sand, 20% fine sand, 15% gravel, 5% silt, brown, bottom 2 in. is black/gray. (FILL)
10								
11		S-6	12	10.0-12.0	11 7 5 3	12	14.0	Poorly graded sand with gravel (SP); wet, medium dense, 50% coarse sand, 15% medium sand, 15% fine sand, 15% gravel, 5% silt, gray/black. (FILL) Faint weathered petroleum odor noted in sample.
12								
13								
14								
15								
16		S-7	13	15.0-17.0	1 1 1 1	2	12.8	Very loose, similar to S-6. Faint weathered petroleum odor noted in sample.
17								
18								
19								
20								
21		S-8	13	20.0-22.0	4 2 2 2	4	11.2	S-8A: Similar to S-6. (8 in.) S-8B: Lean clay (CL); wet, soft, light gray.
22								

WELL DETAIL | Ground Water | STRATUM | REMARKS

REMARKS: 1 (Poorly graded sand with gravel (SP); wet, medium dense, 50% coarse sand, 15% medium sand, 15% fine sand, 15% gravel, 5% silt, gray/black. (FILL) Faint weathered petroleum odor noted in sample.)
REMARKS: 2 (Very loose, similar to S-6. Faint weathered petroleum odor noted in sample.)

GRANULAR SOILS (N-Value)

0 to 4 - Very Loose
5 to 10 - Loose
10 to 30 - Medium Dense
31 to 50 - Dense
Over 50 - Very Dense

COHESIVE SOILS (N-Value)

0 to 2 - Very Soft
3 to 4 - Soft
5 to 8 - Medium Stiff
9 to 15 - Stiff
15 to 30 - Very Stiff
Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 1/4 inch ID Hollow Stem Auger. (HSA)

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
9/1/05		9.12	8.75	8 days

REMARKS:
1) Below water table, start using standard sampling intervals.
2) Sheen noted on drilling rods below groundwater table.

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-6MW
FILE NO. 77210
Sheet No. 2 of 2
Checked by: K. Jelinek
Date Start 8/23/05
Date End 8/23/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan
Driller Justin Emma Inspector Adam Roy Ground Surface El. 22.03 Datum NGVD Top-of-Riser El. 21.66

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure	WELL DETAIL	Ground Water	STRATUM	REMARKS
23												
24												
25												
26		S-9	24	25.0-27.0	2 2 2 2	4	<1	Lean clay (CL); wet, soft, light gray. 0.75 to 1.5 TSF on pocket pentrometer.				1
27												
28												
29												
30												
31		S-10	24	30.0-32.0	WOH WOH WOH 2	NA	<1	Similar to S-9. 0.5 to 1.5 TSF.				2
32												
33								Boring terminated at 32 ft. Reached target depth. Monitoring Well installed at depth of 15 feet.				
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												

GRANULAR SOILS (N-Value)	COHESIVE SOILS (N-Value)
0 to 4 - Very Loose	0 to 2 - Very Soft
5 to 10 - Loose	3 to 4 - Soft
10 to 30 - Medium Dense	5 to 8 - Medium Stiff
31 to 50 - Dense	9 to 15 - Stiff
Over 50 - Very Dense	15 to 30 - Very Stiff
	Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 1/4 inch ID Hollow Stem Auger. (HSA)

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
9/1/05		9.12	8.75	8 days

REMARKS:
1) TSF is tons per square foot.
2) WOH = Weight of Hammer

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-7
FILE NO. 77210
Sheet No. 1 of 2
Checked by: K. Jelinek
Date Start 8/24/05
Date End 8/24/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan
Driller Justin Emma Inspector Adam Roy Ground Surface El. 24.09 Datum NGVD Top-of-Riser El.

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (Inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure	WELL DETAIL	Ground Water	STRATUM	REMARKS
1								Advance HSA through asphalt, (3 in.) Start sampling at 1 foot.				
2		S-1	12	1.0-3.0	2 3 3 1	6	<1	Poorly graded sand (SP); dry, loose, 60% medium sand, 15% fine sand, 10% coarse sand, 10% gravel, 5% silt, brown. (FILL)				
3												
4		S-2	11	3.0-5.0	7 6 6 4	12	<1	Poorly graded sand (SP); dry, medium dense, 40% medium sand, 30% fine sand, 15% coarse sand, 10% gravel, 5% silt, brown. (FILL)				
5												
6		S-3	13	5.0-7.0	6 4 10 8	14	<1	S-3A: Similar to S-2. (5 in.) S-3B: Silty sand (SM); moist to wet, medium dense, 80% fine sand, 15% silt, 5% medium sand, brown. Laminated clay layer noted in sample. (8 in.)				
7												
8		S-4	16	7.0-9.0	7 11 17 20	28	<1	Silty sand (SM); moist to wet, medium dense, 80% fine sand, 20% silt. Advance HSA to 10ft.				
9												
10												
11		S-5	24	10.0-12.0	3 3 4 5	7	<1	Lean clay (CL); moist to wet, medium stiff, lensed fine sand and silt noted in top 12 in., light brown to light gray. 1.5 to 3.5 TSF on pocket pentrometer.				1
12												
13												
14												
15												
16								Shelby tube sample from 15 to 17 ft. Advance HSA to 20 ft.				
17												
18												
19												
20												
21		S-6	24	20.0-22.0	2 2 2 2	4	<1	Lean clay, wet, soft, light gray. 0.75 to 2.0 TSF on pocket pentrometer.				
22												

GRANULAR SOILS (N-Value)	COHESIVE SOILS (N-Value)
0 to 4 - Very Loose	0 to 2 - Very Soft
5 to 10 - Loose	3 to 4 - Soft
10 to 30 - Medium Dense	5 to 8 - Medium Stiff
31 to 50 - Dense	9 to 15 - Stiff
Over 50 - Very Dense	15 to 30 - Very Stiff
	Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 1/4 inch ID Hollow Stem Auger. (HSA)

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
8/24/05		9		

REMARKS:
1) TSF is tons per square foot.

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-7
FILE NO. 77210
Sheet No. 2 of 2
Checked by: K. Jelinek
Date Start 8/24/05
Date End 8/24/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan
Driller Justin Emma Inspector Adam Roy Ground Surface El. 24.09 Datum NGVD Top-of-Riser El.

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure	WELL DETAIL	Ground Water	STRATUM	REMARKS
23												
24												
25												
26		S-7	24	25.0-27.0	WOH 1 1 1	2	>1	Lean clay (CL); wet, very soft, thin laminated silt layer noted. 0.5 to 1.5 TSF on pocket pentrometer.				1
27												
28												
29												
30												
31		S-8	24	30.0-32.0	WOH WOH 2 2	NA	<1	Similar to S-7. 0.5 to 1.5 TSF on pocket pentrometer. Advance HSA to 40 ft. to try and find limits of clay.				
32												
33												
34												
35												
36												
37												
38												
39												
40												
41		S-9	24	40.0-42.0	WOH WOH WOH WOH	NA	<1	Similar to S-7. 0.5 to 1.25 TSF on pocket pentrometer.				
42								Boring terminated at 42 ft. in clay.				
43												
44												

GRANULAR SOILS (N-Value)	COHESIVE SOILS (N-Value)
0 to 4 - Very Loose	0 to 2 - Very Soft
5 to 10 - Loose	3 to 4 - Soft
10 to 30 - Medium Dense	5 to 8 - Medium Stiff
31 to 50 - Dense	9 to 15 - Stiff
Over 50 - Very Dense	15 to 30 - Very Stiff
	Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 1/4 inch ID Hollow Stem Auger. (HSA)

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
8/24/05		9		

REMARKS:
1) WOH = Weight of Hammer

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-8
FILE NO. 77210
Sheet No. 1 of 3
Checked by: K. Jelinek
Date Start 8/25/05
Date End 8/25/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan
Driller Justin Emma Inspector Adam Roy Ground Surface El. 23.15 Datum NGVD Top-of-Riser El.

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure	WELL DETAIL	Ground Water	STRATUM	REMARKS
1		S-1	9	0.0-2.0	4 4 8 16	12	<1	Poorly graded sand with silt (SP-SM); dry, medium dense, 70% fine sand, 10% medium sand, 10% coarse sand, 5% gravel, brown. (FILL) Concrete noted in spoon tip.				
2												
3		S-2	4	2.0-4.0	7 50/2"	NA	<1	Similar to S-1. Concrete and brick material noted in sample. Spoon refusal. Auger refusal, move rig 3 feet and resume drilling.				
4												
5		S-3	12	4.0-6.0	8 22 11 13	33	<1	Poorly graded sand (SP); dry, dense, 50% medium sand, 25% fine sand, 15% coarse sand, 5% silt, 5% gravel, brown. (FILL)				
6												
7		S-4	12	6.0-8.0	22 17 26 32	43	<1	S-4A: Poorly graded sand (SP), dry, dense, 90% fine sand, 5% medium sand, 5% silt, brown, stratified iron staining noted in sample. (6 in.) S-4B: Silt (ML), Thin laminated clay layers noted. (6 in.)				
8												
9		S-5	8	8.0-10.0	3 4 4 6	8	<1	Lean clay (CL), stiff, gray. Thin laminated silt layers noted in sample. 1.75 to 3.0 TSF on pocket pentrometer.				1
10												
11		S-6	24	10.0-12.0	2 3 2 4	5	<1	Similar to S-5, medium stiff. 1.5 to 2.75 TSF on pocket pentrometer.				2
12												
13												
14												
15												
16		S-7	24	15.0-17.0	1 1 2 2	3	<1	Lean clay (CL); soft, gray. 0.5 to 1.75 TSF on pocket pentrometer.				
17												
18												
19												
20												
21		S-8	24	20.0-22.0	1 1 2 2	3	<1	Similar to S-7. 0 to 1.5 TSF on pocket pentrometer.				
22												

GRANULAR SOILS (N-Value)

0 to 4 - Very Loose
5 to 10 - Loose
10 to 30 - Medium Dense
31 to 50 - Dense
Over 50 - Very Dense

COHESIVE SOILS (N-Value)

0 to 2 - Very Soft
3 to 4 - Soft
5 to 8 - Medium Stiff
9 to 15 - Stiff
15 to 30 - Very Stiff
Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 inch HW casing. Drive and wash.

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
8/24/05				

REMARKS:
1) TSF is tons per square foot.
2) Continue using standard sampling intervals.

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-8
FILE NO. 77210
Sheet No. 2 of 3
Checked by: K. Jelinek
Date Start 8/25/05
Date End 8/25/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan
Driller Justin Emma Inspector Adam Roy Ground Surface El. 23.15 Datum NGVD Top-of-Riser El.

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure	WELL DETAIL	Ground Water	STRATUM	REMARKS
23												
24												
25												
26		S-9	24	25.0-27.0	WOH 2 3 3	5	<1	Similar to S-7. 1.0 TSF on pocket pentrometer.				1
27												
28												
29												
30												
31		S-10	24	30.0-32.0	WOH 2 2 4	4	<1	Lean clay (CL); soft, gray. 0.5 to 1.0 TSF on pocket pentrometer. Advance HSA to 50 ft. Attempt to find limits of clay.				
32												
33												
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												

GRANULAR SOILS (N-Value)

0 to 4 - Very Loose
5 to 10 - Loose
10 to 30 - Medium Dense
31 to 50 - Dense
Over 50 - Very Dense

COHESIVE SOILS (N-Value)

0 to 2 - Very Soft
3 to 4 - Soft
5 to 8 - Medium Stiff
9 to 15 - Stiff
15 to 30 - Very Stiff
Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 inch HW casing. Drive and wash.

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
8/24/05				

REMARKS:
1) WOH = Weight of Hammer

Nobis Engineering, Inc.

PROJECT

Division of Capital Asset Management

Ramp Re-Alignment Bridge Street and North Street

Salem, Massachusetts

BORING NO. B-8
FILE NO. 77210
Sheet No. 3 of 3
Checked by: K. Jelinek
Date Start 8/25/05
Date End 8/25/05

Boring Co. Geo-Search Rig CME 75 Truck Mount Boring Location See Site Plan
Driller Justin Emma Inspector Adam Roy Ground Surface El. 23.15 Datum NGVD Top-of-Riser El.

Depth (ft.)	Casing Blows (ft.)	SAMPLE INFORMATION Type & No.	REC (inches)	DEPTH (feet)	BLOWS/ 6 IN.	SPT N-Value	PID	SAMPLE DESCRIPTION Visual Manual Procedure	WELL DETAIL	Ground Water	STRATUM	REMARKS
45												
46												
47												
48												
49												
50												
51		S-11	19	50.0-52.0	15 13 13 14	26	<1	Poorly graded sand (SP); medium dense, 75% fine sand, 15% medium sand, 5% coarse sand, 5% silt, brown. (ALLUVIUM) Stratified iron staining and laminated clay layers noted in sample.				
52												
53												
54												
55												
56		S-12	15	55.0-57.0	12 11 12 13	23	<1	Poorly graded sand (SP); medium dense, 80% fine sand, 10% medium sand, 5% coarse sand, 5% silt. (ALLUVIUM) Stratified iron staining noted in sample.				
57												
58								Boring terminated at 57 ft. Found extent of clay layer.				
59												
60												
61												
62												
63												
64												
65												
66												

GRANULAR SOILS (N-Value)

0 to 4 - Very Loose
5 to 10 - Loose
10 to 30 - Medium Dense
31 to 50 - Dense
Over 50 - Very Dense

COHESIVE SOILS (N-Value)

0 to 2 - Very Soft
3 to 4 - Soft
5 to 8 - Medium Stiff
9 to 15 - Stiff
15 to 30 - Very Stiff
Over 30 - Hard

Sampler: 2-inch O.D. split-spoon sampler.

Drilling Method: 4 inch HW casing. Drive and wash.

Groundwater Observations (ft.)

Date	Time	Depth Below Ground	Depth Below Riser	Stabilization Time
8/24/05				

REMARKS:

APPENDIX C

GeoTesting express

1145 Massachusetts Avenue
Boxborough, MA 01719
978 635 0424 Tel
978 635 0266 Fax

Geotechnical Test Report

September 17, 2005

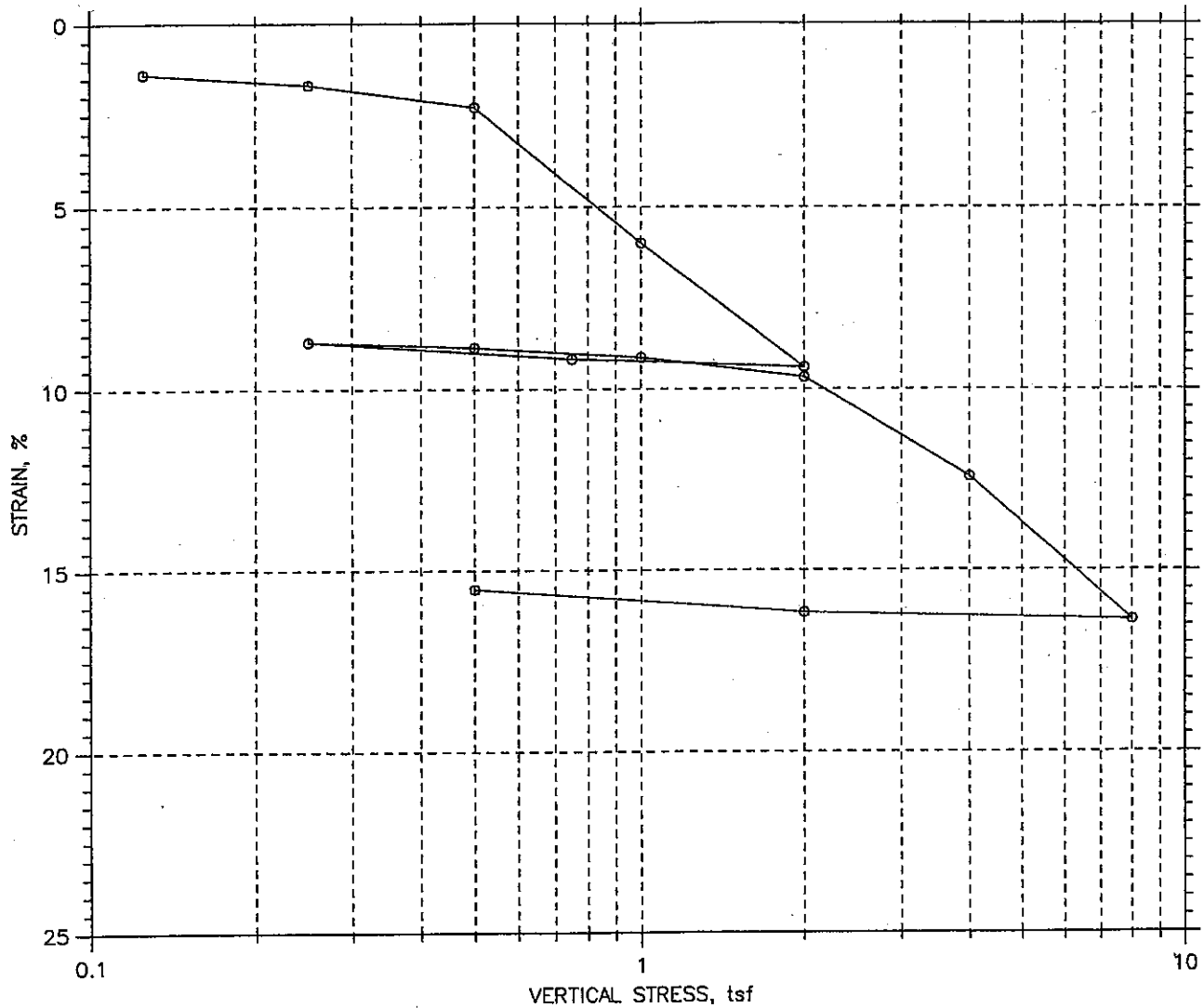
Project No. 77210.00

Prepared for:

Nobis

CONSOLIDATION TEST DATA

SUMMARY REPORT



				Before Test	After Test
Overburden Pressure: ---				Water Content, %	26.63	24.65
Preconsolidation Pressure: ---				Dry Unit Weight, pcf	86.23	102.1
Compression Index: ---				Saturation, %	74.22	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	0.98	0.67
LL: ---	PL: ---	PI: ---	GS: 2.74			

GeoTesting express	Project: NO.77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-4	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/07/05	Depth: 8 ft
	Test No.: 6182-C1	Sample Type: Tube	Elevation: ---
	Description: Moist, olive brown clayey silt		
	Remarks: ---		

CONSOLIDATION TEST DATA

Project: NO.77210.00
Boring No.: B-4
Sample No.: ---
Test No.: 6182-C1

Location: ---
Tested By: md
Test Date: 09/07/05
Sample Type: Tube

Project No.: GTX-6182
Checked By: jdt
Depth: 8 ft
Elevation: ---

Soil Description: Moist, olive brown clayey silt
Remarks: ---

Estimated Specific Gravity: 2.74
Initial Void Ratio: 0.98
Final Void Ratio: 0.67

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Initial Height: 1.00 in
Specimen Diameter: 2.50 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	1058	RING		
Wt. Container + Wet Soil, gm	224.24	356.26	354.06	145.93
Wt. Container + Dry Soil, gm	181.41	326.68	326.68	118.64
Wt. Container, gm	8.06	215.57	215.57	7.91
Wt. Dry Soil, gm	173.35	111.11	111.11	110.73
Water Content, %	24.71	26.63	24.65	24.65
Void Ratio	---	0.98	0.67	---
Degree of Saturation, %	---	74.22	100.00	---
Dry Unit Weight, pcf	---	86.228	102.06	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

CONSOLIDATION TEST DATA

Project: NO.77210.00
Boring No.: B-4
Sample No.: ---
Test No.: 6182-C1

Location: ---
Tested By: md
Test Date: 09/07/05
Sample Type: Tube

Project No.: GTX-6182
Checked By: jdt
Depth: 8 ft
Elevation: ---

Soil Description: Moist, olive brown clayey silt
Remarks: ---

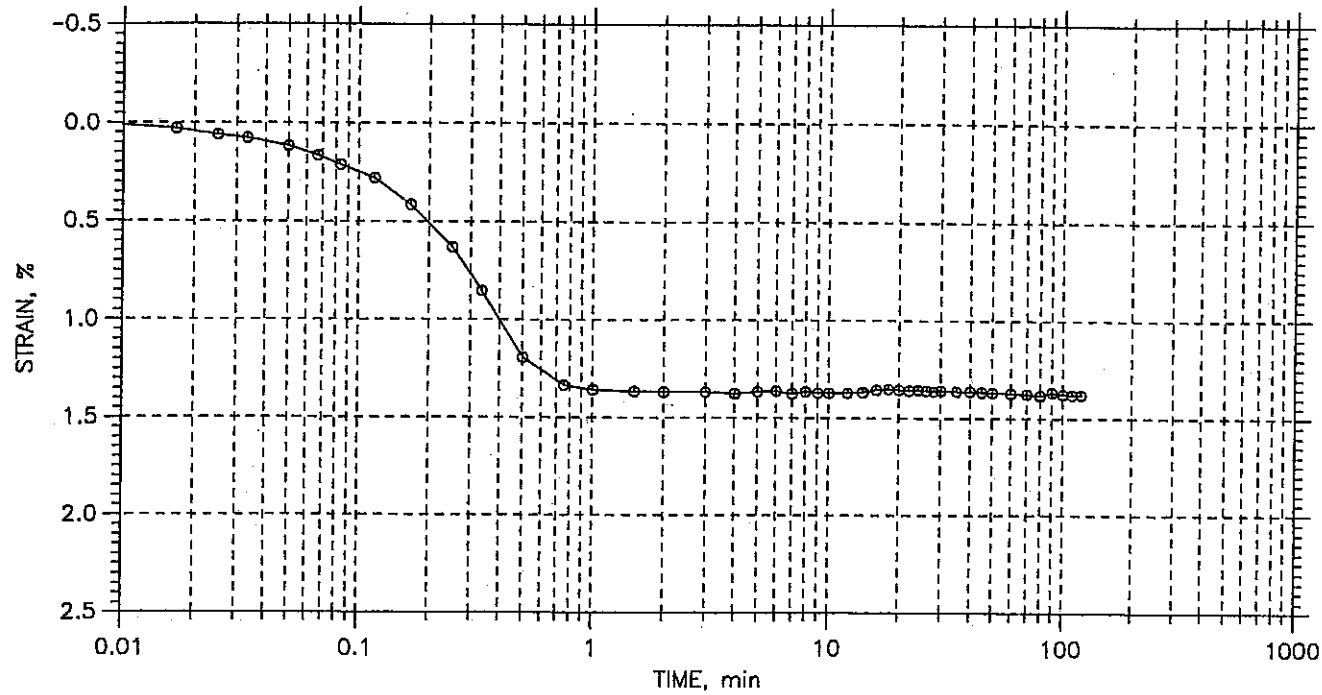
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	T50 Fitting Sq.Rt. min	T50 Fitting Log min	Coefficient of Consolidation Sq.Rt. in^2/sec	Coefficient of Consolidation Log in^2/sec	Coefficient of Consolidation Ave. in^2/sec
1	0.125	0.01378	0.955	1.38	0.3	0.0	2.46e-003	0.00e+000	2.46e-003
2	0.25	0.01673	0.949	1.67	0.2	0.0	3.56e-003	0.00e+000	3.56e-003
3	0.5	0.02283	0.937	2.28	0.2	0.0	3.88e-003	0.00e+000	3.88e-003
4	1	0.05989	0.863	5.99	0.4	0.4	1.97e-003	2.08e-003	2.03e-003
5	2	0.09398	0.796	9.40	0.2	0.1	4.53e-003	5.01e-003	4.75e-003
6	0.75	0.09169	0.800	9.17	0.1	0.0	1.33e-002	0.00e+000	1.33e-002
7	0.25	0.087	0.810	8.70	0.3	0.1	2.32e-003	6.99e-003	3.48e-003
8	0.5	0.08845	0.807	8.85	0.1	0.0	7.26e-003	0.00e+000	7.26e-003
9	1	0.09131	0.801	9.13	0.0	0.0	2.00e-002	0.00e+000	2.00e-002
10	2	0.09678	0.790	9.68	0.8	0.0	8.36e-004	0.00e+000	8.36e-004
11	4	0.1244	0.736	12.44	0.4	0.1	1.71e-003	6.58e-003	2.72e-003
12	8	0.1637	0.658	16.37	0.3	0.2	1.91e-003	2.74e-003	2.25e-003
13	2	0.1616	0.662	16.16	0.0	0.0	3.74e-002	3.20e-002	3.45e-002
14	0.5	0.1551	0.675	15.51	0.4	0.0	1.57e-003	0.00e+000	1.57e-003

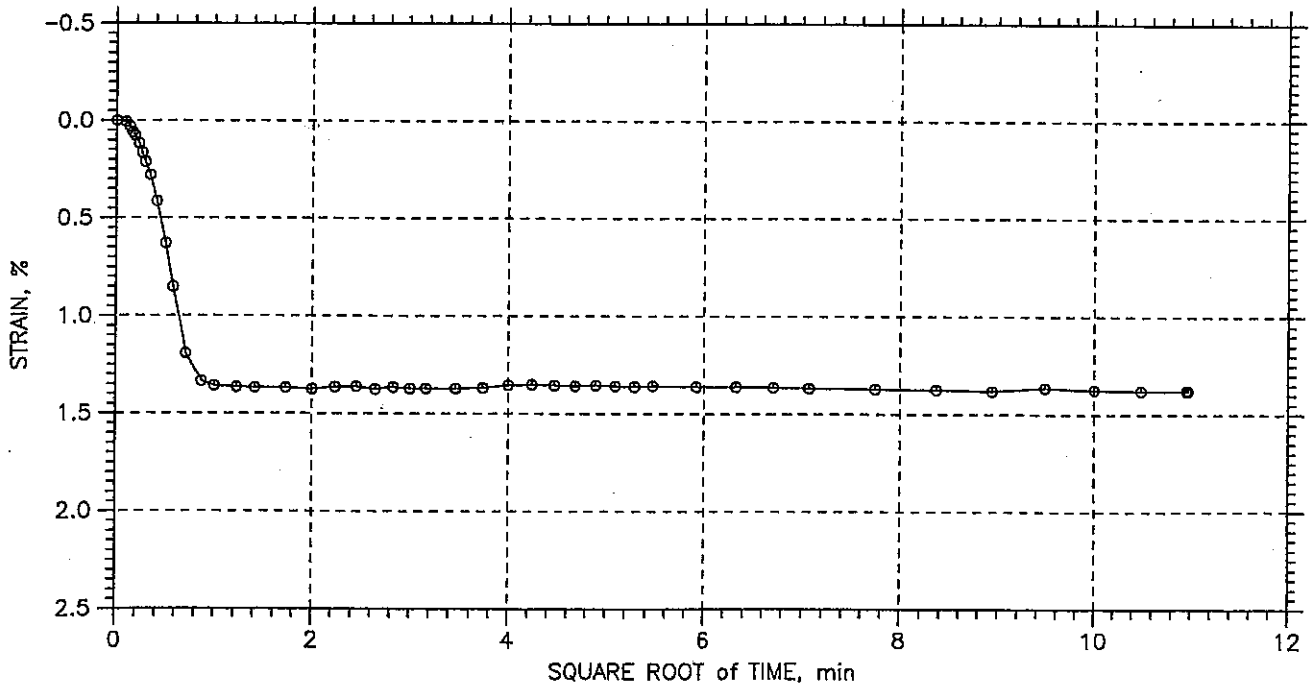
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 1 of 14

Stress: 0.125 tsf





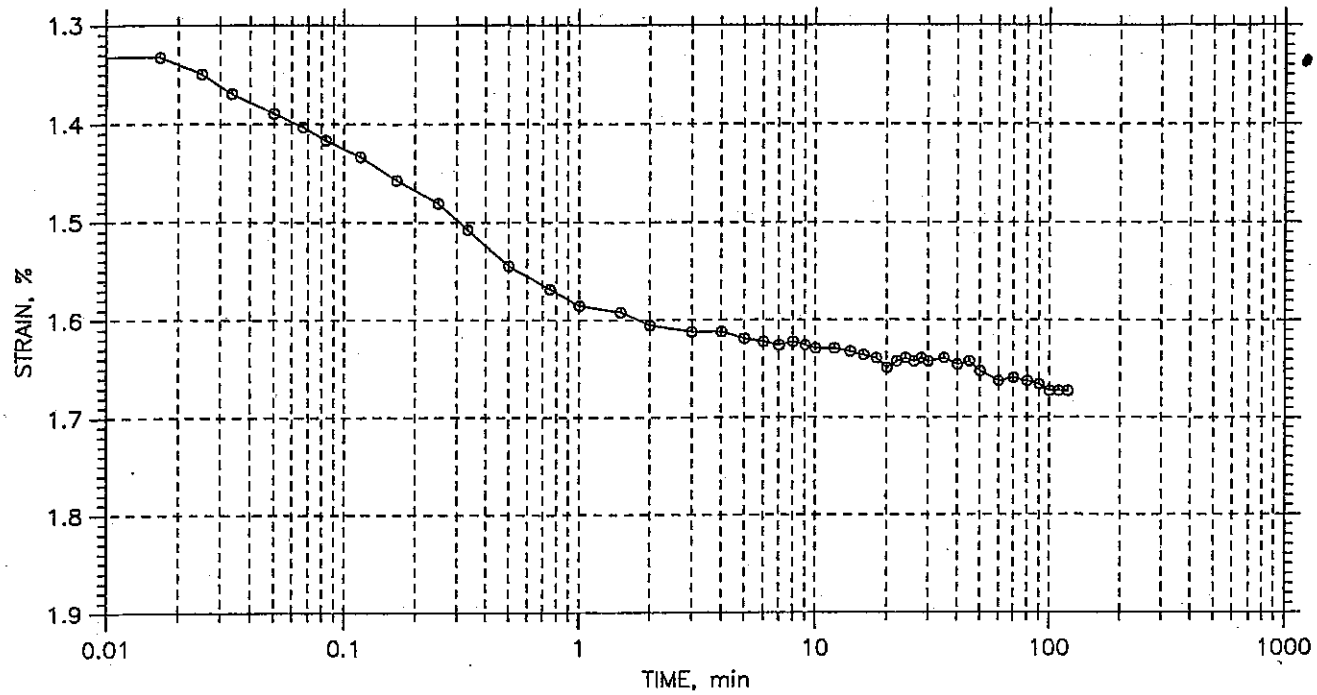
GeoTesting express	Project: N0.77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-4	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/07/05	Depth: 8 ft
	Test No.: 6182-C1	Sample Type: Tube	Elevation: ---
	Description: Moist, olive brown clayey silt		
	Remarks: ---		

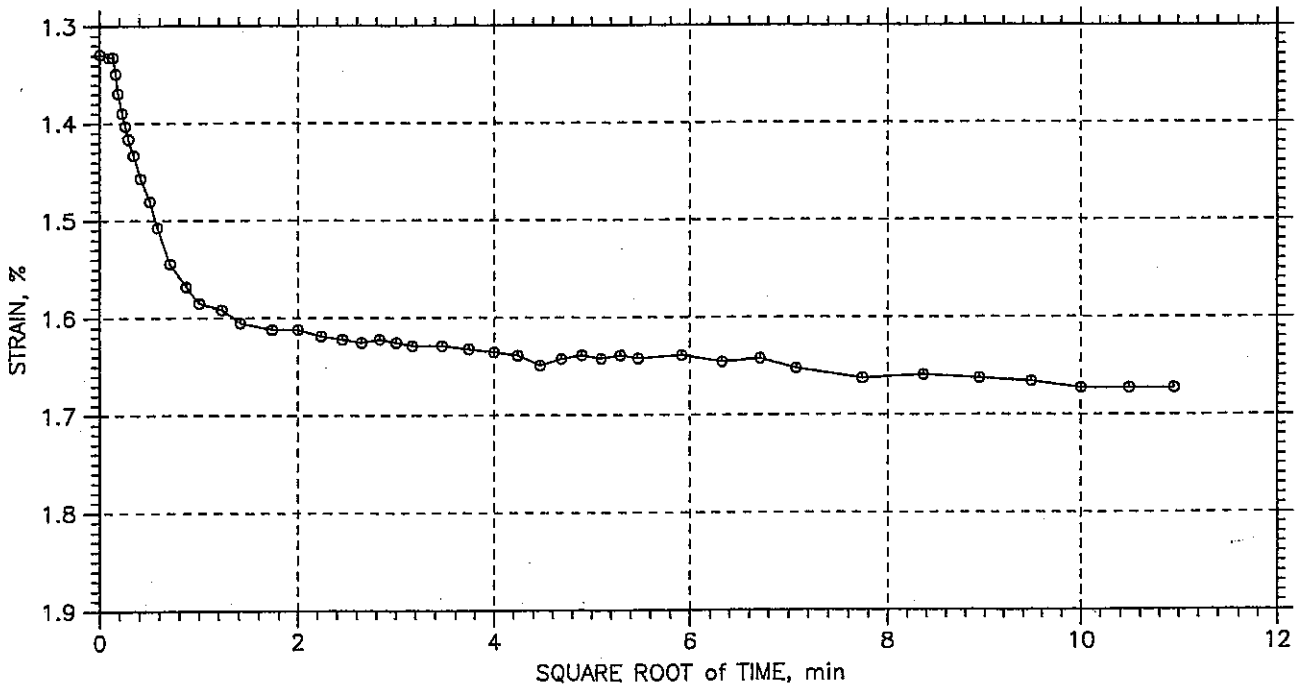
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 2 of 14

Stress: 0.25 tsf





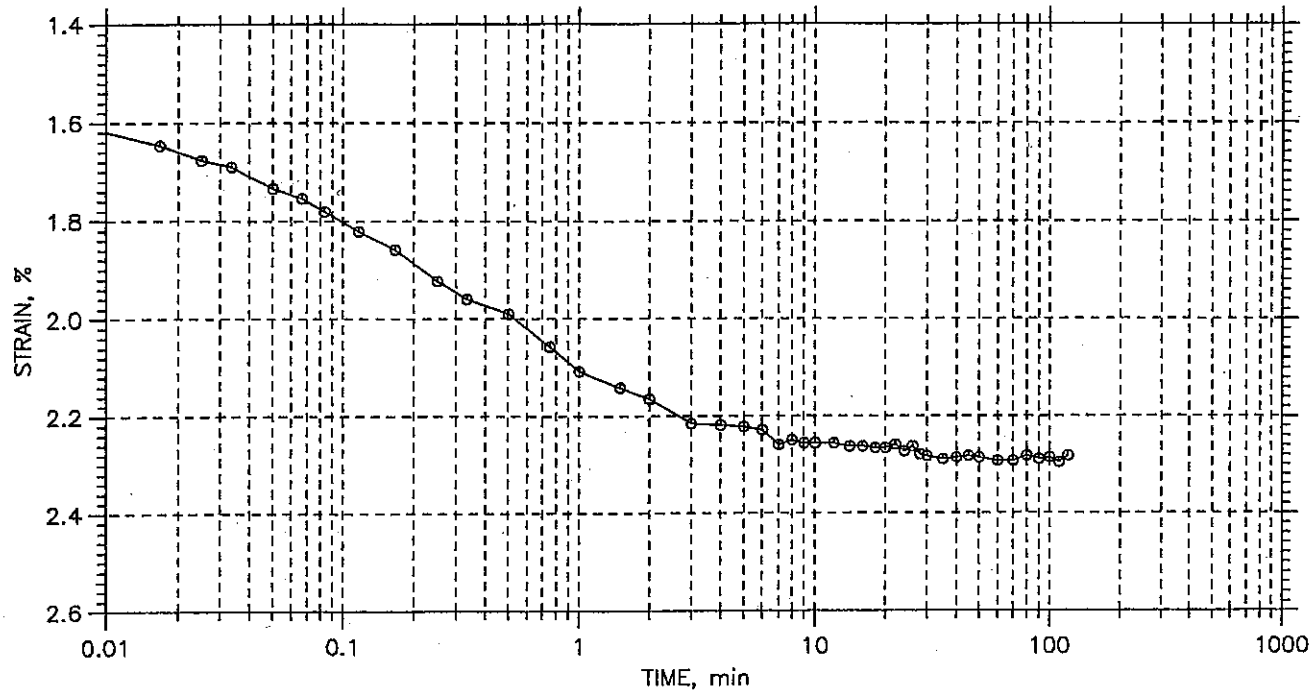
GeoTesting express	Project: NO.77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-4	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/07/05	Depth: 8 ft
	Test No.: 6182-C1	Sample Type: Tube	Elevation: ---
	Description: Moist, olive brown clayey silt		
	Remarks: ---		

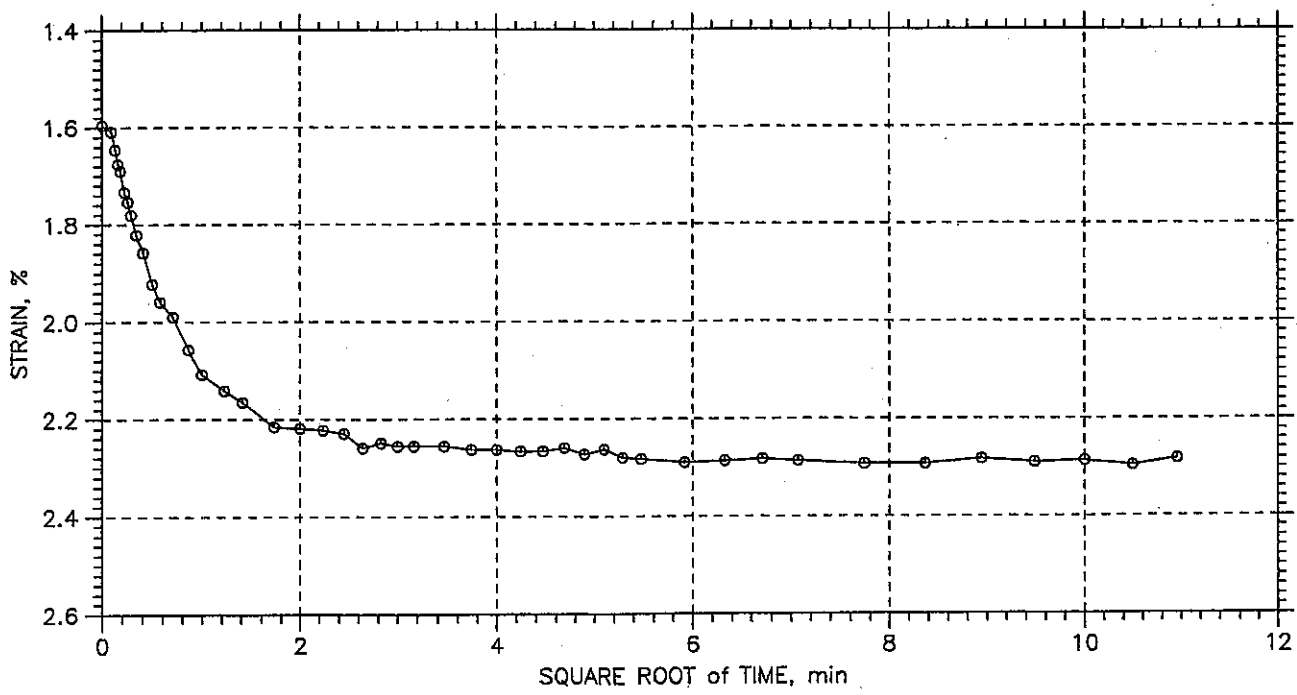
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 3 of 14

Stress: 0.5 tsf





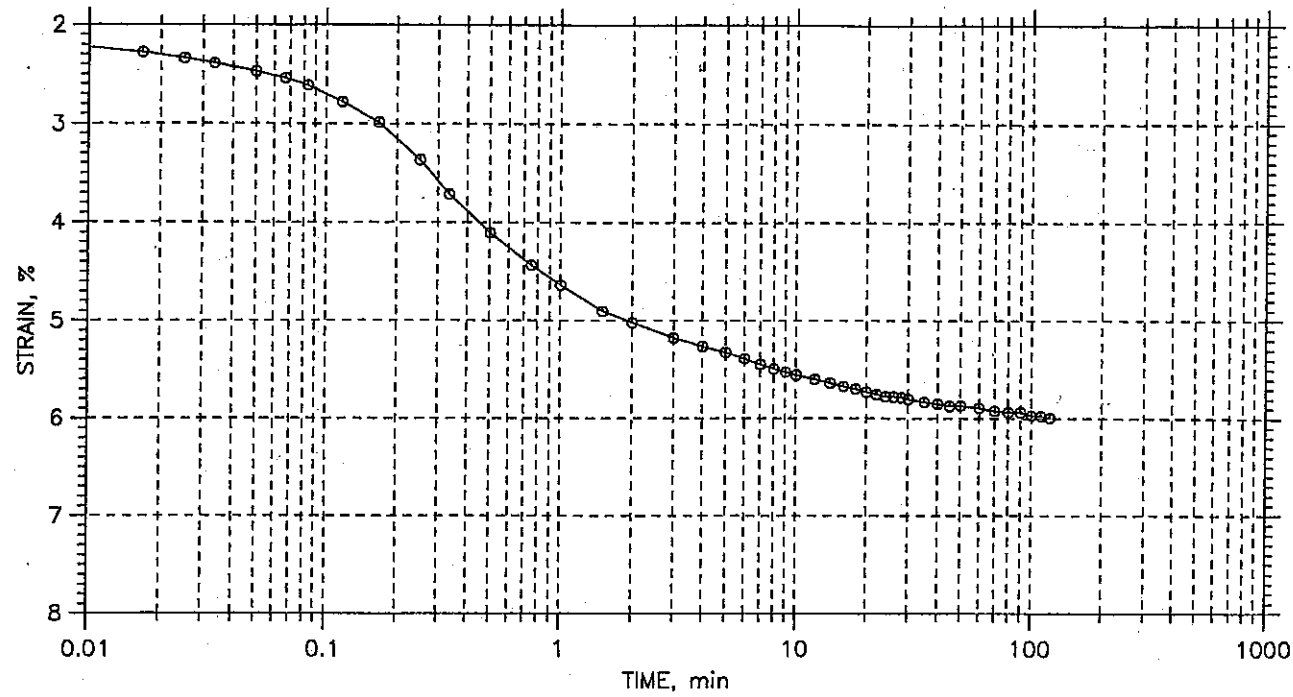
GeoTesting express	Project: NO.77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-4	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/07/05	Depth: 8 ft
	Test No.: 6182-C1	Sample Type: Tube	Elevation: ---
	Description: Moist, olive brown clayey silt		
	Remarks: ---		

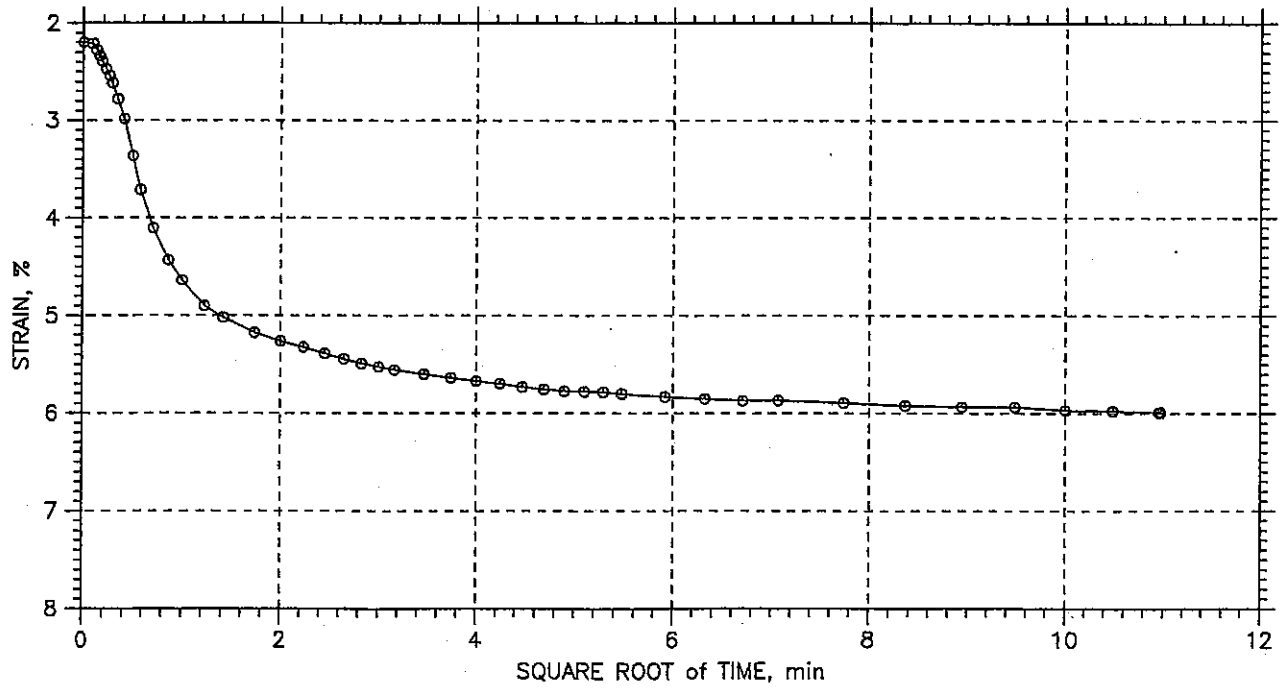
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 4 of 14

Stress: 1. tsf





GeoTesting express	Project: NO.77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-4	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/07/05	Depth: 8 ft
	Test No.: 6182-C1	Sample Type: Tube	Elevation: ---
	Description: Moist, olive brown clayey silt		
	Remarks: ---		

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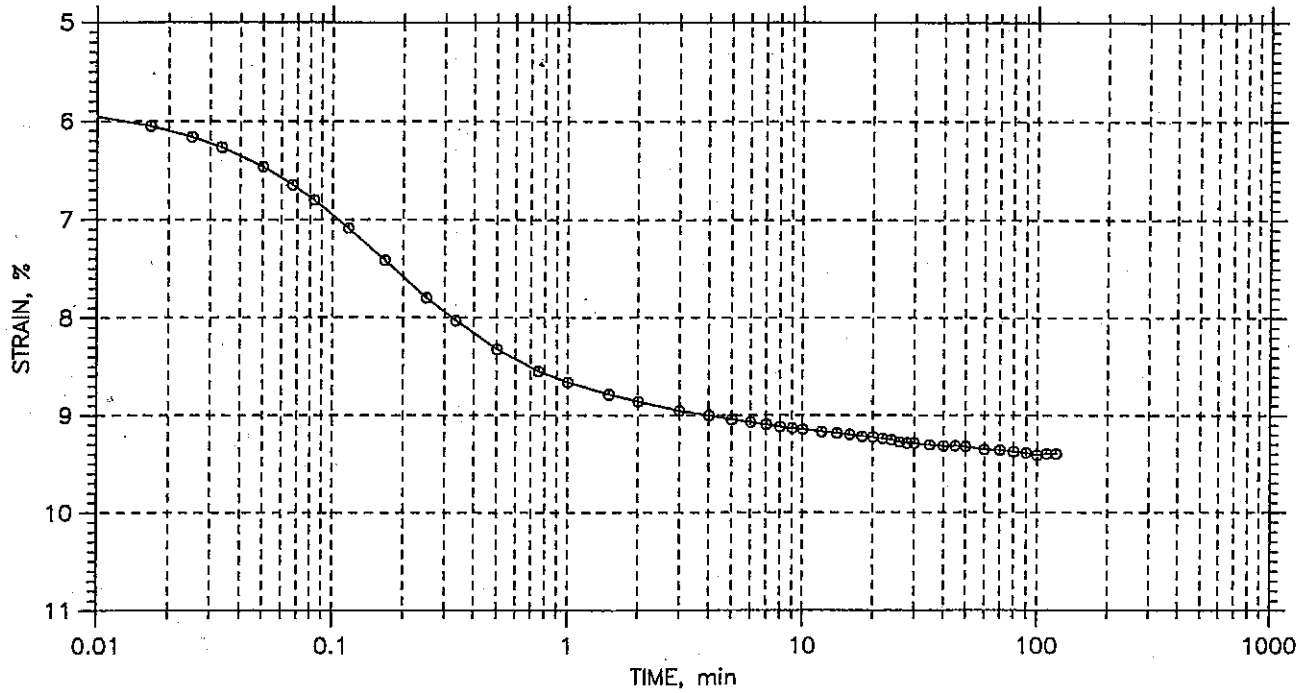
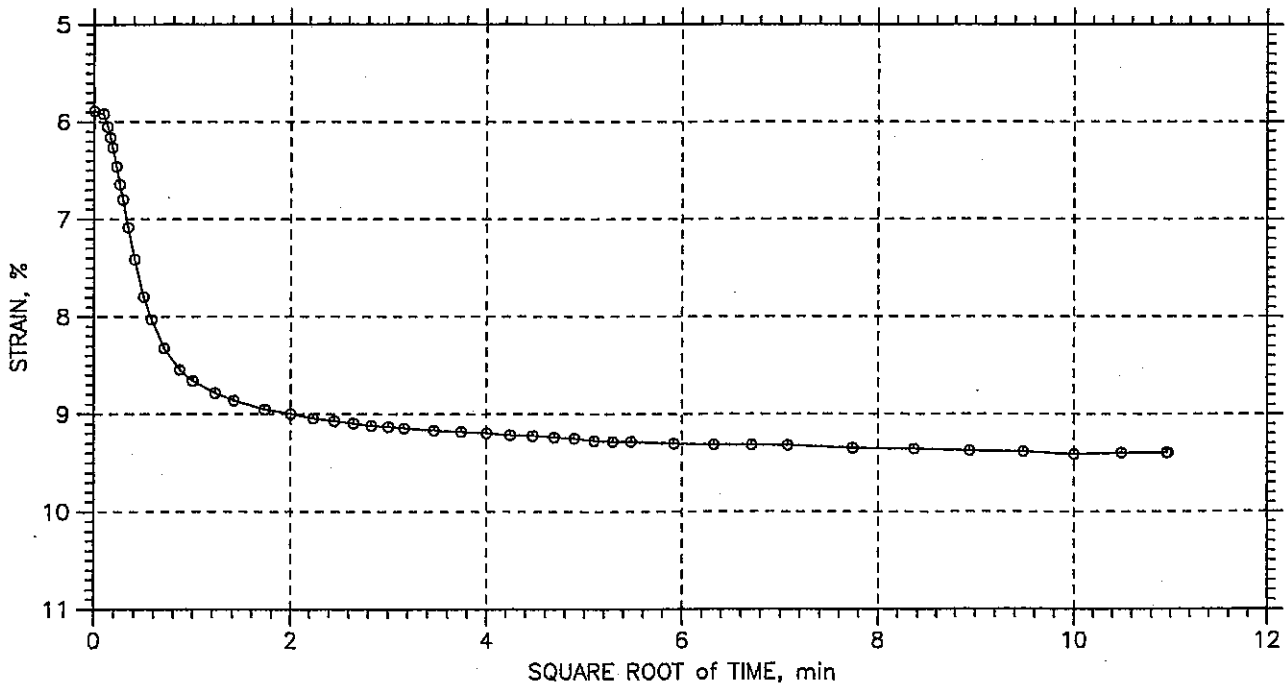
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 5 of 14

Stress: 2. tsf





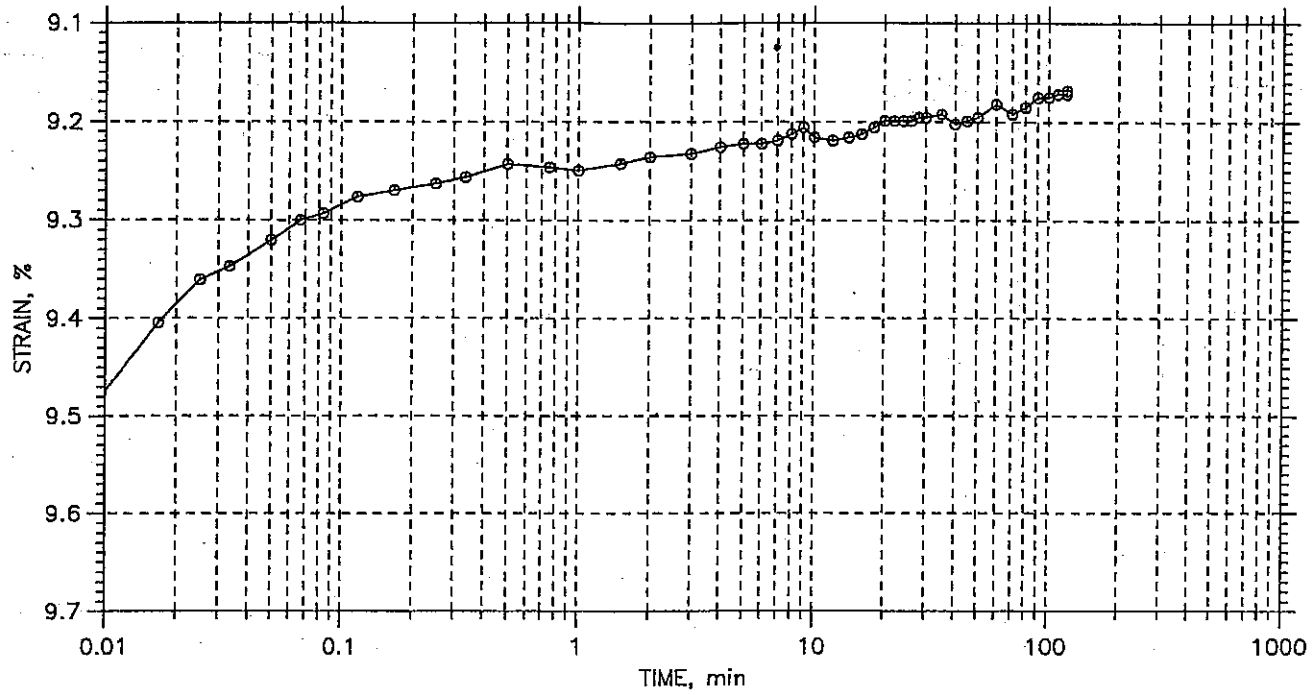
GeoTesting express	Project: N0.77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-4	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/07/05	Depth: 8 ft
	Test No.: 6182-C1	Sample Type: Tube	Elevation: ---
	Description: Moist, olive brown clayey silt		
	Remarks: ---		

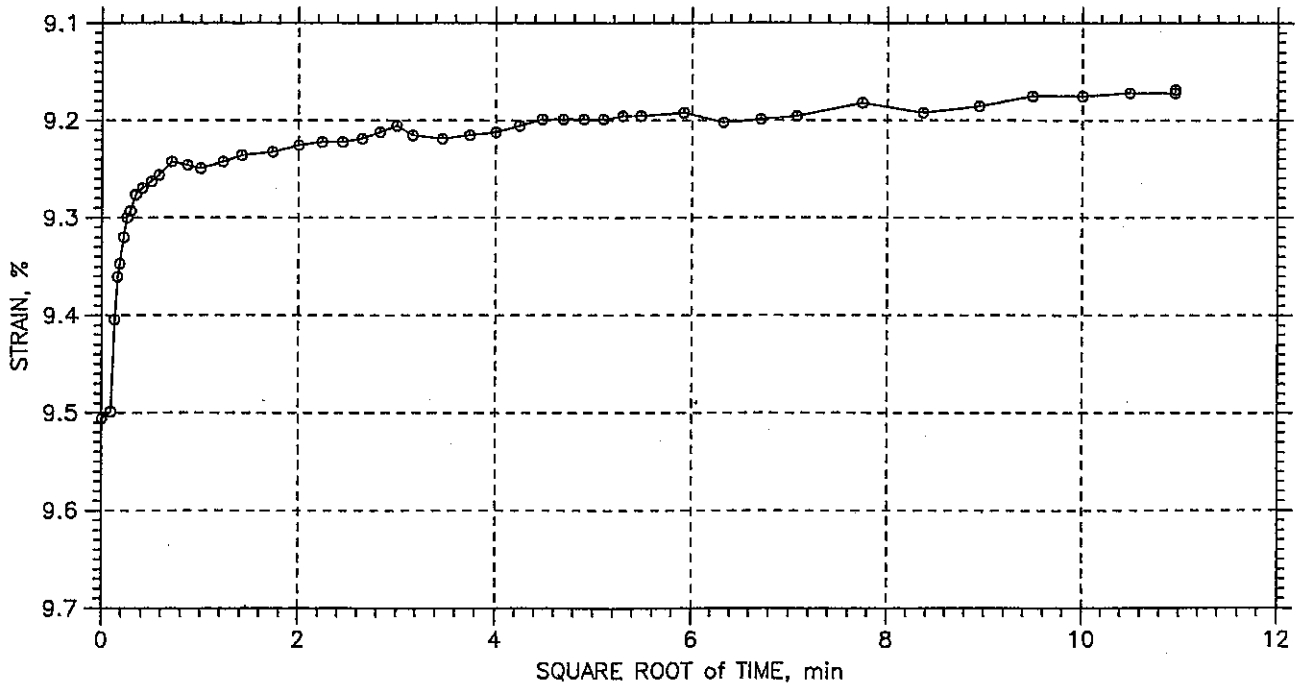
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 6 of 14

Stress: 0.75 tsf





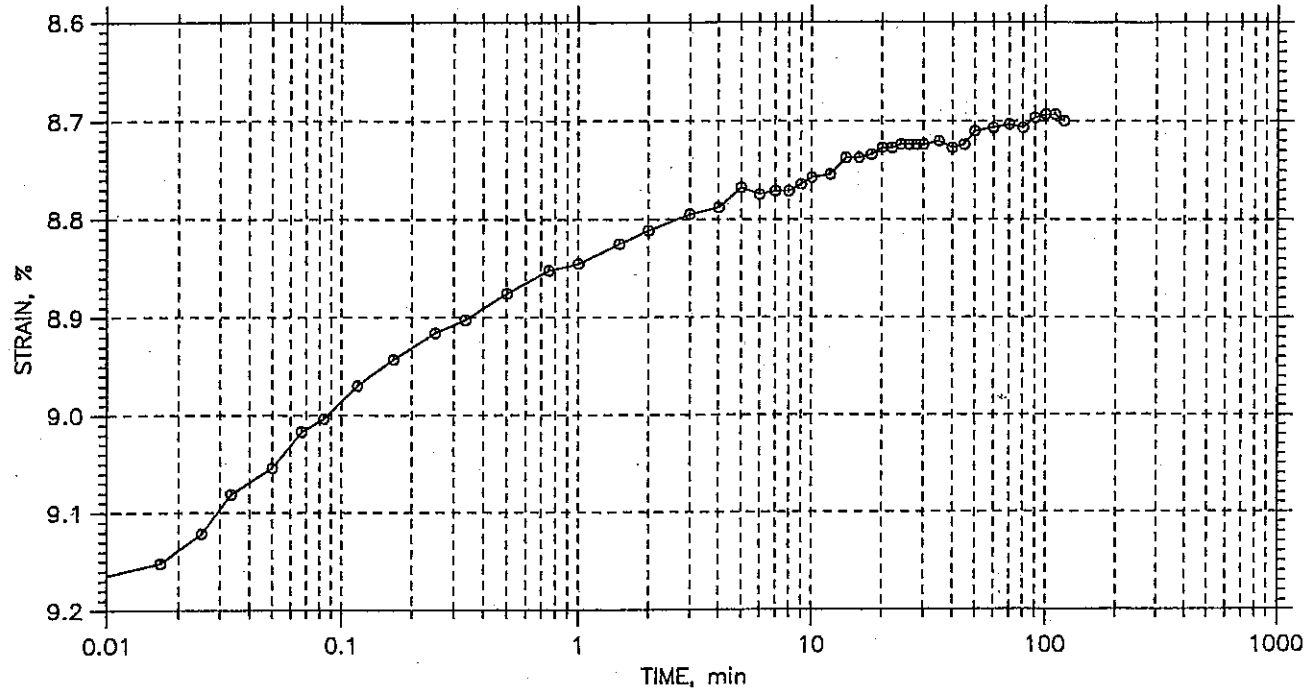
GeoTesting express	Project: NO.77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-4	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/07/05	Depth: 8 ft
	Test No.: 6182-C1	Sample Type: Tube	Elevation: ---
	Description: Moist, olive brown clayey silt		
	Remarks: ---		

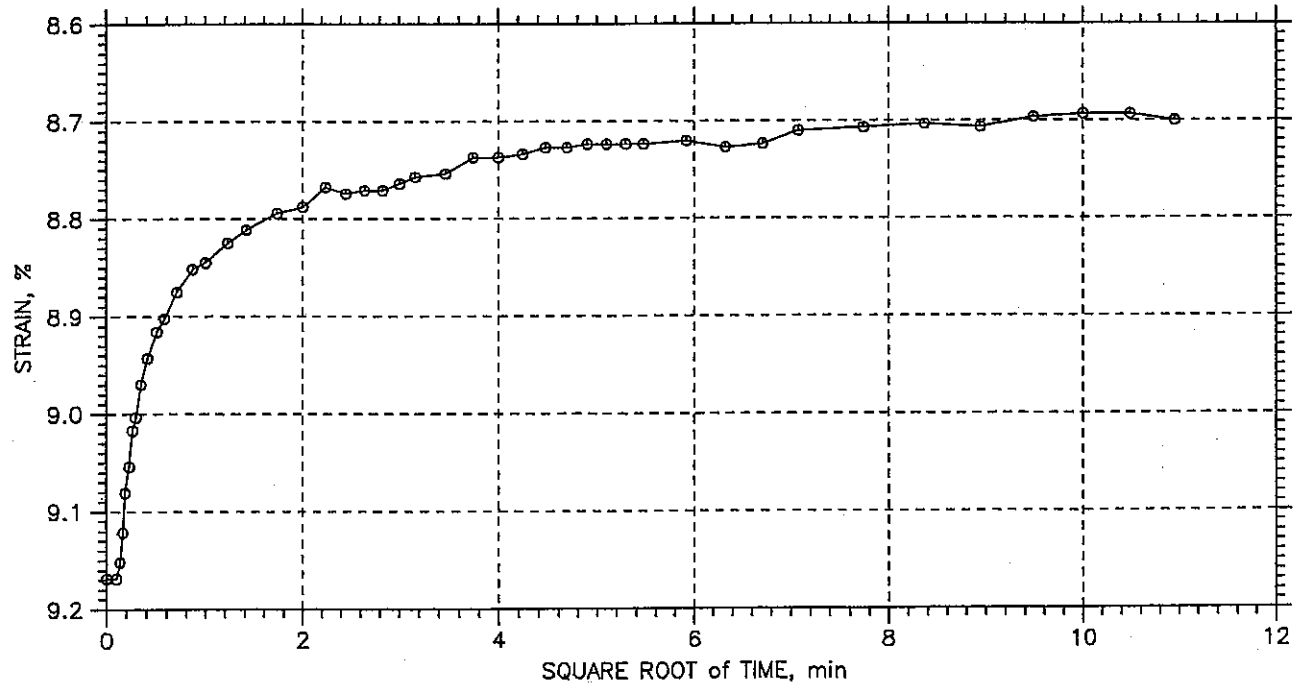
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 7 of 14

Stress: 0.25 tsf





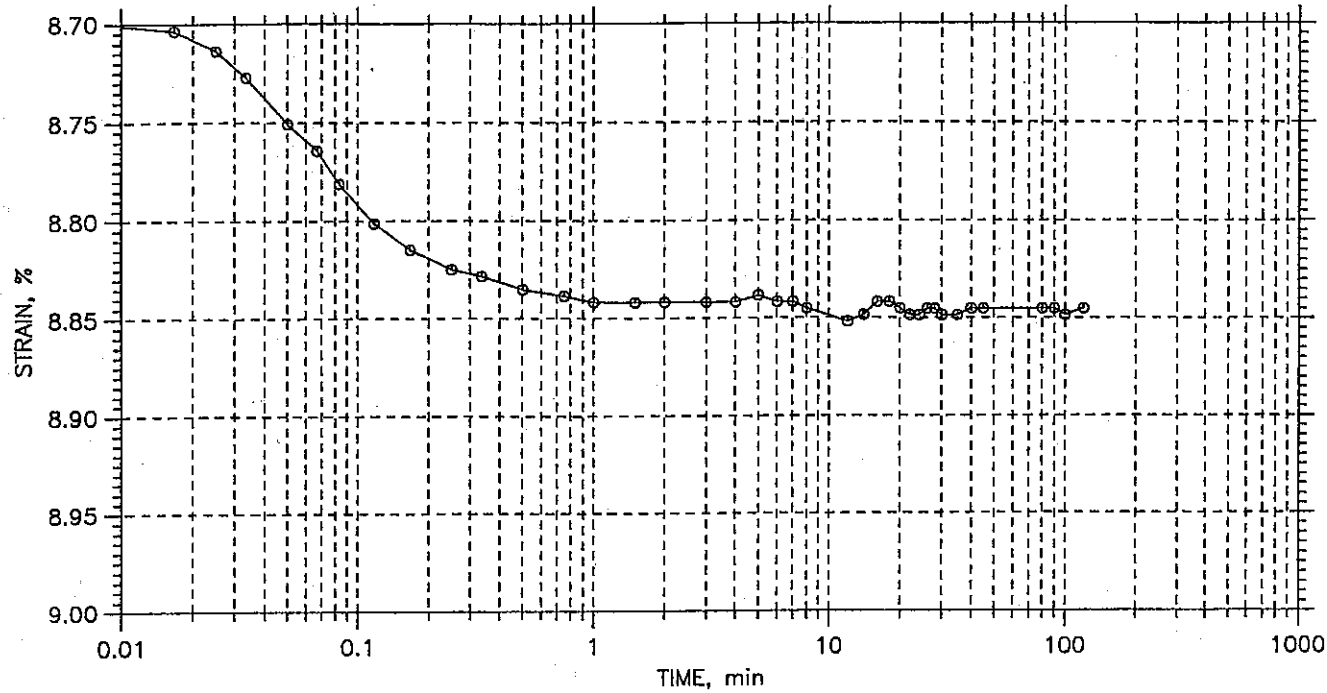
GeoTesting express	Project: NO.77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-4	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/07/05	Depth: 8 ft
	Test No.: 6182-C1	Sample Type: Tube	Elevation: ---
	Description: Moist, olive brown clayey silt		
	Remarks: ---		

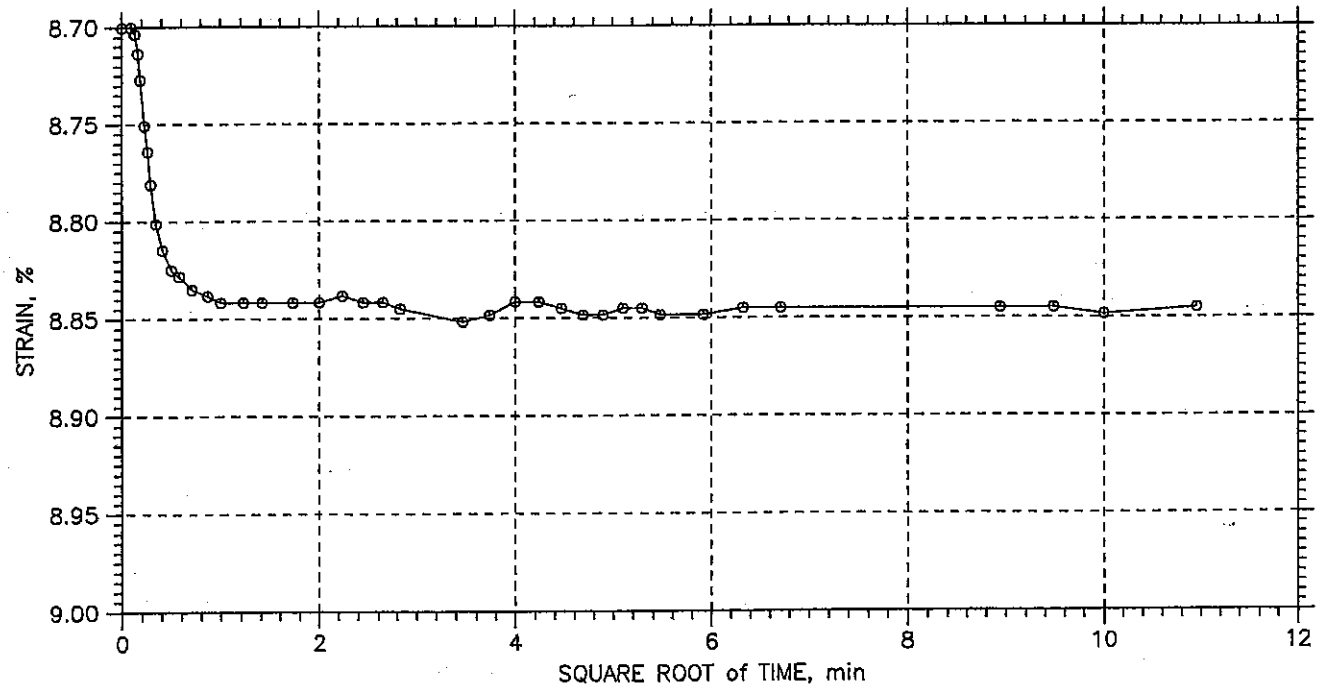
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 8 of 14

Stress: 0.5 tsf





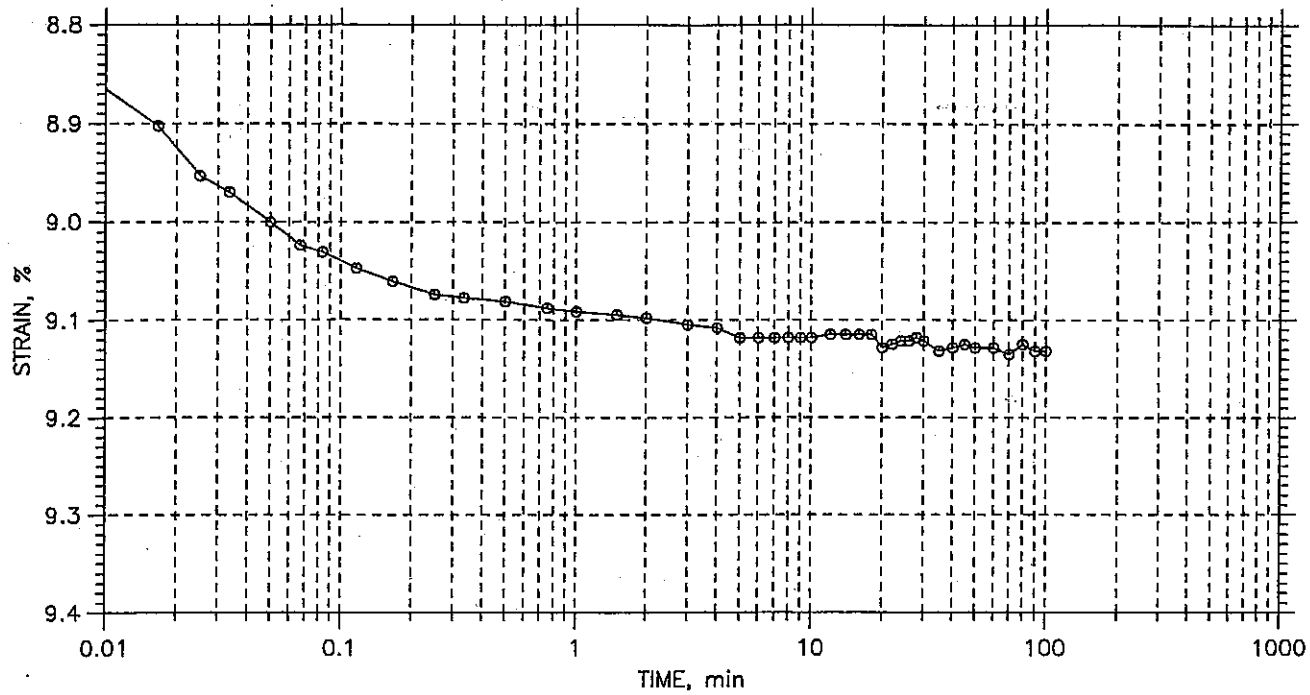
GeoTesting express	Project: NO.77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-4	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/07/05	Depth: 8 ft
	Test No.: 6182-C1	Sample Type: Tube	Elevation: ---
	Description: Moist, olive brown clayey silt		
	Remarks: ---		

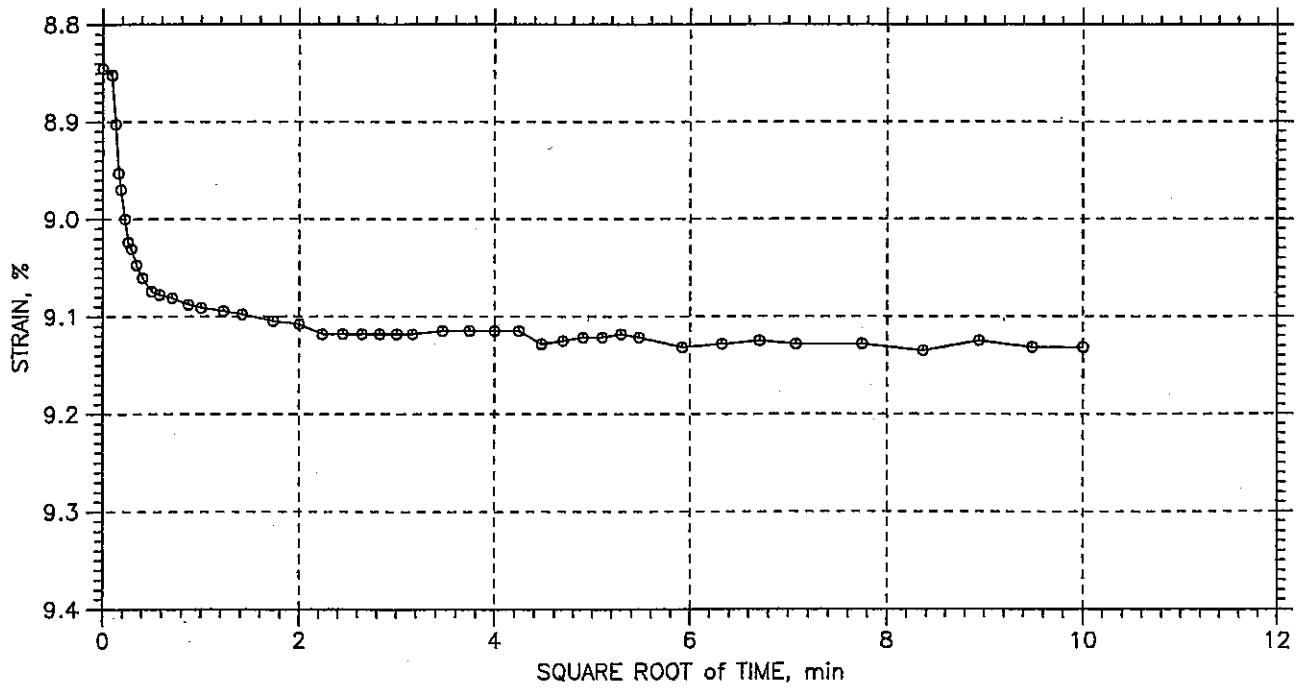
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 9 of 14

Stress: 1. tsf





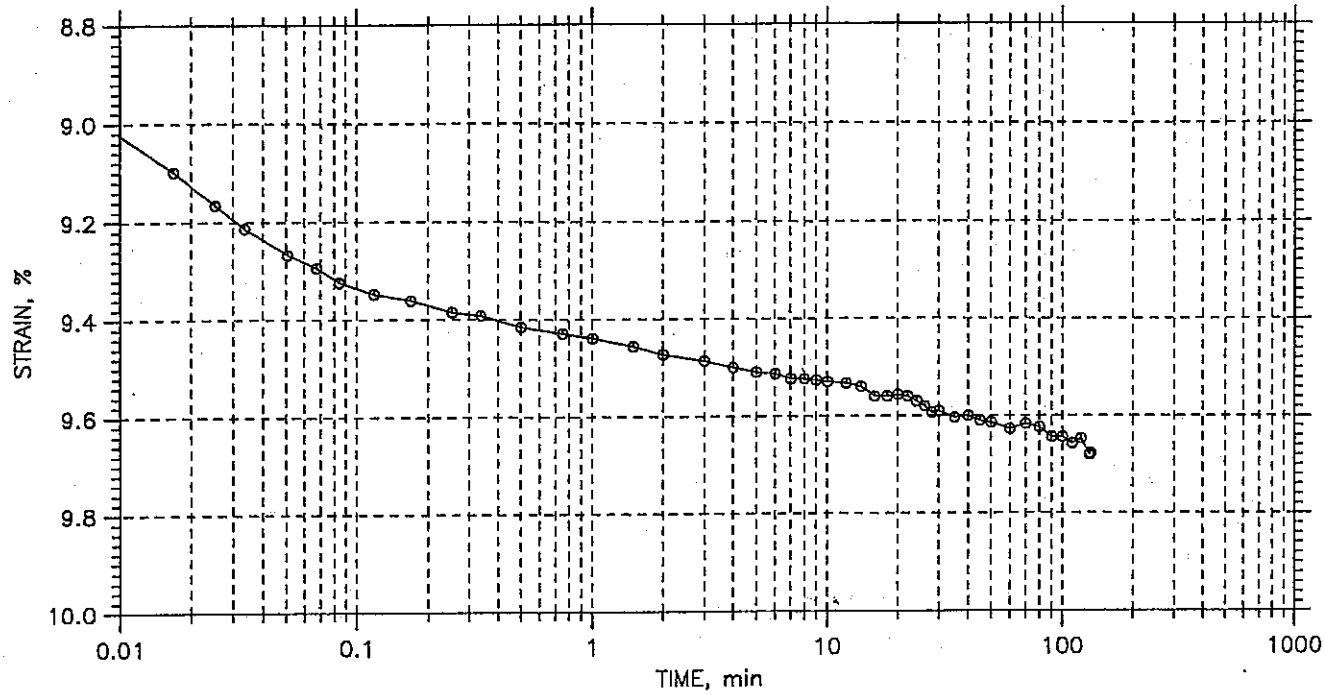
GeoTesting express	Project: NO.77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-4	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/07/05	Depth: 8 ft
	Test No.: 6182-C1	Sample Type: Tube	Elevation: ---
	Description: Moist, olive brown clayey silt		
	Remarks: ---		

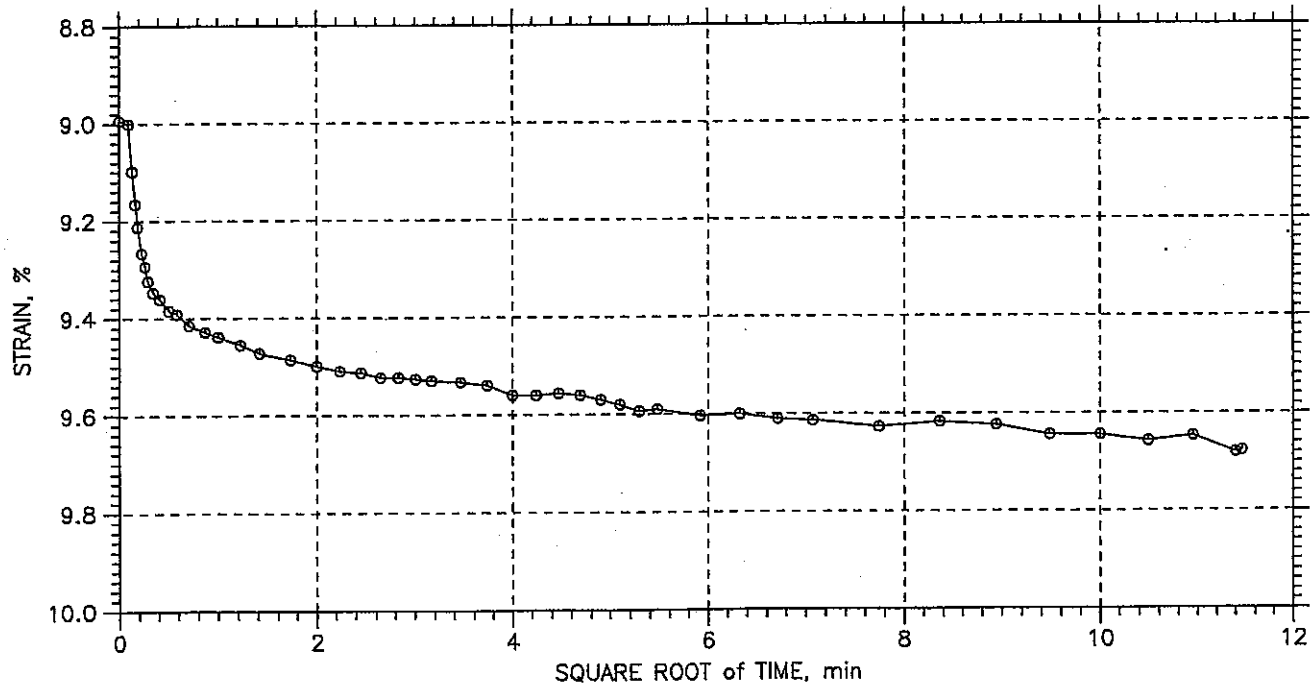
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 10 of 14

Stress: 2. tsf





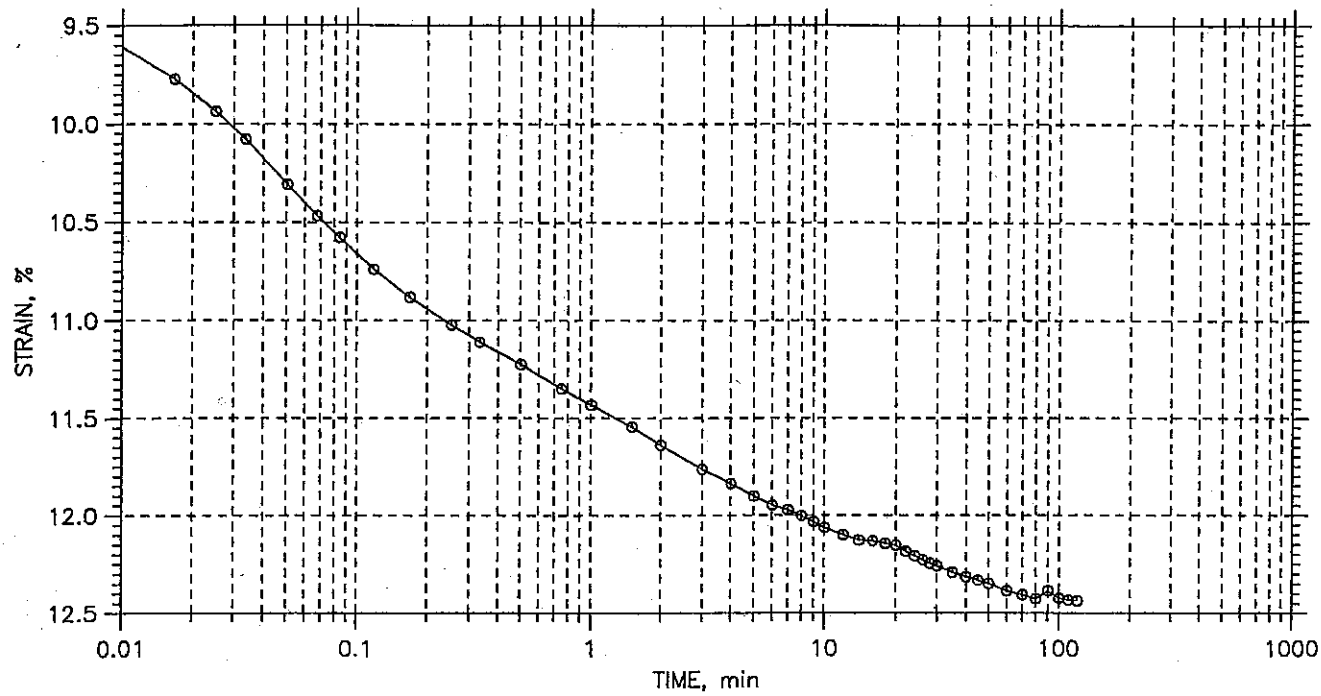
GeoTesting express	Project: NO.77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-4	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/07/05	Depth: 8 ft
	Test No.: 6182-C1	Sample Type: Tube	Elevation: ---
	Description: Moist, olive brown clayey silt		
	Remarks: ---		

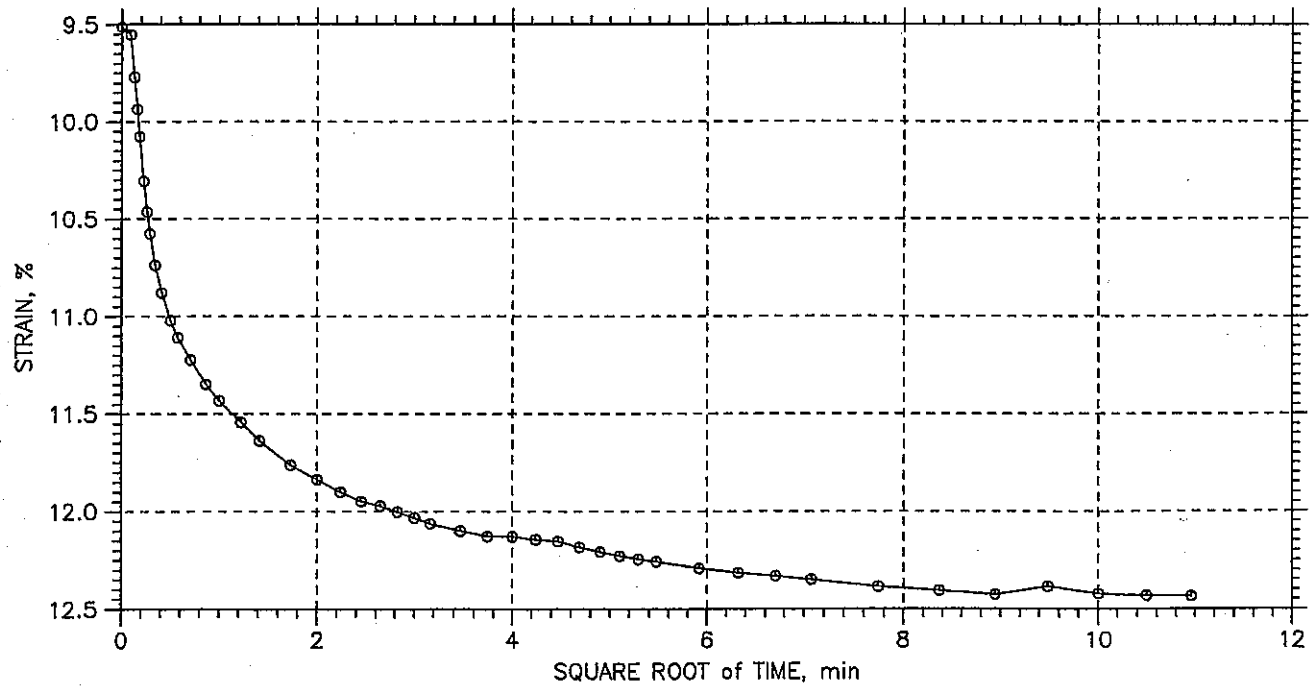
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 11 of 14

Stress: 4. tsf





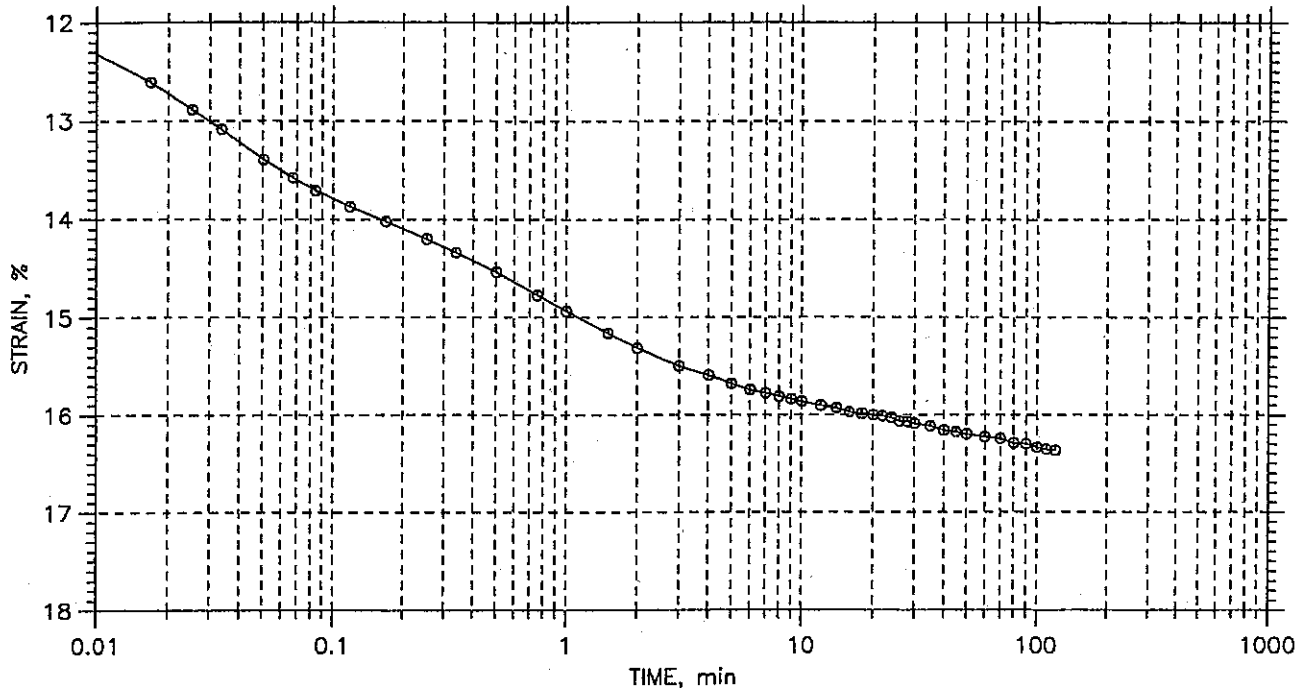
GeoTesting express	Project: NO.77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-4	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/07/05	Depth: 8 ft
	Test No.: 6182-C1	Sample Type: Tube	Elevation: ---
	Description: Moist, olive brown clayey silt		
	Remarks: ---		

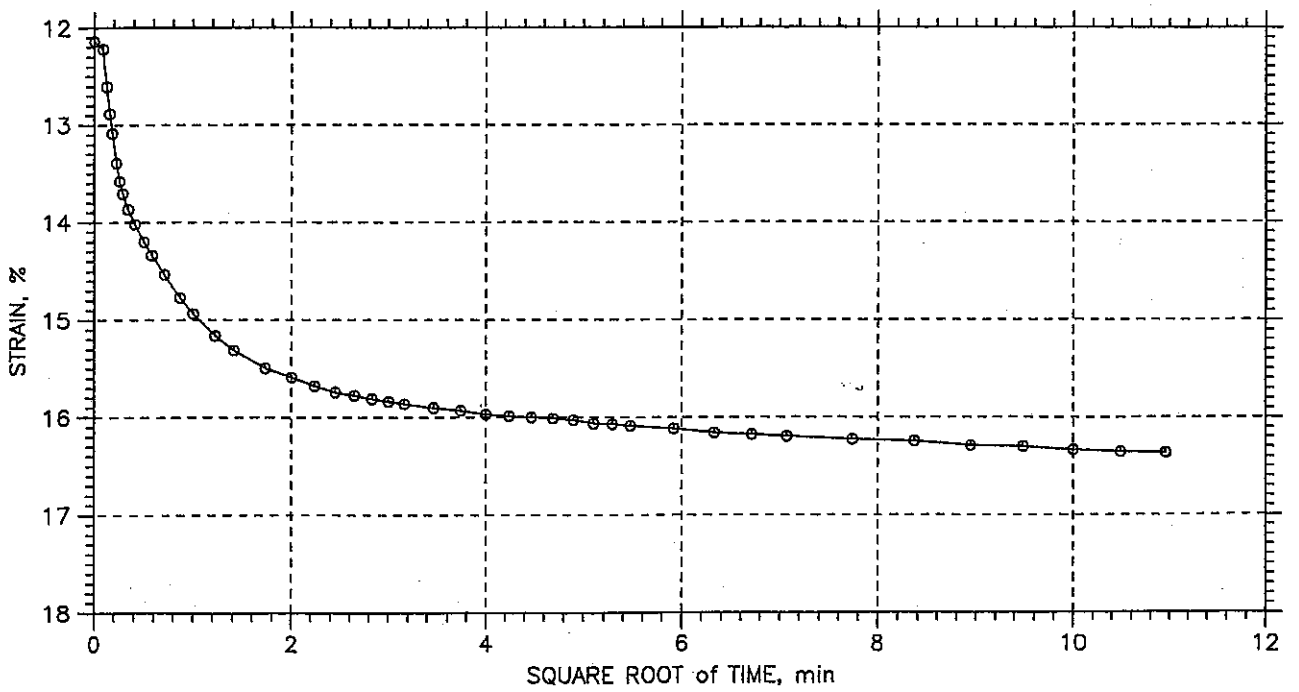
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 12 of 14

Stress: 8. tsf





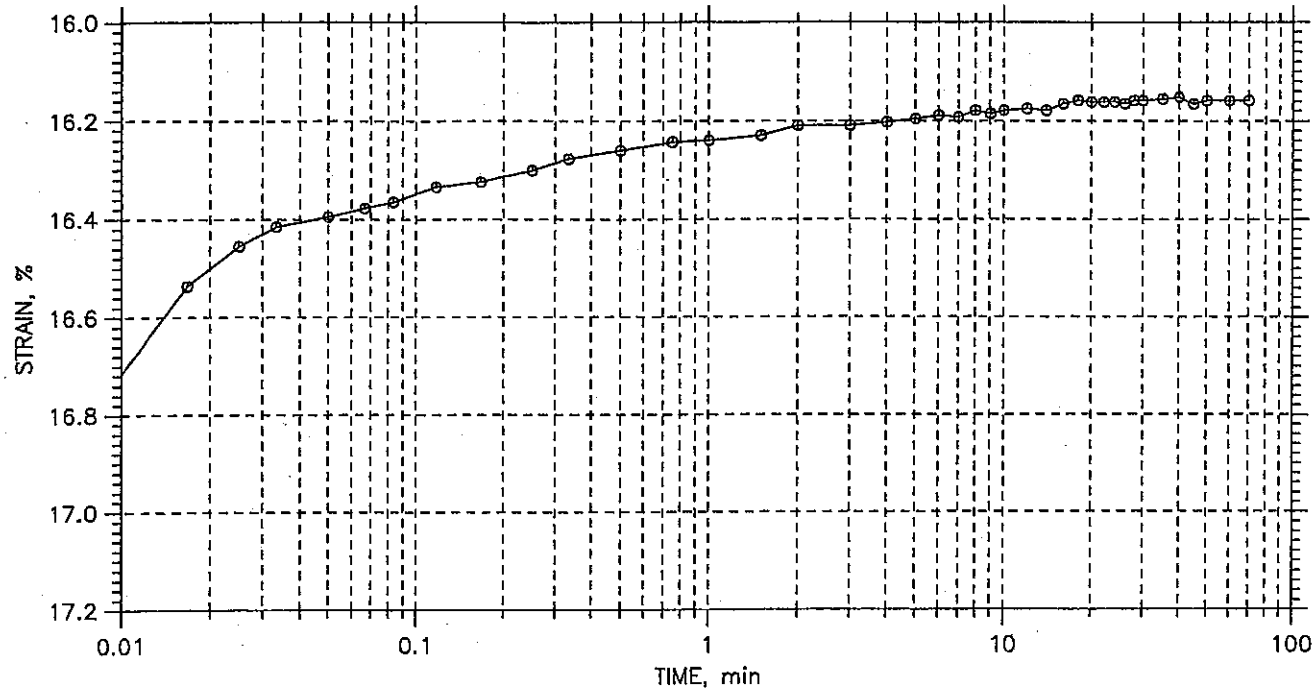
GeoTesting express	Project: NO.77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-4	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/07/05	Depth: 8 ft
	Test No.: 6182-C1	Sample Type: Tube	Elevation: ---
	Description: Moist, olive brown clayey silt		
	Remarks: ---		

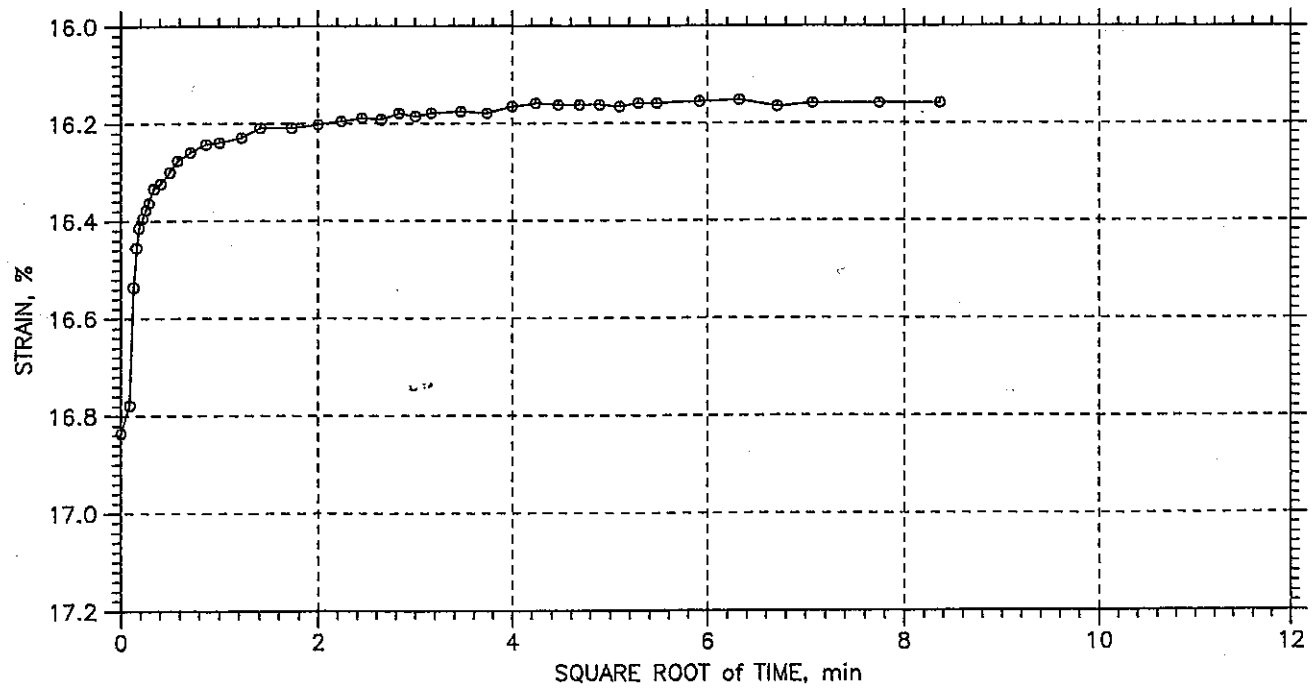
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 13 of 14

Stress: 2. tsf





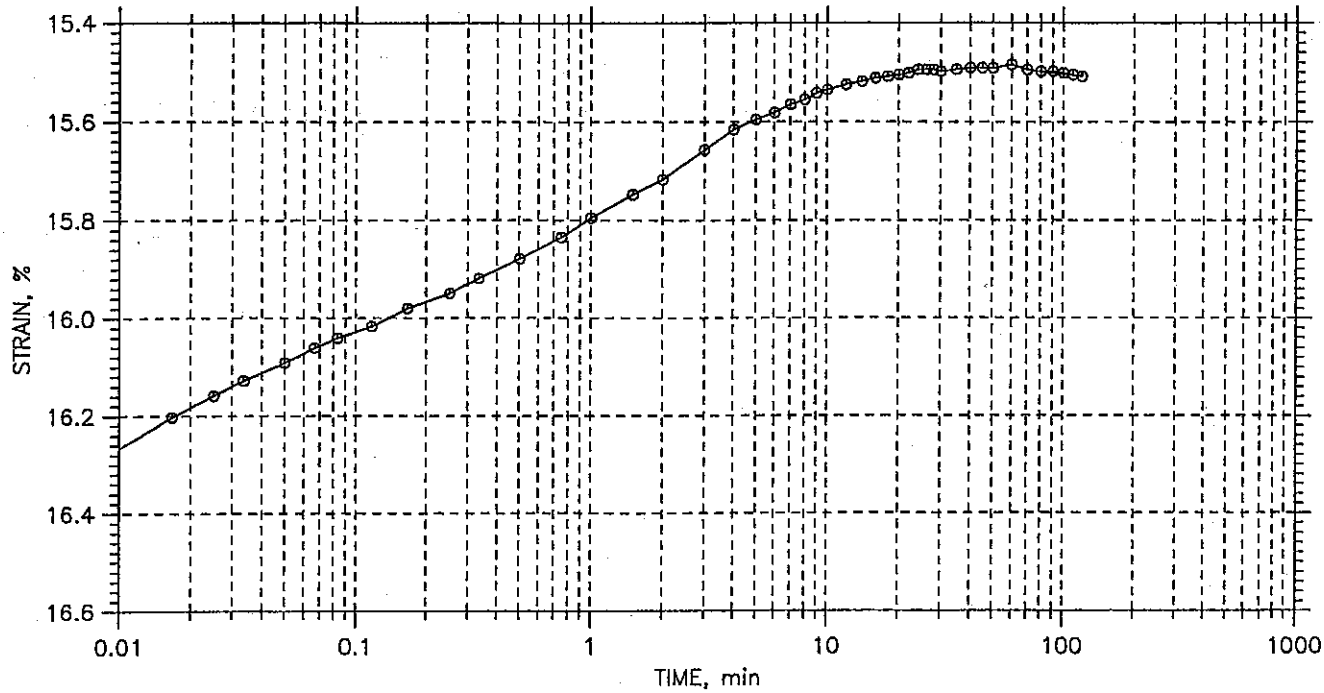
GeoTesting express	Project: NO.77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-4	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/07/05	Depth: 8 ft
	Test No.: 6182-C1	Sample Type: Tube	Elevation: ---
	Description: Moist, olive brown clayey silt		
	Remarks: ---		

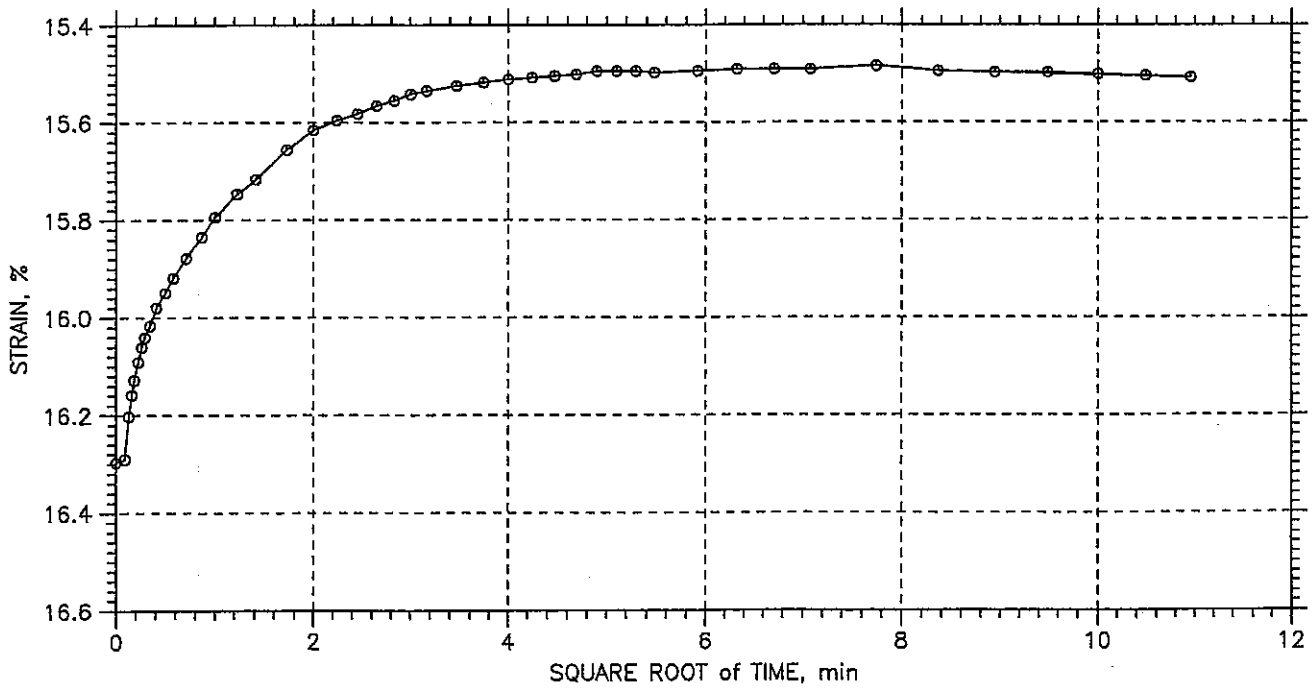
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 14 of 14

Stress: 0.5 tsf

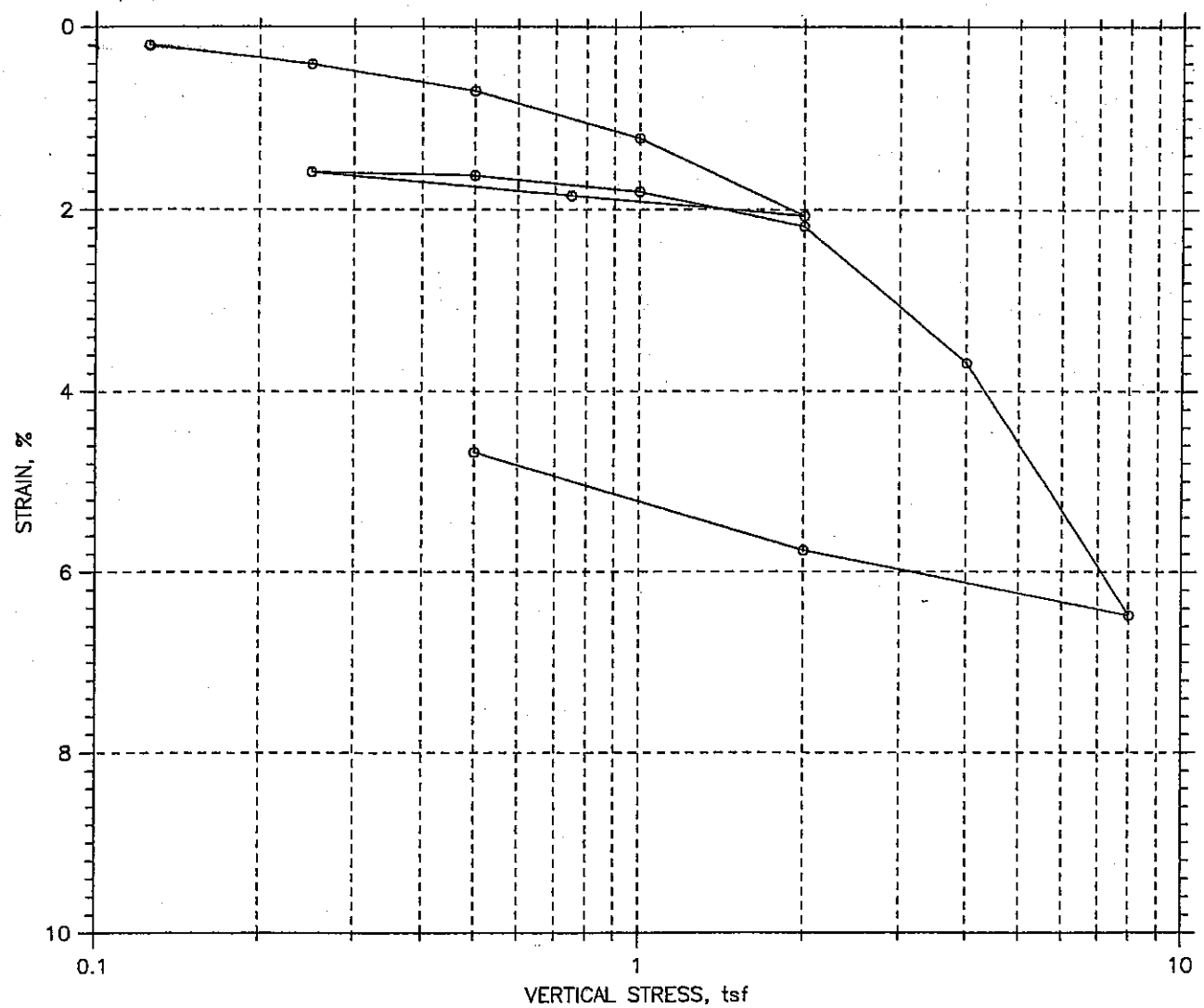




GeoTesting express	Project: NO.77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-4	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/07/05	Depth: 8 ft
	Test No.: 6182-C1	Sample Type: Tube	Elevation: ---
	Description: Moist, olive brown clayey silt		
	Remarks: ---		

CONSOLIDATION TEST DATA

SUMMARY REPORT



				Before Test	After Test
Overburden Pressure: ---				Water Content, %	30.32	28.38
Preconsolidation Pressure: ---				Dry Unit Weight, pcf	92.75	97.3
Compression Index: ---				Saturation, %	96.17	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	0.88	0.79
LL: ---	PL: ---	PI: ---	GS: 2.79			

GeoTesting express	Project: NO. 77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-7	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/12/05	Depth: 15 ft
	Test No.: C-2	Sample Type: Tube	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: ---		

CONSOLIDATION TEST DATA

Project: NO. 77210.00
Boring No.: B-7
Sample No.: ---
Test No.: C-2

Location: ---
Tested By: md
Test Date: 09/12/05
Sample Type: Tube

Project No.: GTX-6182
Checked By: jdt
Depth: 15 ft
Elevation: ---

Soil Description: Moist, greenish gray clay
Remarks: ---

Estimated Specific Gravity: 2.79
Initial Void Ratio: 0.88
Final Void Ratio: 0.79

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Initial Height: 1.00 in
Specimen Diameter: 2.50 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	NRT-20	RING		
Wt. Container + Wet Soil, gm	327.13	372.24	369.92	160.89
Wt. Container + Dry Soil, gm	248.79	336.01	336.01	127.11
Wt. Container, gm	8.31	216.5	216.5	8.08
Wt. Dry Soil, gm	240.48	119.51	119.51	119.03
Water Content, %	32.58	30.32	28.38	28.38
Void Ratio	---	0.88	0.79	---
Degree of Saturation, %	---	96.17	100.00	---
Dry Unit Weight, pcf	---	92.746	97.296	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

CONSOLIDATION TEST DATA

Project: NO. 77210.00
Boring No.: B-7
Sample No.: ---
Test No.: C-2

Location: ---
Tested By: md
Test Date: 09/12/05
Sample Type: Tube

Project No.: GTX-6182
Checked By: jdt
Depth: 15 ft
Elevation: ---

Soil Description: Moist, greenish gray clay
Remarks: ---

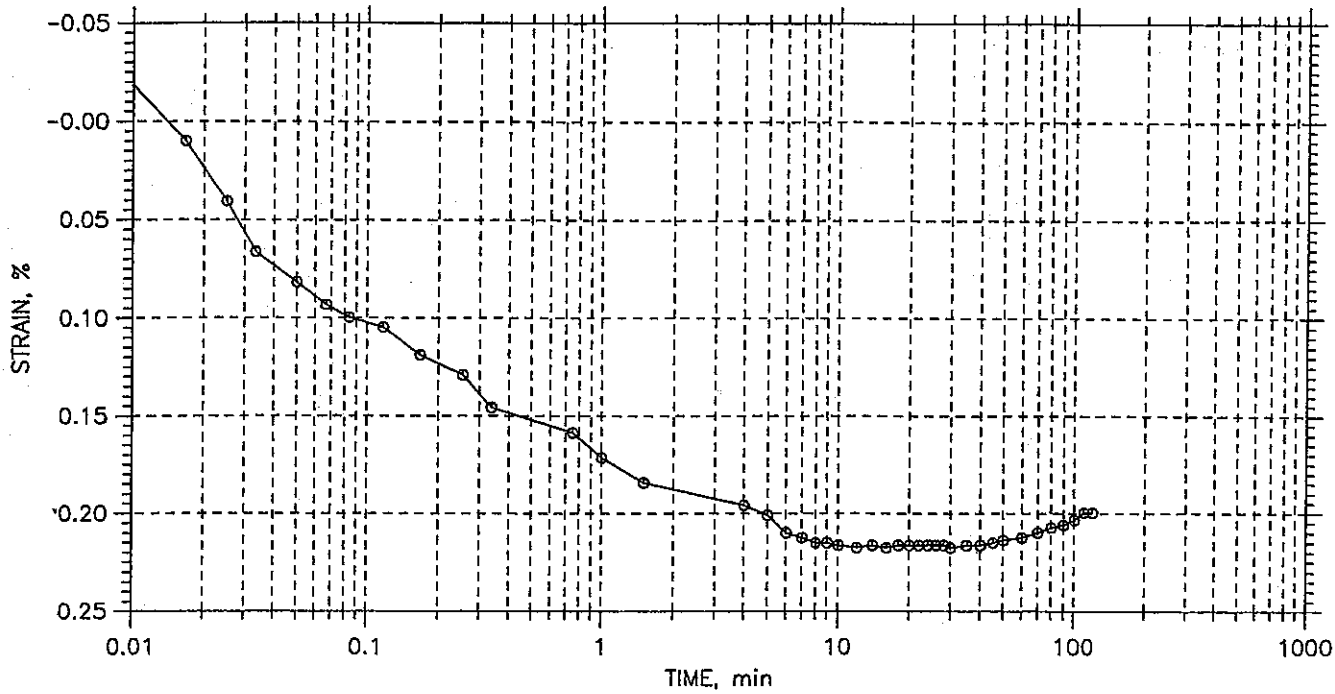
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	T50 Fitting Sq.Rt. min	T50 Fitting Log min	Coefficient of Consolidation Sq.Rt. in^2/sec	Coefficient of Consolidation Log in^2/sec	Coefficient of Consolidation Ave. in^2/sec
1	0.125	0.001995	0.877	0.20	0.1	0.0	1.38e-002	0.00e+000	1.38e-002
2	0.25	0.004082	0.873	0.41	0.2	0.1	3.42e-003	1.32e-002	5.44e-003
3	0.5	0.007048	0.868	0.70	0.2	0.0	4.19e-003	0.00e+000	4.19e-003
4	1	0.01219	0.858	1.22	0.2	0.0	3.25e-003	0.00e+000	3.25e-003
5	2	0.02068	0.842	2.07	0.3	0.1	2.73e-003	6.20e-003	3.79e-003
6	0.75	0.01846	0.846	1.85	0.1	0.0	1.20e-002	6.12e-002	2.01e-002
7	0.25	0.01589	0.851	1.59	0.2	0.2	3.81e-003	5.25e-003	4.41e-003
8	0.5	0.01628	0.850	1.63	0.1	0.0	1.20e-002	0.00e+000	1.20e-002
9	1	0.01803	0.847	1.80	0.1	0.0	9.67e-003	0.00e+000	9.67e-003
10	2	0.02184	0.840	2.18	0.1	0.0	7.65e-003	1.85e-002	1.08e-002
11	4	0.03688	0.812	3.69	0.6	0.4	1.23e-003	1.78e-003	1.45e-003
12	8	0.0648	0.759	6.48	0.9	0.9	8.18e-004	7.97e-004	8.07e-004
13	2	0.05763	0.773	5.76	0.2	0.0	3.35e-003	0.00e+000	3.35e-003
14	0.5	0.04676	0.793	4.68	1.3	0.0	5.48e-004	0.00e+000	5.48e-004

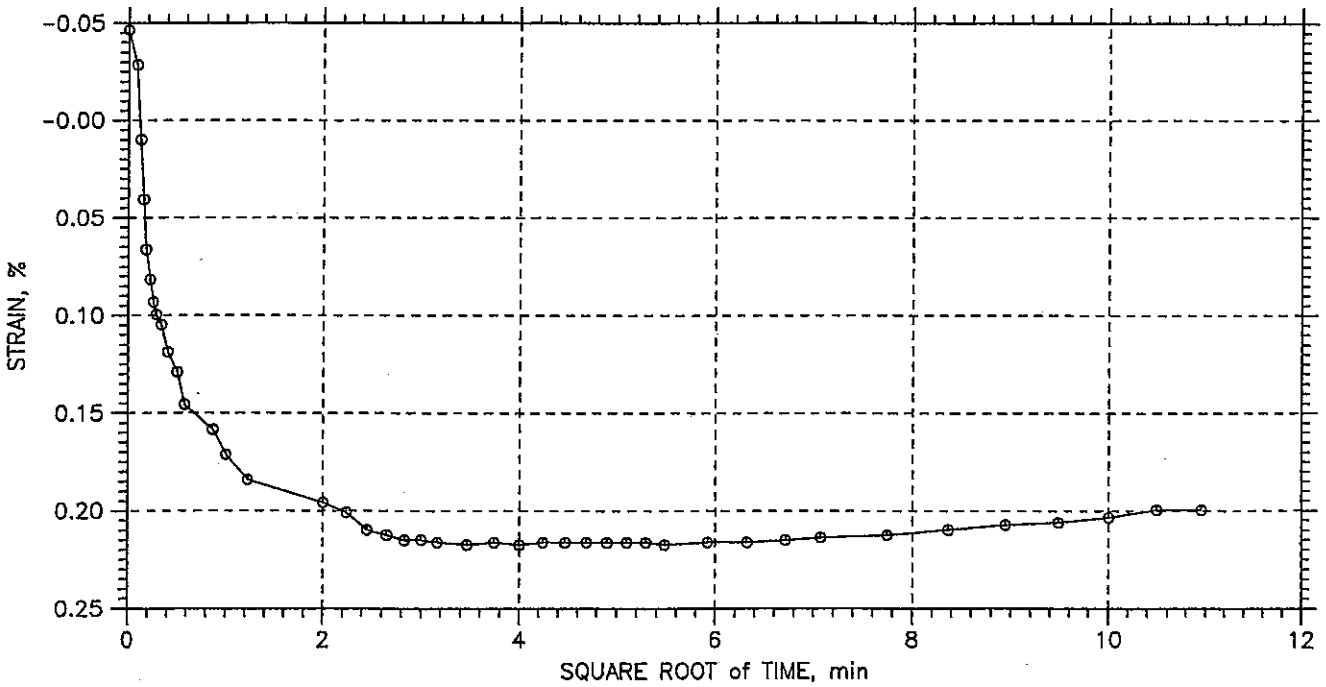
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 1 of 14

Stress: 0.125 tsf





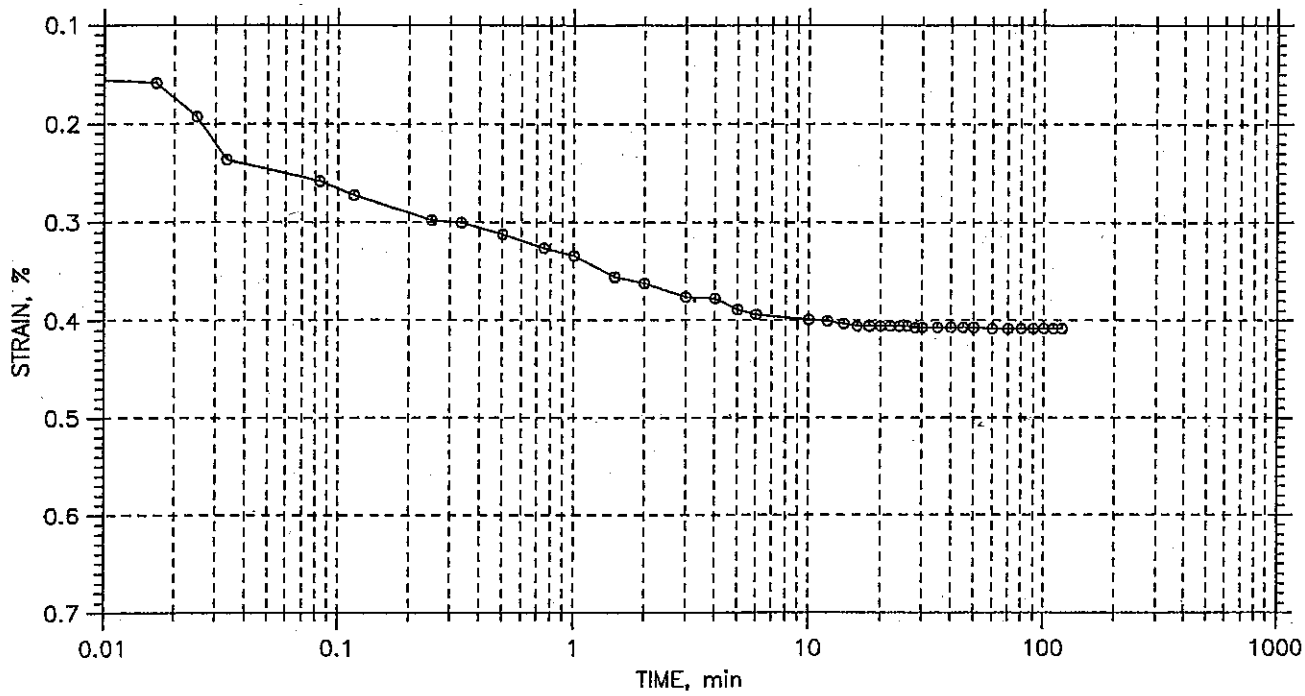
GeoTesting express	Project: NO. 77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-7	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/12/05	Depth: 15 ft
	Test No.: C-2	Sample Type: Tube	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: ---		

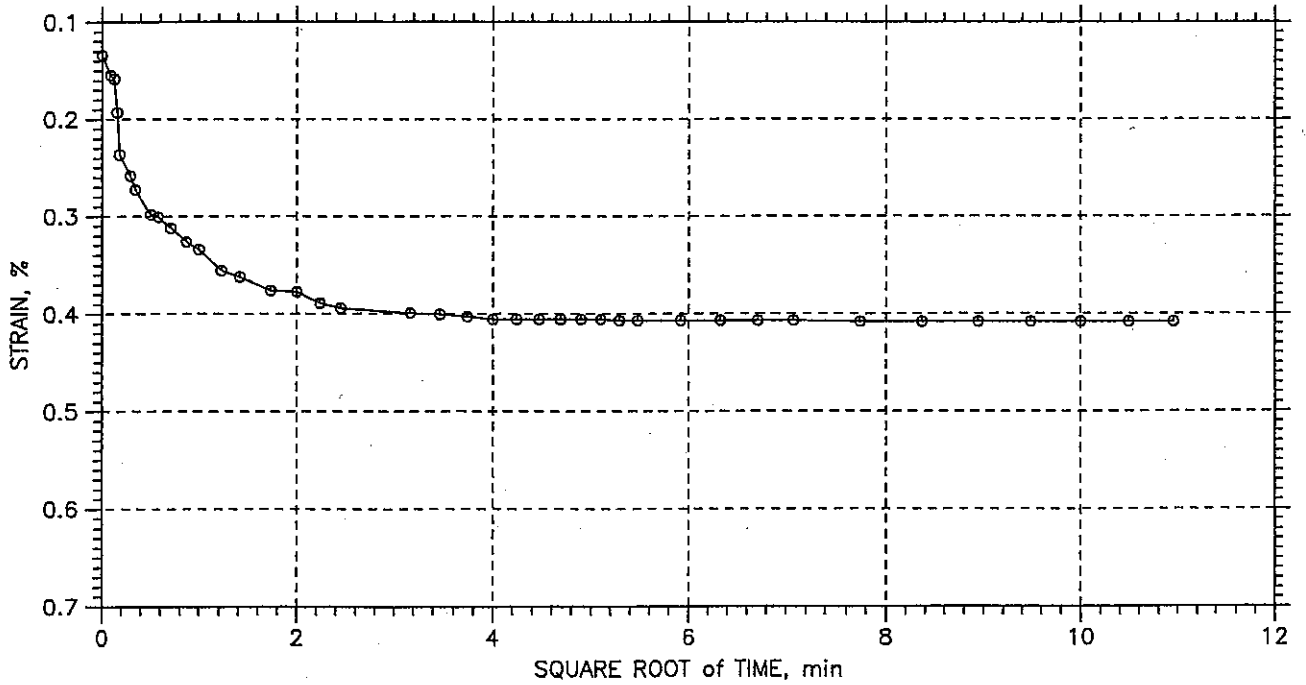
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 2 of 14

Stress: 0.25 tsf





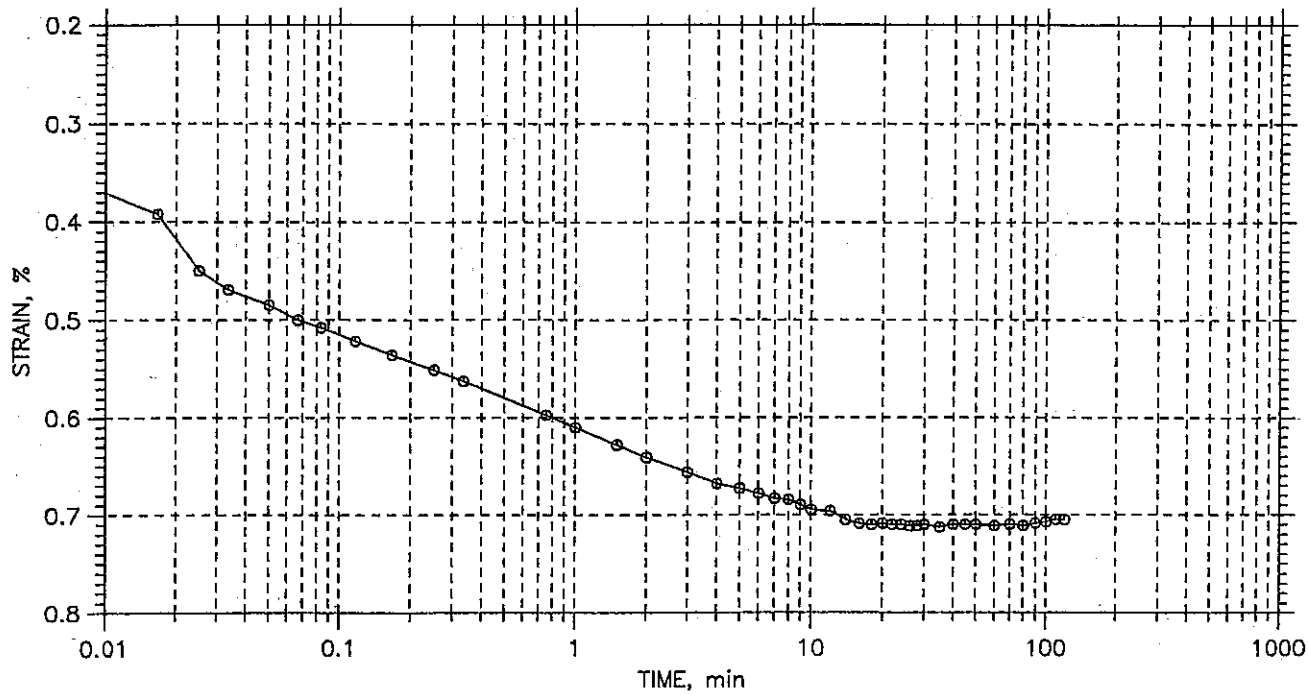
GeoTesting express	Project: NO. 77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-7	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/12/05	Depth: 15 ft
	Test No.: C-2	Sample Type: Tube	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: ---		

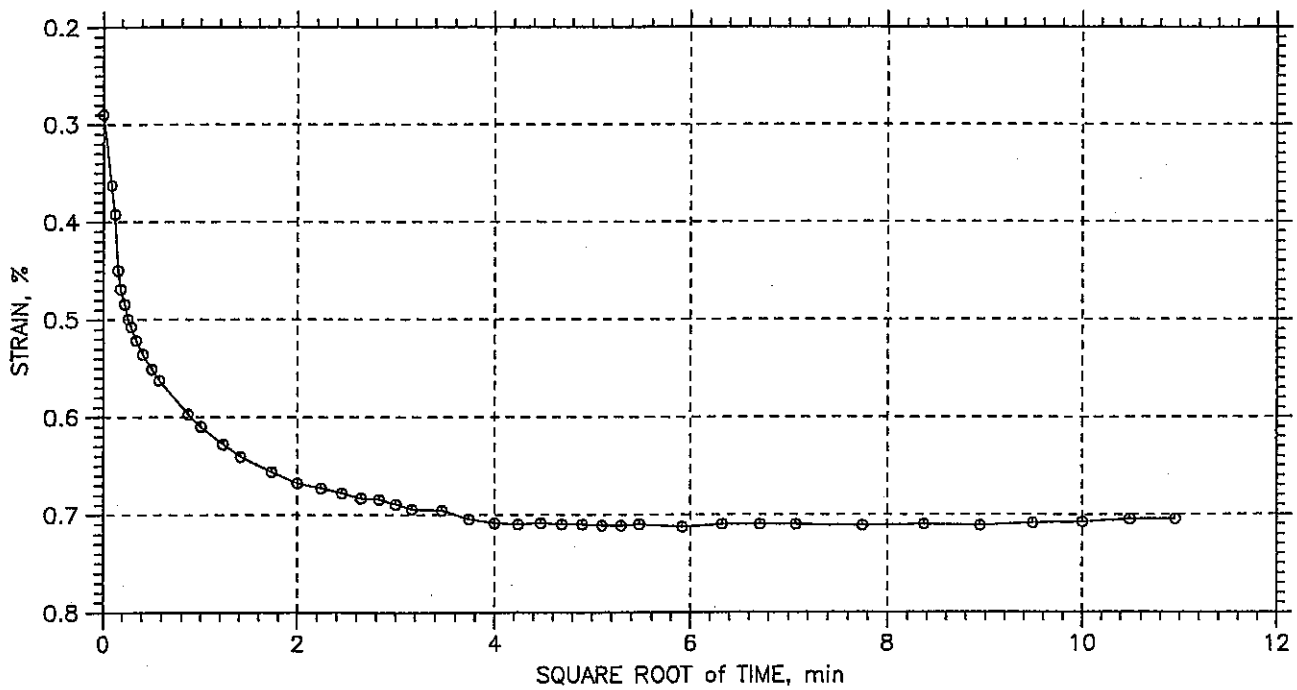
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 3 of 14

Stress: 0.5 tsf





GeoTesting express	Project: NO. 77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-7	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/12/05	Depth: 15 ft
	Test No.: C-2	Sample Type: Tube	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: ---		

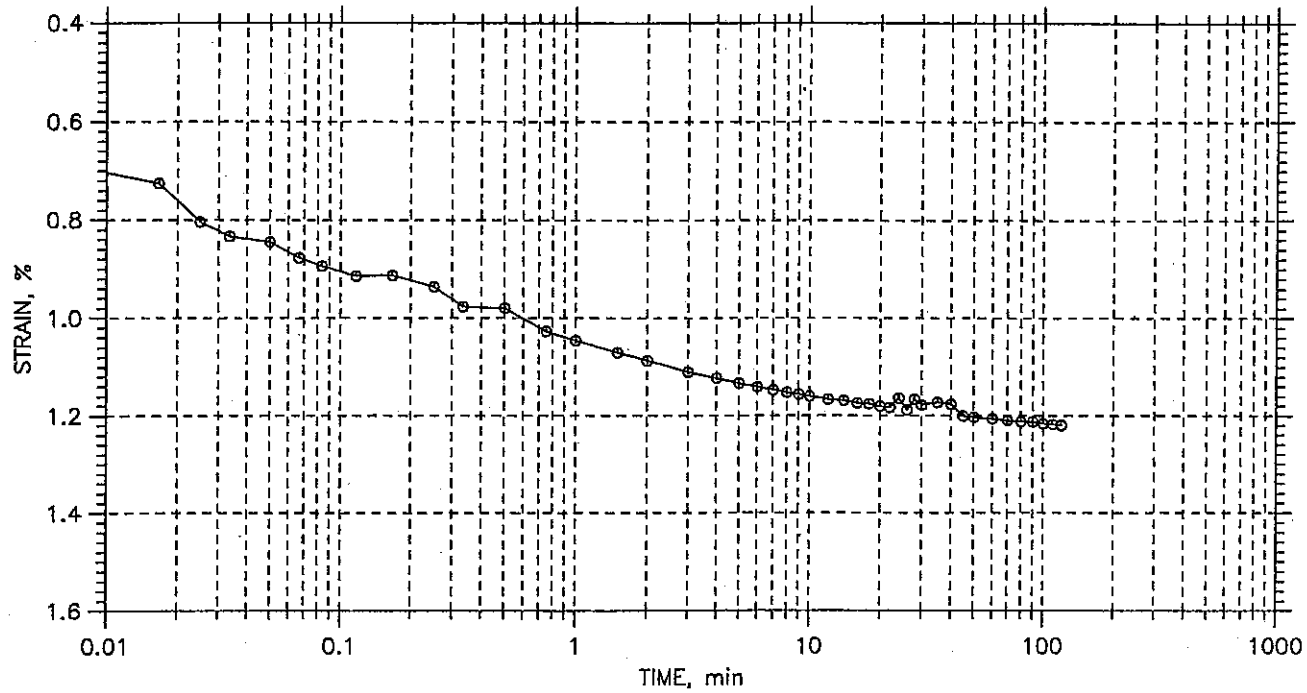
Fri, 16-SEP-2005 15:27:14

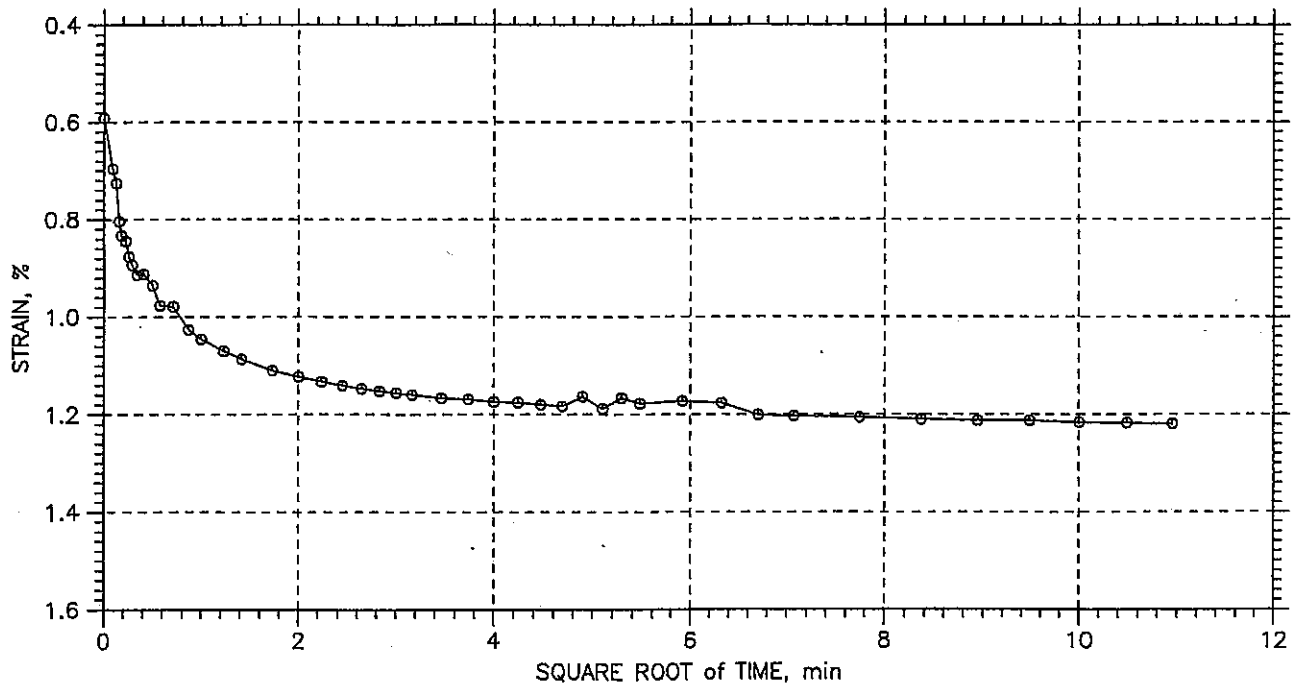
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 4 of 14

Stress: 1. tsf





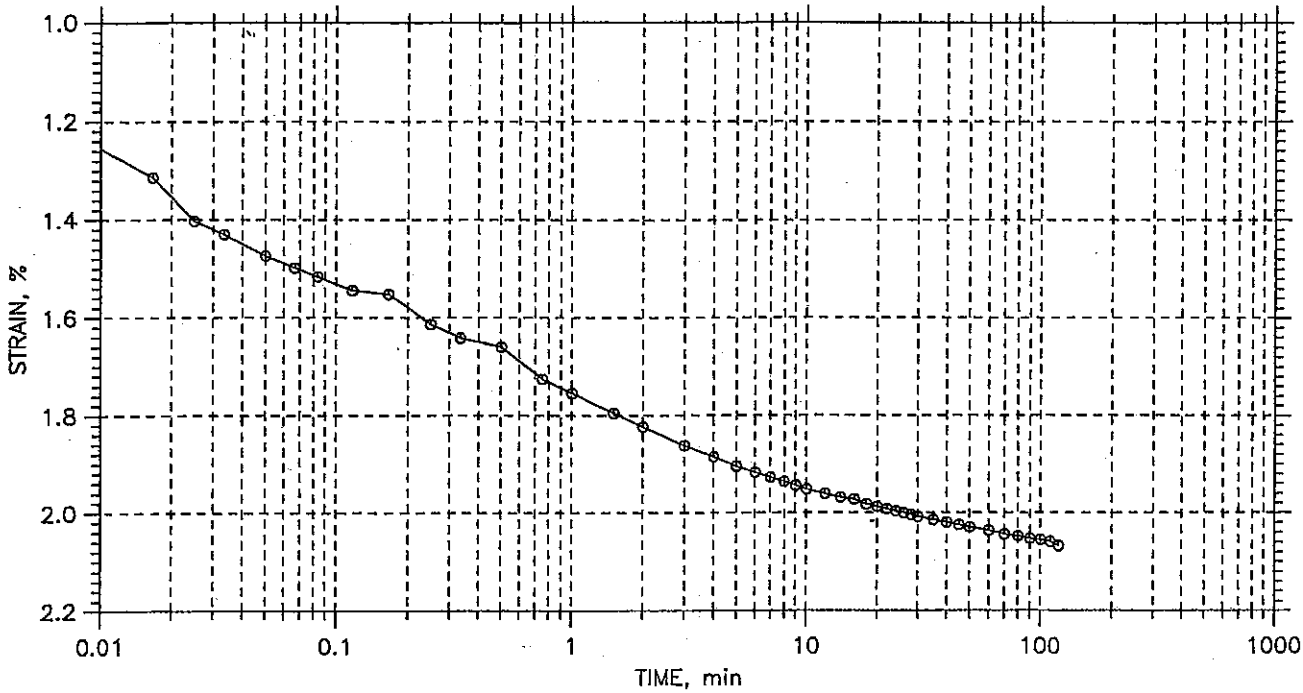
GeoTesting express	Project: NO. 77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-7	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/12/05	Depth: 15 ft
	Test No.: C-2	Sample Type: Tube	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: ---		

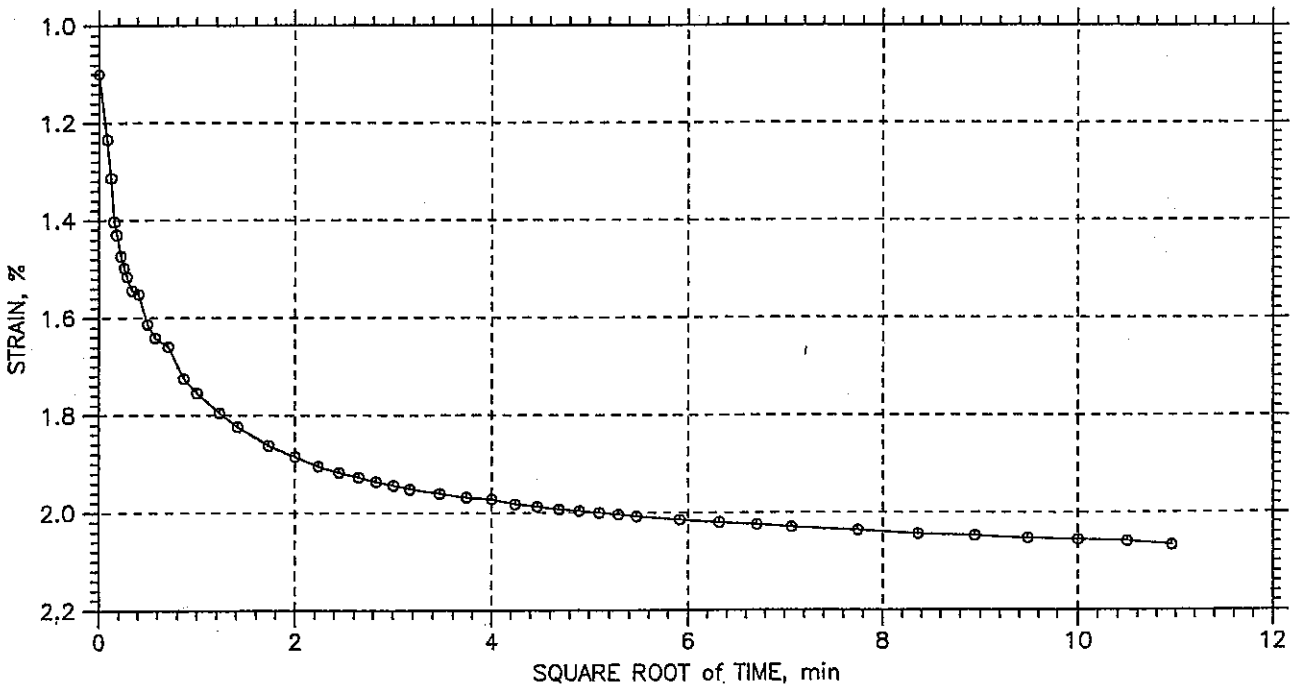
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 5 of 14

Stress: 2. tsf





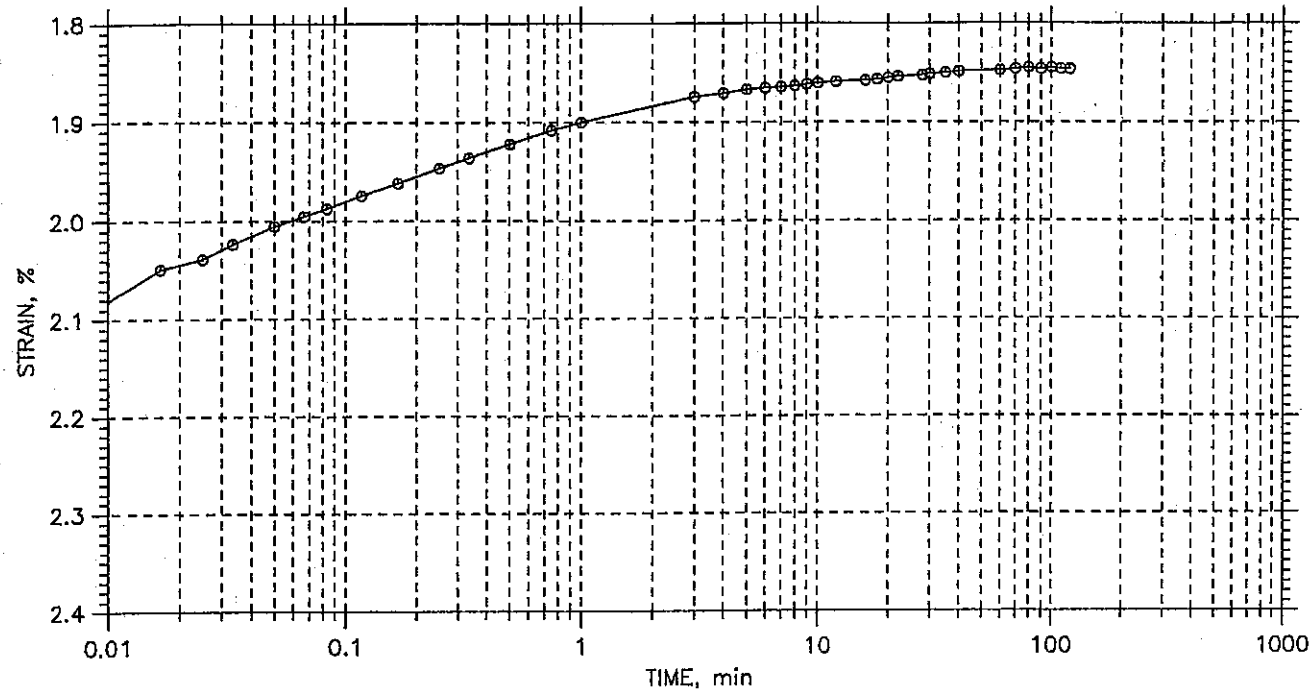
GeoTesting express	Project: NO. 77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-7	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/12/05	Depth: 15 ft
	Test No.: C-2	Sample Type: Tube	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: ---		

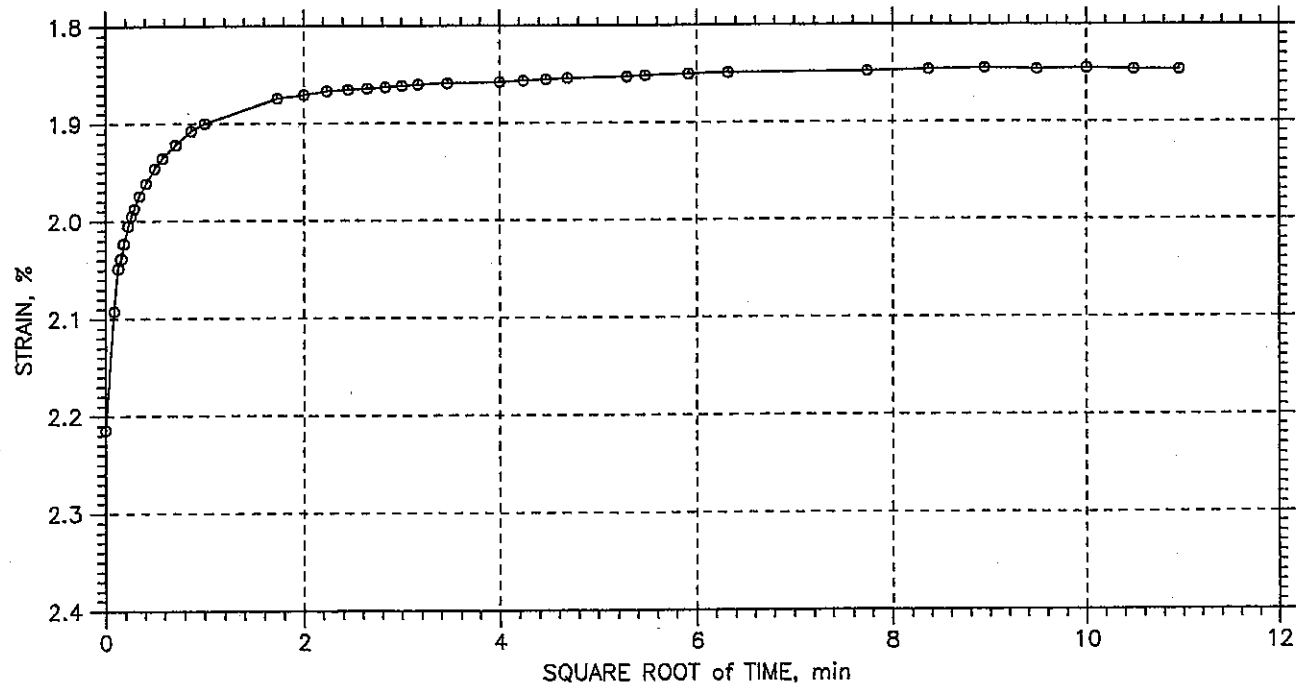
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 6 of 14

Stress: 0.75 tsf





GeoTesting express	Project: NO. 77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-7	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/12/05	Depth: 15 ft
	Test No.: C-2	Sample Type: Tube	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: ---		

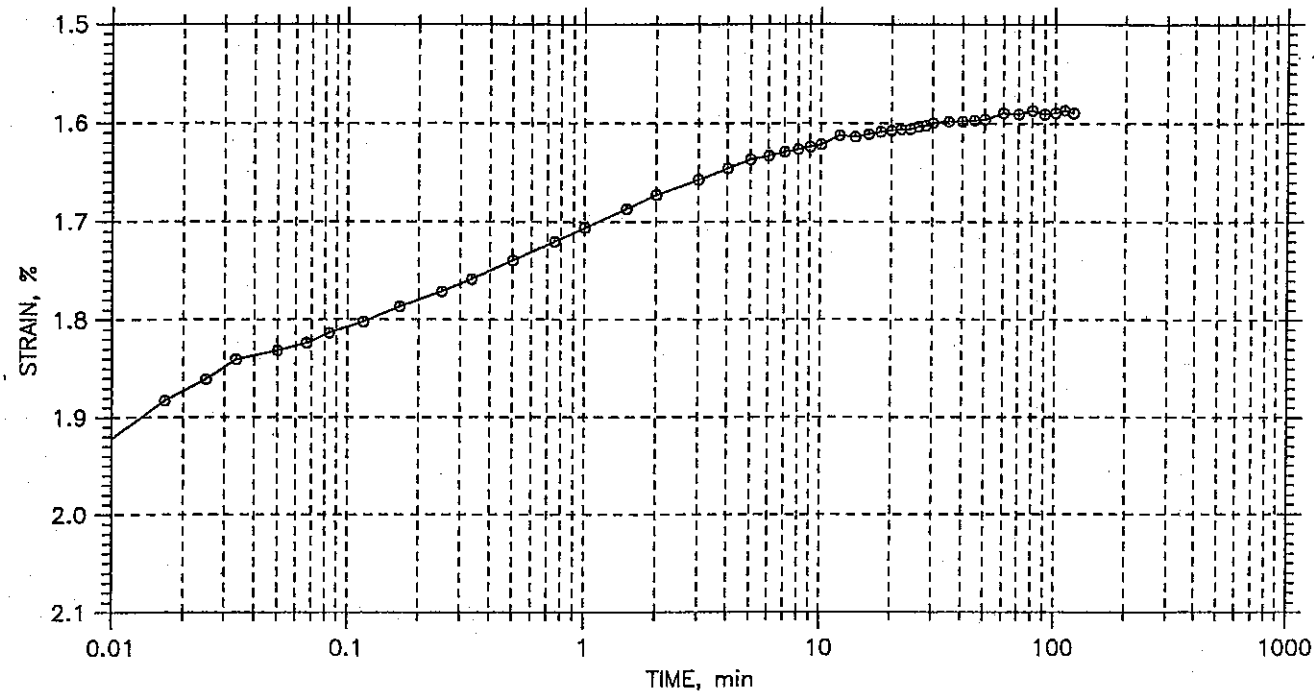
Fri, 16-SEP-2005 15:27:15

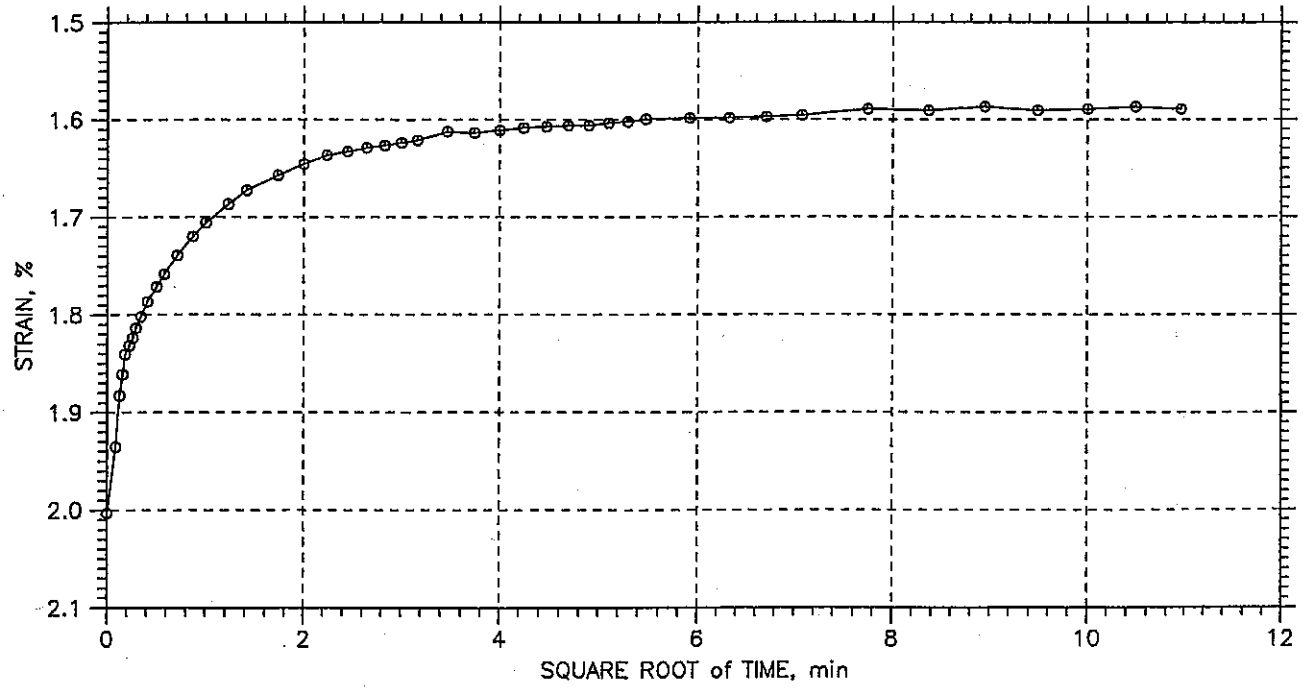
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 7 of 14

Stress: 0.25 tsf





GeoTesting express	Project: NO. 77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-7	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/12/05	Depth: 15 ft
	Test No.: C-2	Sample Type: Tube	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: ---		

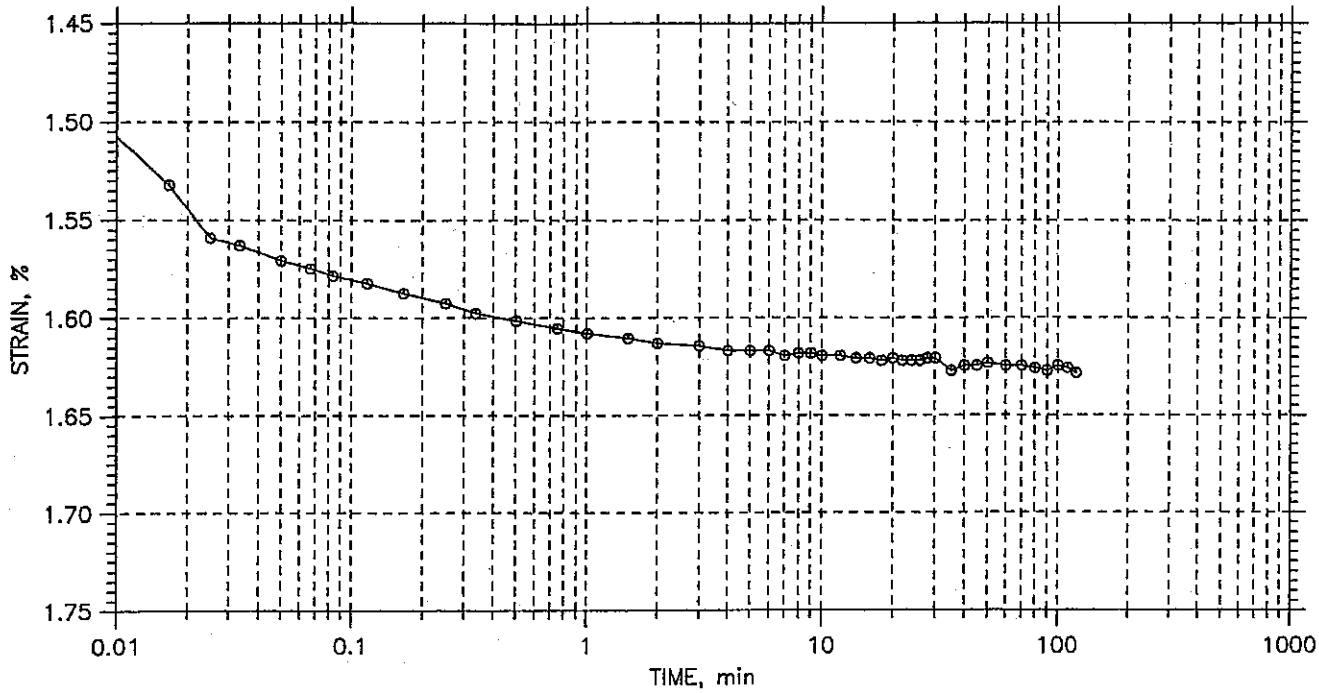
Fri, 16-SEP-2005 15:27:15

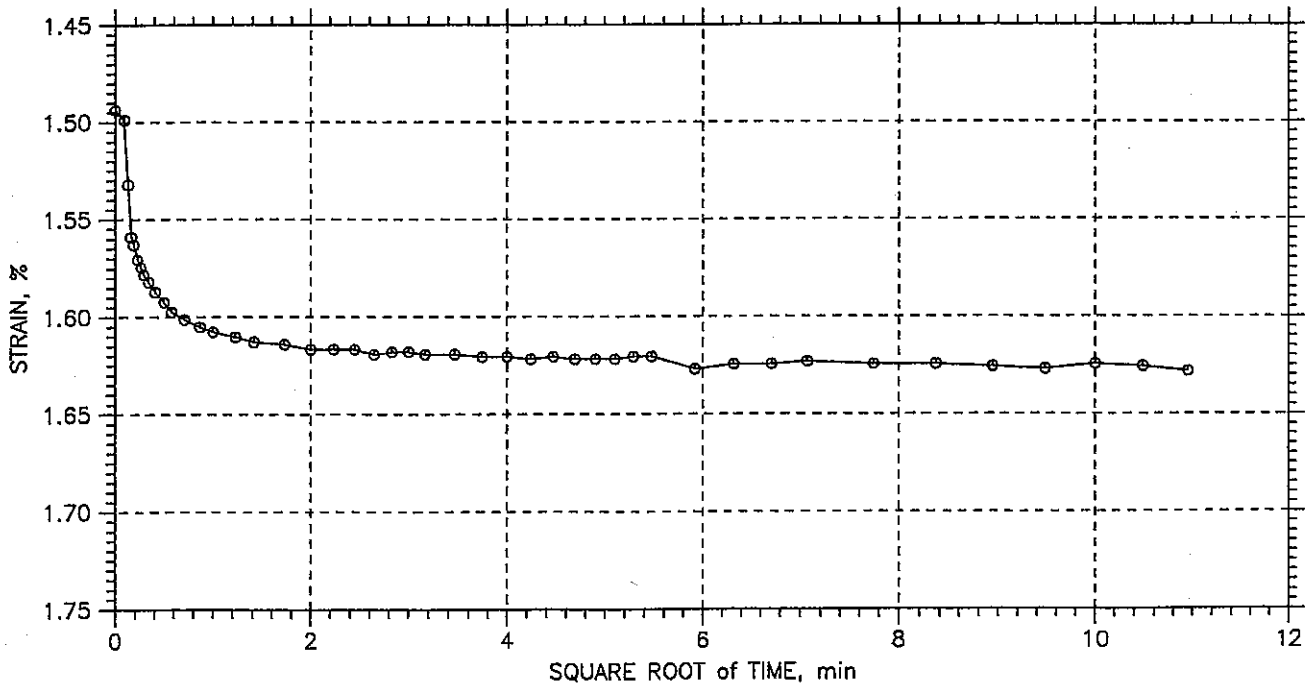
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 8 of 14

Stress: 0.5 tsf





GeoTesting express	Project: NO. 77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-7	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/12/05	Depth: 15 ft
	Test No.: C-2	Sample Type: Tube	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: ---		

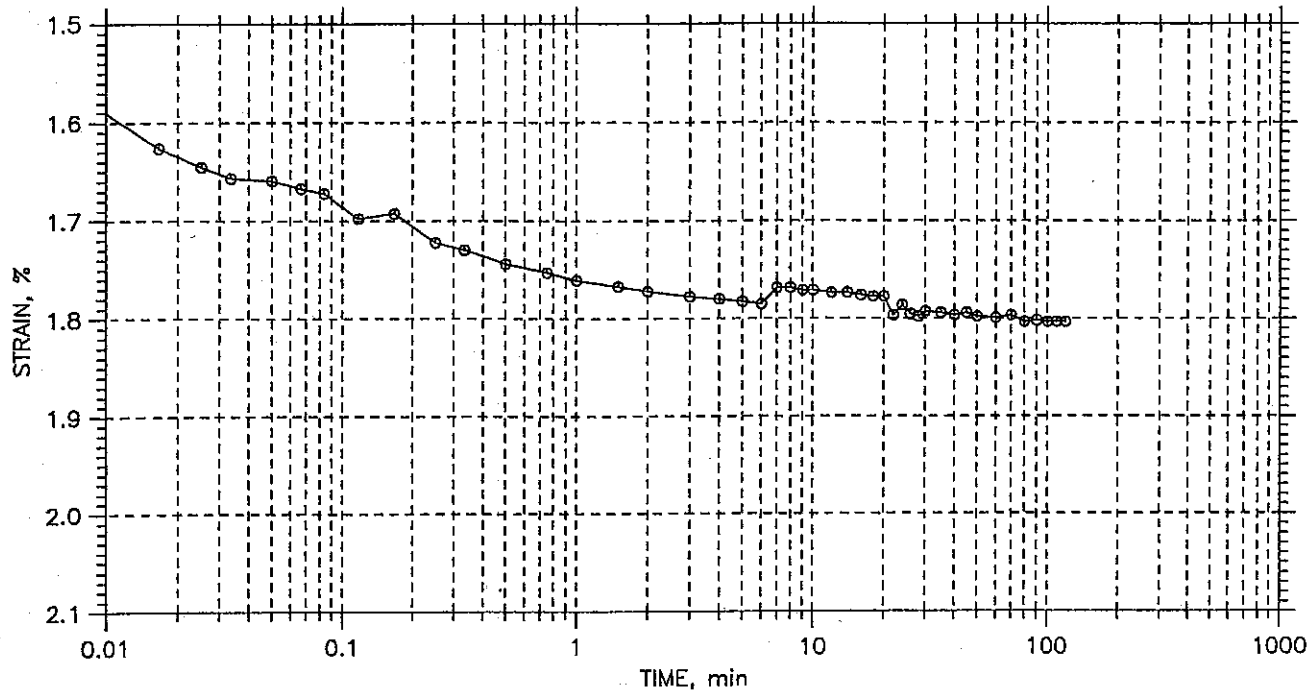
Fri, 16-SEP-2005 15:27:15

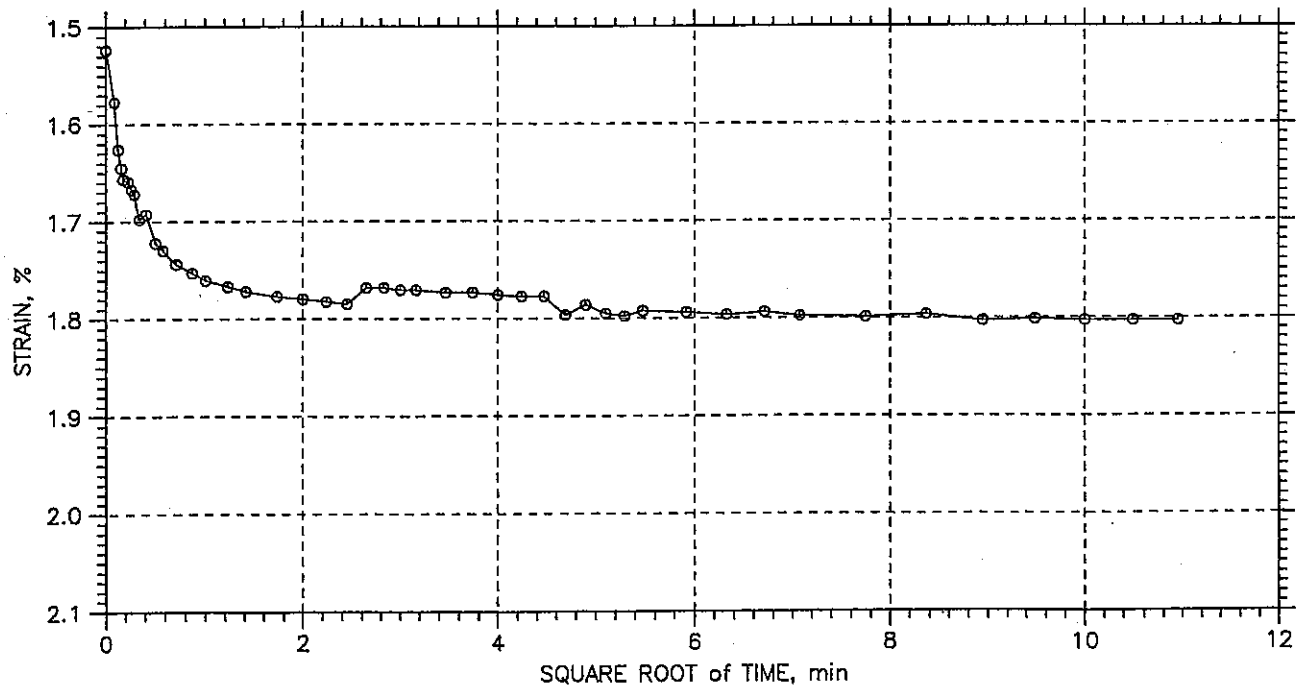
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 9 of 14

Stress: 1. tsf





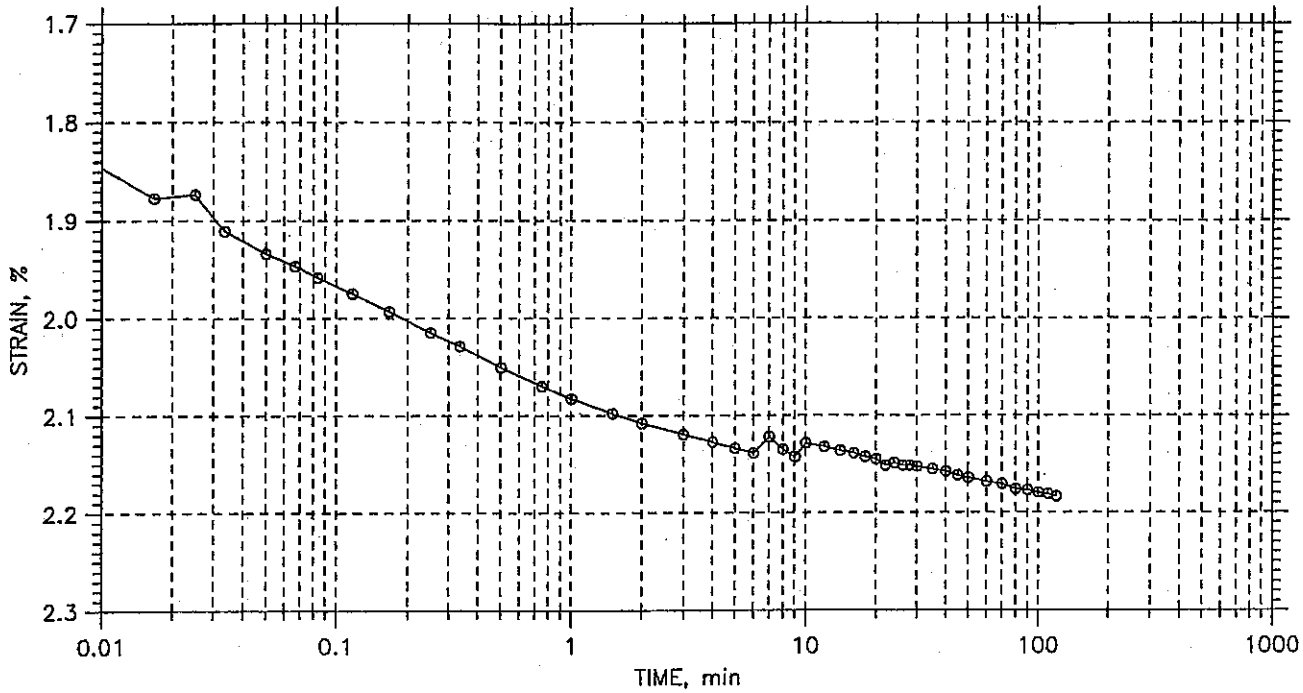
GeoTesting express	Project: NO. 77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-7	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/12/05	Depth: 15 ft
	Test No.: C-2	Sample Type: Tube	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: ---		

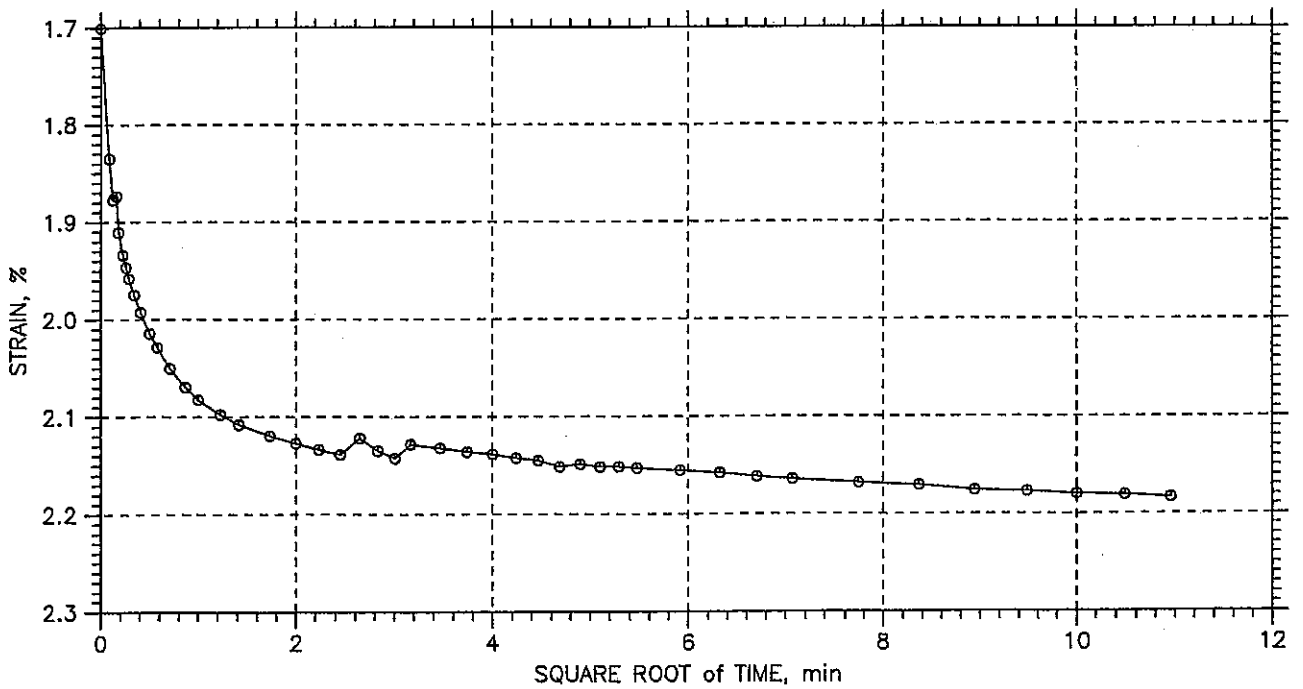
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 10 of 14

Stress: 2. tsf





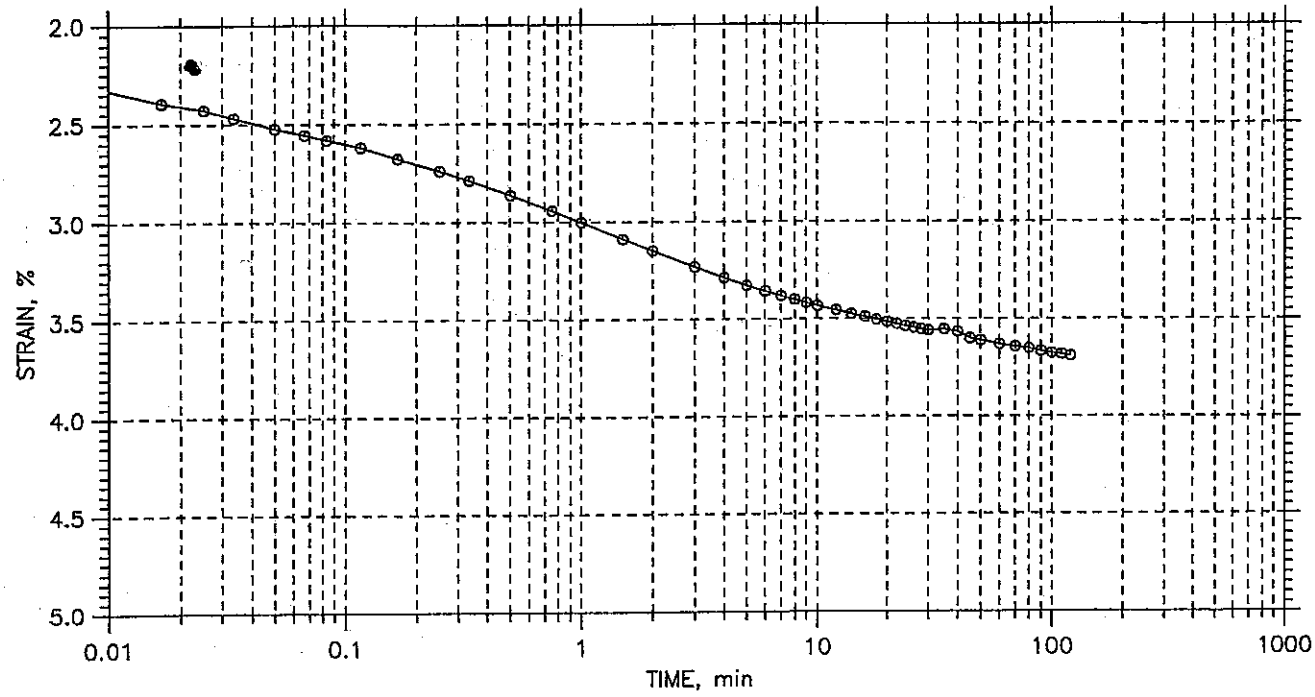
GeoTesting express	Project: NO. 77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-7	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/12/05	Depth: 15 ft
	Test No.: C-2	Sample Type: Tube	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: ---		

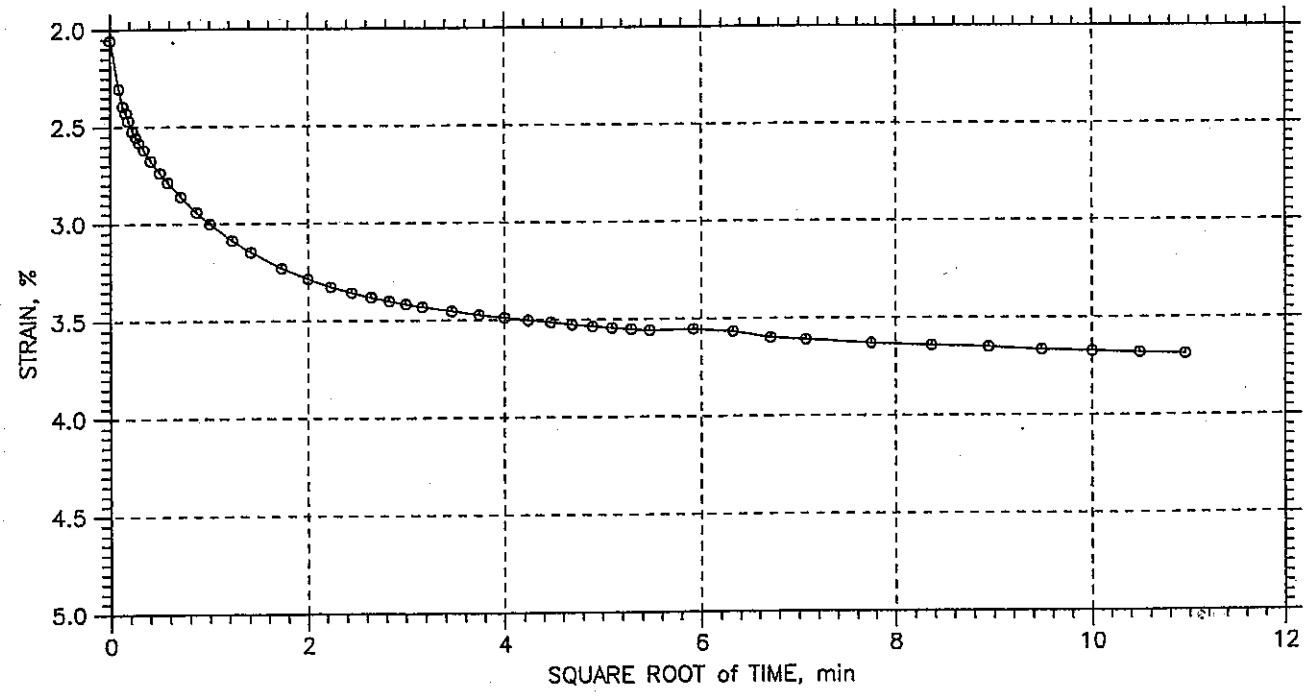
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 11 of 14

Stress: 4. tsf





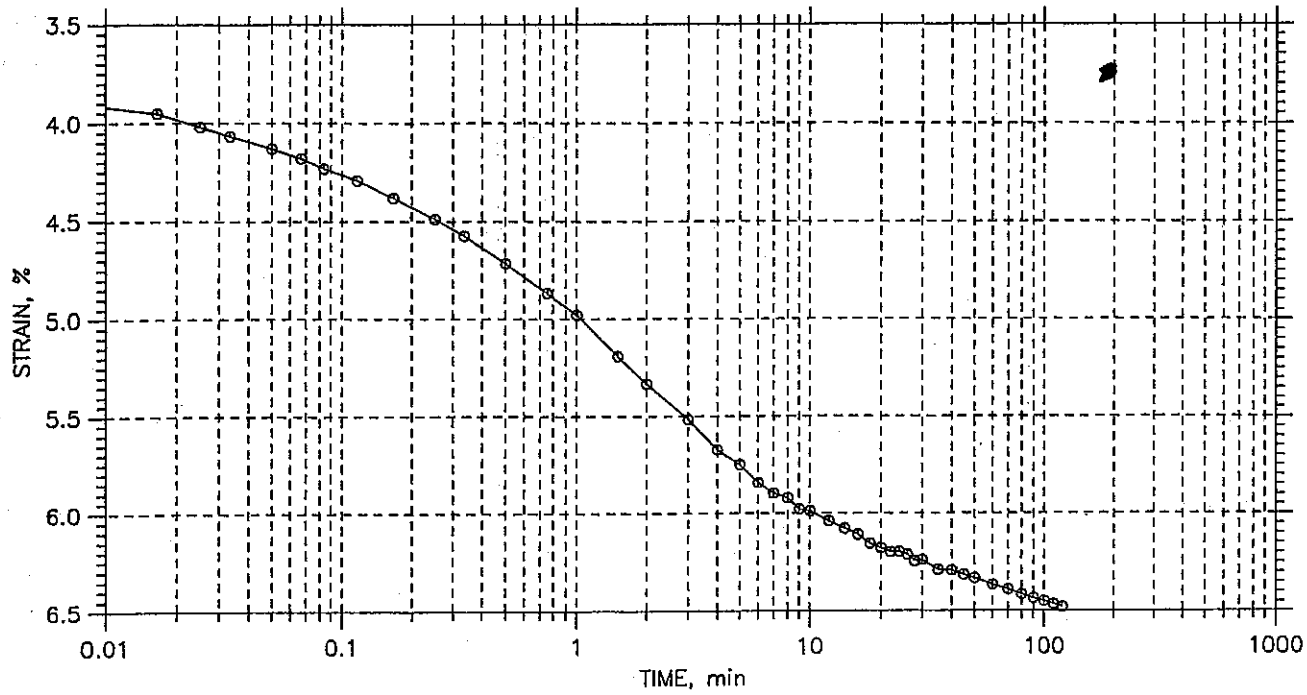
GeoTesting express	Project: NO. 77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-7	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/12/05	Depth: 15 ft
	Test No.: C-2	Sample Type: Tube	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: ---		

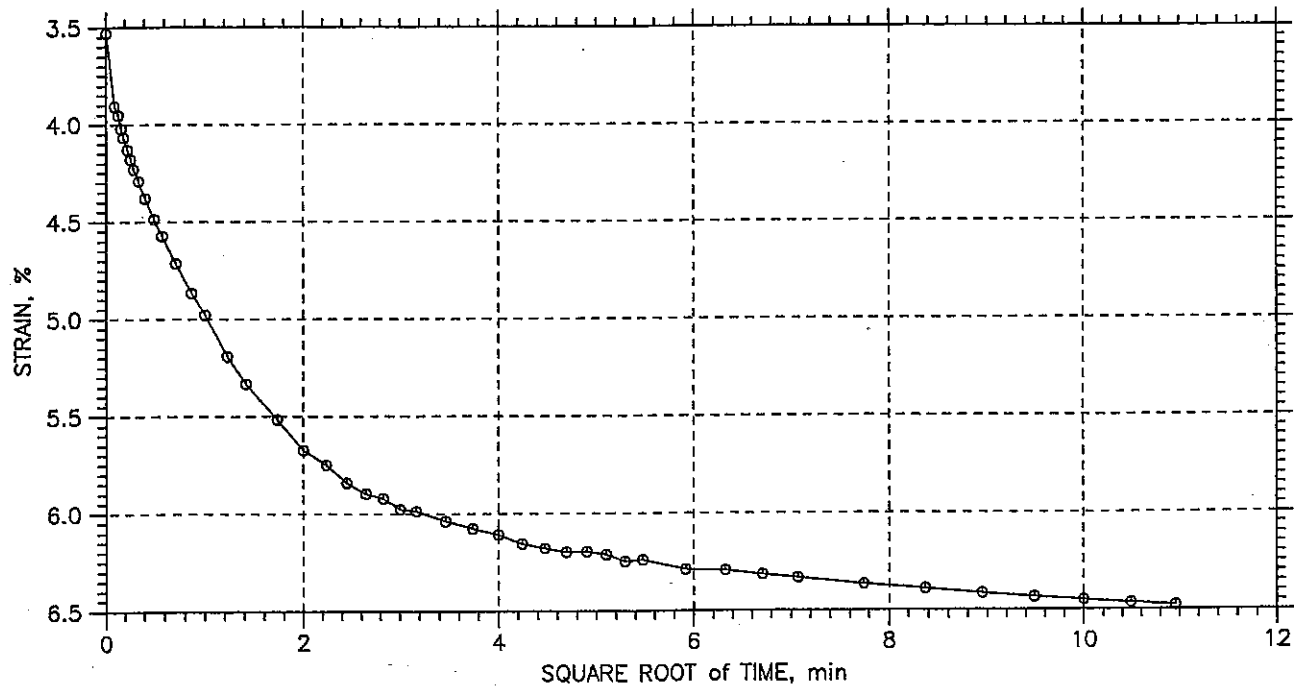
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 12 of 14

Stress: 8. tsf





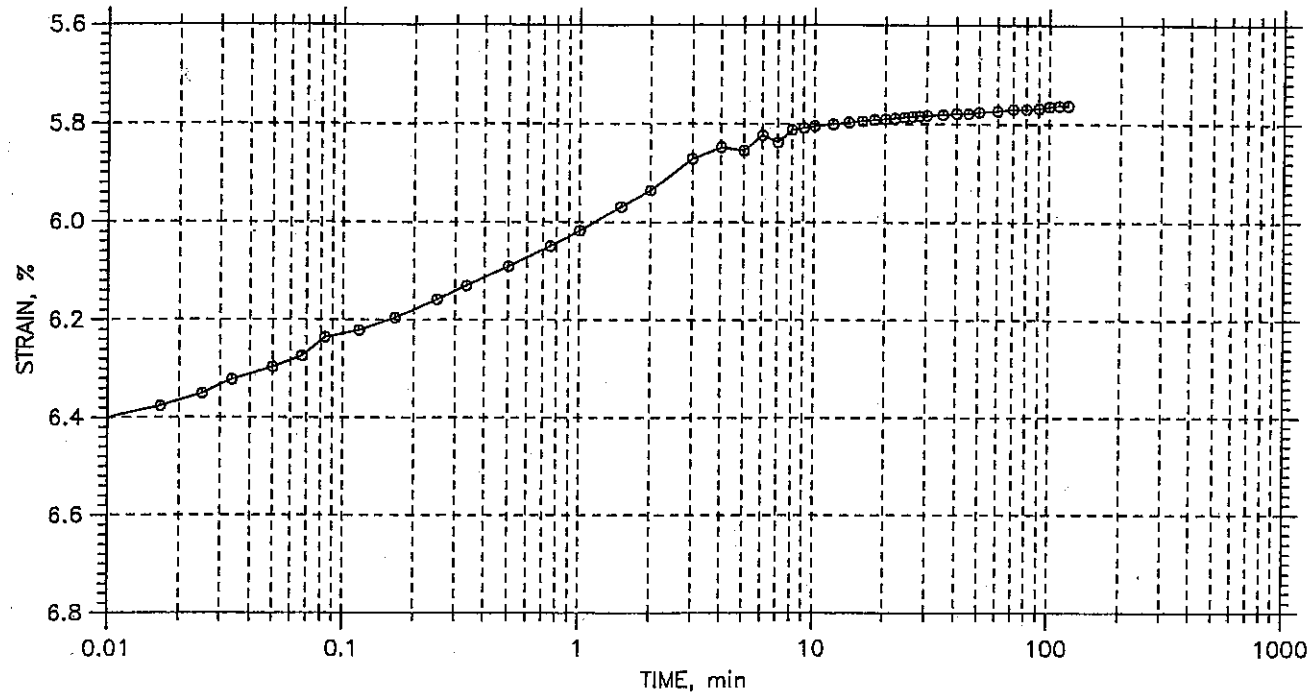
GeoTesting express	Project: NO. 77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-7	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/12/05	Depth: 15 ft
	Test No.: C-2	Sample Type: Tube	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: ---		

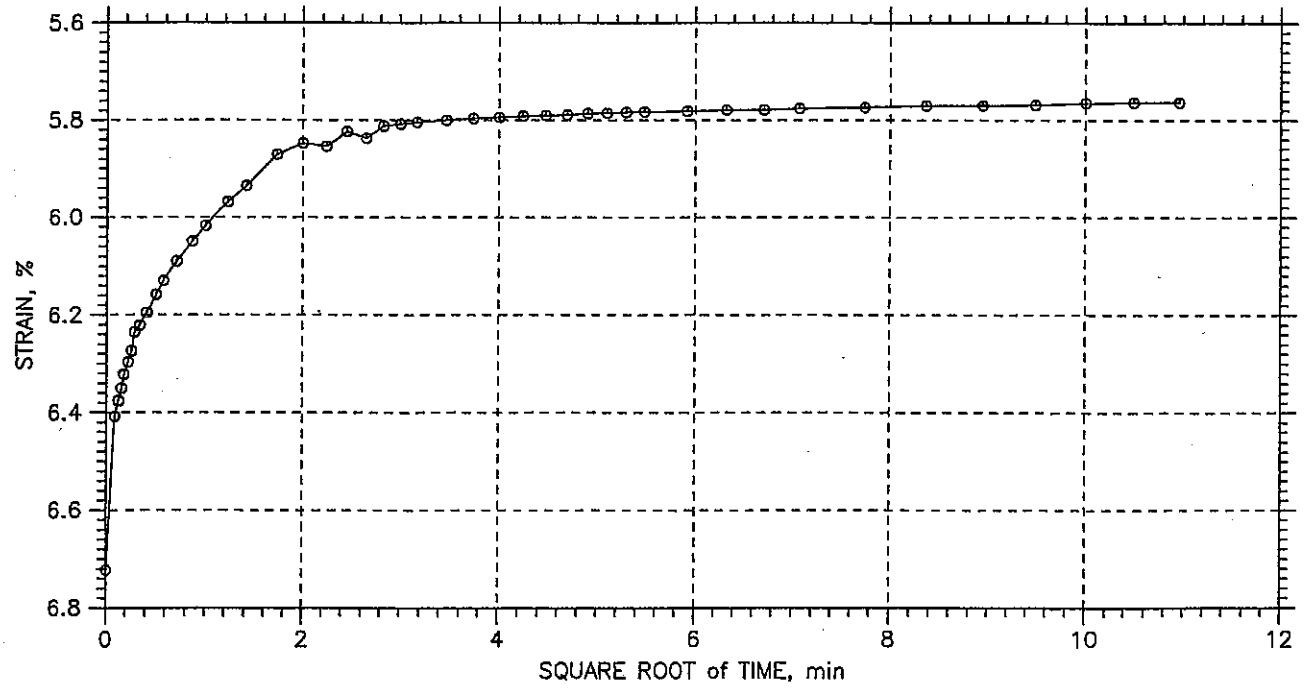
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 13 of 14

Stress: 2. tsf





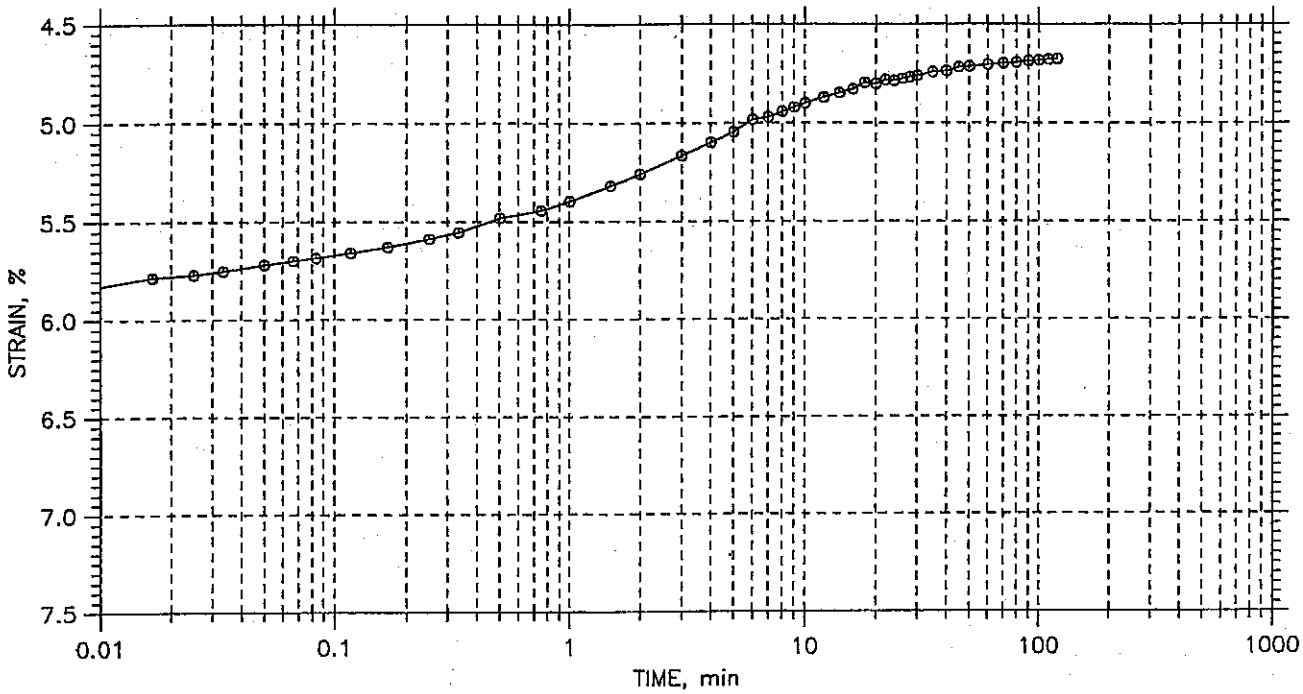
GeoTesting express	Project: NO. 77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-7	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/12/05	Depth: 15. ft
	Test No.: C-2	Sample Type: Tube	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: ---		

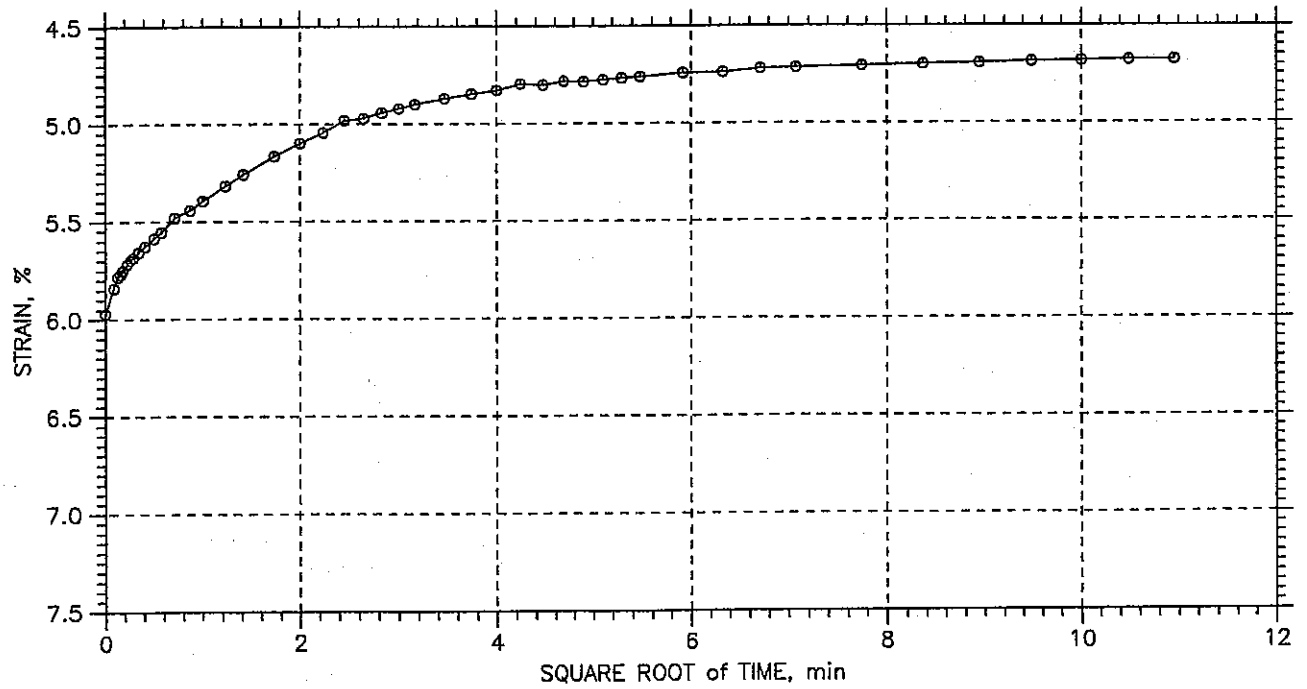
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 14 of 14

Stress: 0.5 tsf





GeoTesting express	Project: NO. 77210.00	Location: ---	Project No.: GTX-6182
	Boring No.: B-7	Tested By: md	Checked By: jdt
	Sample No.: ---	Test Date: 09/12/05	Depth: 15 ft
	Test No.: C-2	Sample Type: Tube	Elevation: ---
	Description: Moist, greenish gray clay		
	Remarks: ---		

GeoTesting express

WARRANTY and LIABILITY

GeoTesting Express (GTX) warrants that all tests it performs are run in general accordance with the specified test procedures and accepted industry practice. GTX will correct or repeat any test that does not comply with this warranty. GTX has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

GTX may report engineering parameters that require us to interpret the test data. Such parameters are determined using accepted engineering procedures. However, GTX does not warrant that these parameters accurately reflect the true engineering properties of the *in situ* material. Responsibility for interpretation and use of the test data and these parameters for engineering and/or construction purposes rests solely with the user and not with GTX or any of its employees.

GTX's liability will be limited to correcting or repeating a test which fails our warranty. GTX's liability for damages to the Purchaser of testing services for any cause whatsoever shall be limited to the amount GTX received for the testing services. GTX will not be liable for any damages, or for any lost benefits or other consequential damages resulting from the use of these test results, even if GTX has been advised of the possibility of such damages. GTX will not be responsible for any liability of the Purchaser to any third party.

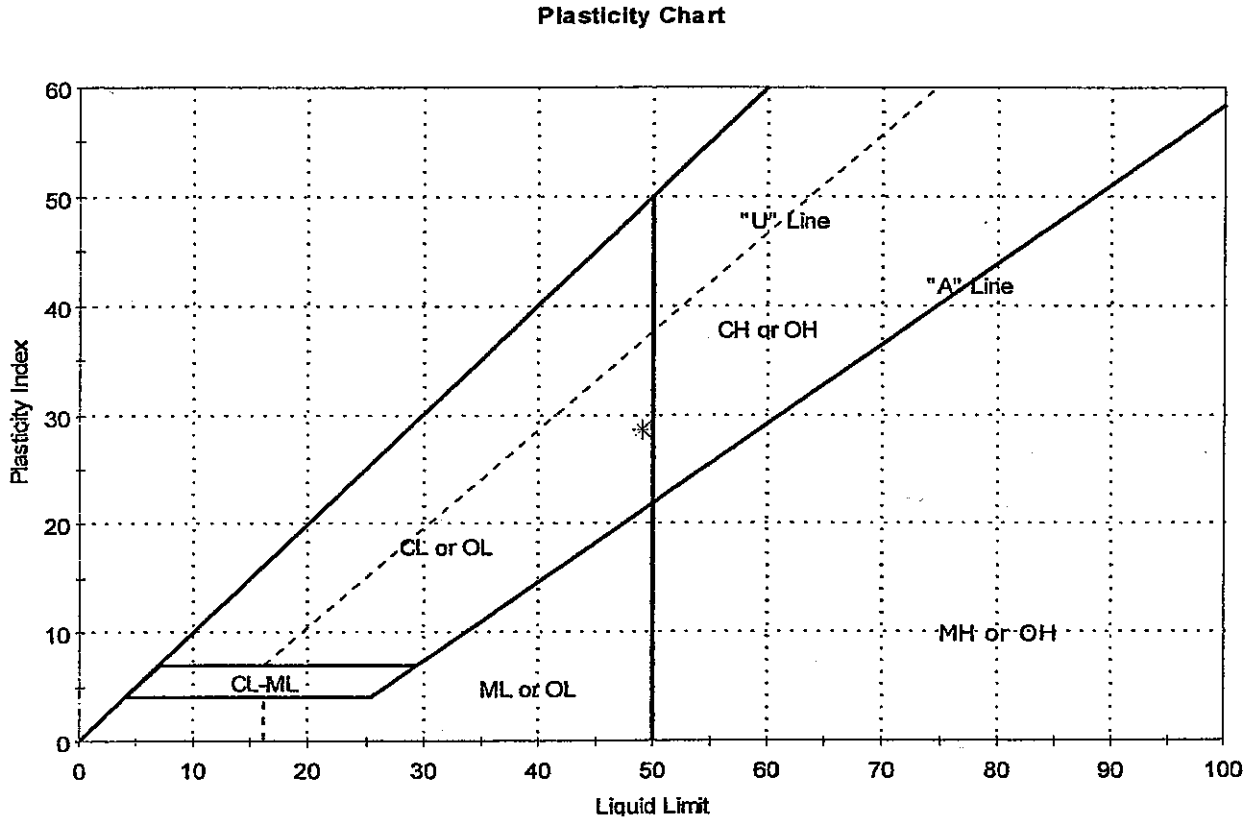
Commonly Used Symbols

A	pore pressure parameter for $\Delta\sigma_1 - \Delta\sigma_3$
B	pore pressure parameter for $\Delta\sigma_3$
CIU	isotropically consolidated undrained triaxial shear test
CR	compression ratio for one dimensional consolidation
C_c	coefficient of curvature, $(D_{30})^2 / (D_{10} \times D_{60})$
C_u	coefficient of uniformity, D_{60}/D_{10}
C_c	compression index for one dimensional consolidation
C_α	coefficient of secondary compression
c_v	coefficient of consolidation
c	cohesion intercept for total stresses
c'	cohesion intercept for effective stresses
D	diameter of specimen
D_{10}	diameter at which 10% of soil is finer
D_{15}	diameter at which 15% of soil is finer
D_{30}	diameter at which 30% of soil is finer
D_{50}	diameter at which 50% of soil is finer
D_{60}	diameter at which 60% of soil is finer
D_{85}	diameter at which 85% of soil is finer
d_{50}	displacement for 50% consolidation
d_{90}	displacement for 90% consolidation
d_{100}	displacement for 100% consolidation
E	Young's modulus
e	void ratio
e_c	void ratio after consolidation
e_o	initial void ratio
G	shear modulus
G_s	specific gravity of soil particles
H	height of specimen
PI	plasticity index
i	gradient
K_o	lateral stress ratio for one dimensional strain
k	permeability
LI	Liquidity Index
m_v	coefficient of volume change
n	porosity
PI	plasticity index
P_c	preconsolidation pressure
p	$(\sigma_1 + \sigma_3) / 2$, $(\sigma_v + \sigma_h) / 2$
p'	$(\sigma'_1 + \sigma'_3) / 2$, $(\sigma'_v + \sigma'_h) / 2$
p'_c	p' at consolidation
Q	quantity of flow
q	$(\sigma_1 - \sigma_3) / 2$
q_f	q at failure
q_o, q_i	initial q
q_c	q at consolidation
S	degree of saturation
SL	shrinkage limit
s_u	undrained shear strength
T	time factor for consolidation
T	temperature
t	time
U, UC	unconfined compression test
UU, Q	unconsolidated undrained triaxial test
u_a	pore gas pressure
u_e	excess pore water pressure
u, u_w	pore water pressure
V	total volume
V_g	volume of gas
V_s	volume of solids
V_v	volume of voids
V_w	volume of water
V_o	initial volume
v	velocity
W	total weight
W_s	weight of solids
W_w	weight of water
w	water content
w_c	water content at consolidation
w_f	final water content
w_l	liquid limit
w_n	natural water content
w_p	plastic limit
w_s	shrinkage limit
w_o, w_i	initial water content
α	slope of q_f versus p_f
α'	slope of q_f versus p_f'
γ_t	total unit weight
γ_d	dry unit weight
γ_s	unit weight of solids
γ_w	unit weight of water
ε	strain
ε_{vol}	volume strain
ε_h, ε_v	horizontal strain, vertical strain
μ	Poisson's ratio, also viscosity
σ	normal stress
σ'	effective normal stress
σ_o, σ'_o	consolidation stress in isotropic stress system
σ_h, σ'_h	horizontal normal stress
σ_v, σ'_v	vertical normal stress
σ_1	major principal stress
σ_2	intermediate principal stress
σ_3	minor principal stress
τ	shear stress
φ	friction angle based on total stresses
φ'	friction angle based on effective stresses
φ'_r	residual friction angle
φ_{ult}	φ for ultimate strength

GeoTesting express

Client:	Nobis Engineering, Inc.		
Project:	No.77210.00		
Location:		Project No:	GTX-6182
Boring ID: B-7	Sample Type: tube	Tested By:	pcs
Sample ID:---	Test Date: 10/05/05	Checked By:	jdt
Depth : 15 ft.	Test Id: 78628		
Test Comment:	---		
Sample Description:	Moist, dark greenish gray clay		
Sample Comment:			

Atterberg Limits - ASTM D 4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	---	B-7	15 ft.	33	49	20	29	0	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilentancy: SLOW

Toughness: LOW

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APPENDIX D

CONSOLIDATION TEST DATA

Project: NO.77210.00
Boring No.: B-4
Sample No.: ---
Test No.: 6182-C1

Location: ---
Tested By: md
Test Date: 09/07/05
Sample Type: Tube

Project No.: GTX-6182
Checked By: jdt
Depth: 8 ft
Elevation: ---

Soil Description: Moist, olive brown clayey silt
Remarks: ---

Estimated Specific Gravity: 2.74
Initial Void Ratio: 0.98
Final Void Ratio: 0.67

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Initial Height: 1.00 in
Specimen Diameter: 2.50 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	1058	RING		
Wt. Container + Wet Soil, gm	224.24	356.26	354.06	145.93
Wt. Container + Dry Soil, gm	181.41	326.68	326.68	118.64
Wt. Container, gm	8.06	215.57	215.57	7.91
Wt. Dry Soil, gm	173.35	111.11	111.11	110.73
Water Content, %	24.71	26.63	24.65	24.65
Void Ratio	---	0.98	0.67	---
Degree of Saturation, %	---	74.22	100.00	---
Dry Unit Weight, pcf	---	86.228	102.06	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

CONSOLIDATION TEST DATA

Project: NO.77210.00
Boring No.: B-4
Sample No.: ---
Test No.: 6182-C1

Location: ---
Tested By: md
Test Date: 09/07/05
Sample Type: Tube

Project No.: GTX-6182
Checked By: jdt
Depth: 8 ft
Elevation: ---

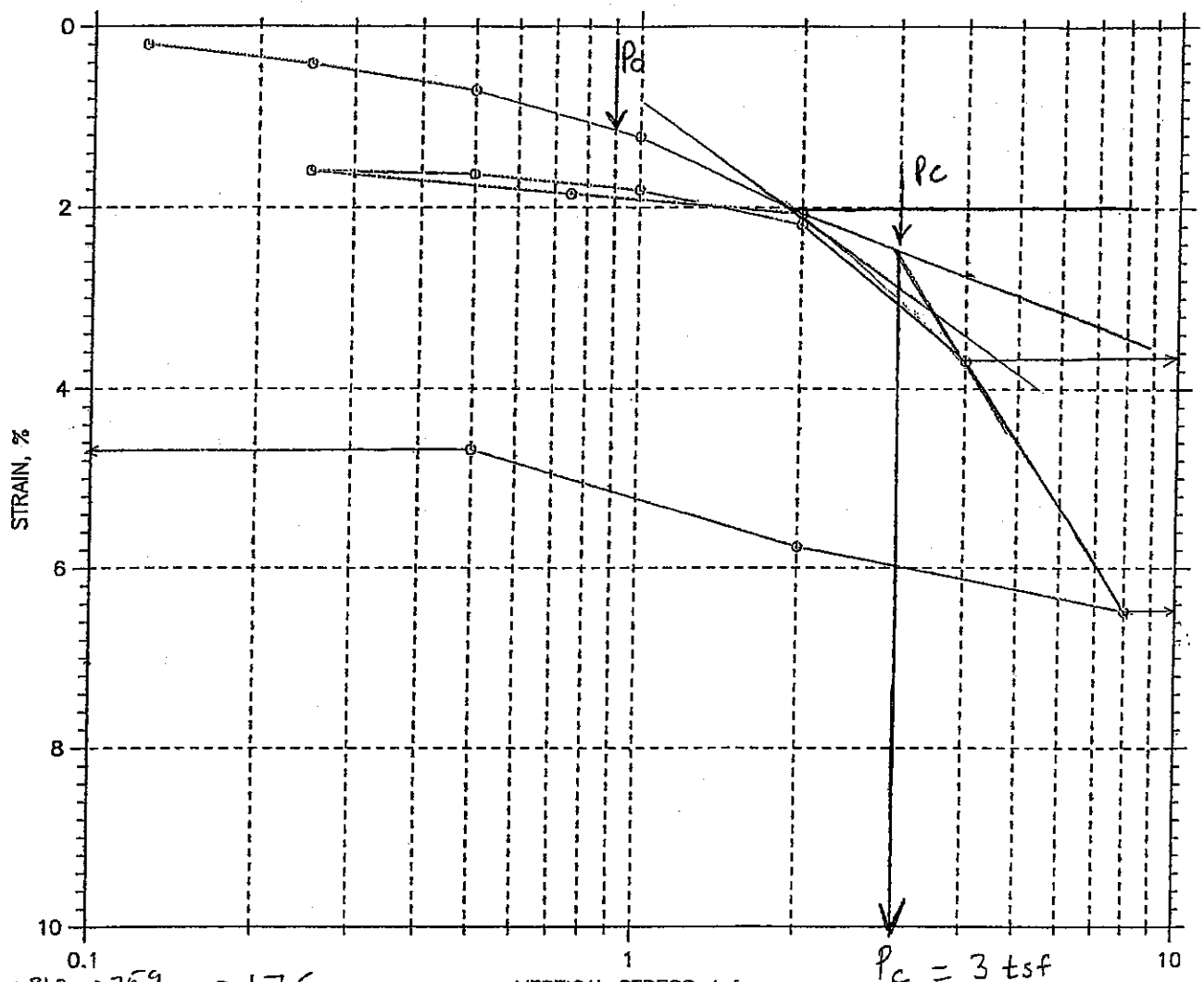
Soil Description: Moist, olive brown clayey silt
Remarks: ---

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	T50 Fitting Sq.Rt. min	T50 Fitting Log min	Coefficient of Consolidation Sq.Rt. in^2/sec	Coefficient of Consolidation Log in^2/sec	Coefficient of Consolidation Ave. in^2/sec
1	0.125	0.01378	0.955	1.38	0.3	0.0	2.46e-003	0.00e+000	2.46e-003
2	0.25	0.01673	0.949	1.67	0.2	0.0	3.56e-003	0.00e+000	3.56e-003
3	0.5	0.02283	0.937	2.28	0.2	0.0	3.88e-003	0.00e+000	3.88e-003
4	1	0.05989	0.863	5.99	0.4	0.4	1.97e-003	2.08e-003	2.03e-003
5	2	0.09398	0.796	9.40	0.2	0.1	4.53e-003	5.01e-003	4.75e-003
6	0.75	0.09169	0.800	9.17	0.1	0.0	1.33e-002	0.00e+000	1.33e-002
7	0.25	0.087	0.810	8.70	0.3	0.1	2.32e-003	6.99e-003	3.48e-003
8	0.5	0.08845	0.807	8.85	0.1	0.0	7.26e-003	0.00e+000	7.26e-003
9	1	0.09131	0.801	9.13	0.0	0.0	2.00e-002	0.00e+000	2.00e-002
10	2	0.09678	0.790	9.68	0.8	0.0	8.36e-004	0.00e+000	8.36e-004
11	4	0.1244	0.736	12.44	0.4	0.1	1.71e-003	6.58e-003	2.72e-003
12	8	0.1637	0.658	16.37	0.3	0.2	1.91e-003	2.74e-003	2.25e-003
13	2	0.1616	0.662	16.16	0.0	0.0	3.74e-002	3.20e-002	3.45e-002
14	0.5	0.1551	0.675	15.51	0.4	0.0	1.57e-003	0.00e+000	1.57e-003

$$C_c = \frac{\Delta e}{\log\left(\frac{P_o + \Delta P}{P_o}\right)}$$

CONSOLIDATION TEST DATA

SUMMARY REPORT



$C_c = \frac{0.812 - 0.759}{\log(8/4)} = 0.176$

$C_r = \frac{0.793 - 0.759}{\log(8/05)} = 0.0282$

$OCR = \frac{P_c}{P_o} = \frac{3}{0.9} = 3.33$

$P_o = 15 \times \gamma_{dry}(1+\omega)$
$= 15 \times 92.75 \times (1 + 0.3032)$
$= 1813 \text{ psf} = 0.9 \text{ tsf}$

				Before Test	After Test
Overburden Pressure: ---				Water Content, %	30.32	28.38
Preconsolidation Pressure: ---				Dry Unit Weight, pcf	92.75	97.3
Compression Index: ---				Saturation, %	96.17	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	0.88	0.79
LL: ---	PL: ---	PI: ---	GS: 2.79			

GeoTesting express

Project: NO. 77210.00	Location: ---	Project No.: GTX-6182
Boring No.: B-7	Tested By: md	Checked By: jdt
Sample No.: ---	Test Date: 09/12/05	Depth: 15 ft
Test No.: C-2	Sample Type: Tube	Elevation: ---
Description: Moist, greenish gray clay		
Remarks: ---		

CONSOLIDATION TEST DATA

Project: NO. 77210.00
Boring No.: B-7
Sample No.: ---
Test No.: C-2

Location: ---
Tested By: md
Test Date: 09/12/05
Sample Type: Tube

Project No.: GTX-6182
Checked By: jdt
Depth: 15 ft
Elevation: ---

Soil Description: Moist, greenish gray clay
Remarks: ---

Estimated Specific Gravity: 2.79
Initial Void Ratio: 0.88
Final Void Ratio: 0.79

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Initial Height: 1.00 in
Specimen Diameter: 2.50 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	NRT-20	RING		
Wt. Container + Wet Soil, gm	327.13	372.24	369.92	160.89
Wt. Container + Dry Soil, gm	248.79	336.01	336.01	127.11
Wt. Container, gm	8.31	216.5	216.5	8.08
Wt. Dry Soil, gm	240.48	119.51	119.51	119.03
Water Content, %	32.58	30.32	28.38	28.38
Void Ratio	---	0.88	0.79	---
Degree of Saturation, %	---	96.17	100.00	---
Dry Unit Weight, pcf	---	92.746	97.296	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

A3.8 Phase I and II Site Analysis Detailed Review

ICON architecture, inc.
July 2003

Phase I and II Site Analysis

Detailed Review

ICON architecture, inc.
September 2003
July 2003

Phase I and II Site Analysis

Introduction

This memorandum provides a detailed review of the earlier phases of the site analysis, and supplements the summary information provided in the Master Plan. It includes preliminary site development alternatives for the existing court sites.

The site analysis task of this project was an extensive, iterative process that had three distinct phases over the course of two years. The initial site scoping evaluated the two existing sites for expansion capabilities and identified several additional sites (some with existing structures) in close proximity to the current Courts complex that could potentially accommodate new facilities.

One of these initial sites, the MBTA parcel across Bridge Street, became the focus of the second phase of site analysis. This phase examined numerous site development possibilities for a new court complex, including joint development possibilities with the MBTA, which was initiating its own studies for the construction of a major parking structure to serve its adjacent commuter rail station.

This second phase presented some interesting joint development possibilities. However, the lack of a good pedestrian connection between the proposed site and the current Court site, and additional security considerations, which became a major concern after September 11, 2001, led to a renewed focus on creating an integrated, contiguous campus site for the existing and proposed new court facilities. This meant finding a way to expand the existing site area.

Creation of this expanded campus site involved two new "outside the box" assumptions:

1. The possibility of relocating Bridge Street and/or the loop ramp linking North Street and Bridge Street; and
2. The possibility of acquiring the First Baptist Church in Salem, situated immediately to the west of the Registry of Deeds building, which came onto the real estate market during the course of the study.

Both of these assumptions were thoroughly tested. In the case of Bridge Street and the loop ramp, discussions were held with both the Massachusetts Highway Department and the Federal Highway Administration, including a site walk with representatives of the latter agency. It became clear that, while a relocation of Bridge Street was unlikely to be considered by highway officials, the replacement of the North Street to Bridge Street loop ramp with a more efficient slip ramp was a distinct possibility. DCAM consequently commissioned a detailed traffic and preliminary engineering study of this possibility, undertaken by Edwards & Kelcey in the Fall of 2002 (see Appendix).

At the same time, discussions with officials of the First Baptist Church indicated a willingness to sell the building. As a contributing structure within the National Register-listed Federal Street Historic District, any changes to the Church or its setting would require careful review in accordance with the Secretary of the Interiors' Standards for Rehabilitation. ICON's preservation planner provided an analysis of the various concepts for incorporating the Church into the Courts site and program (see Appendix) while maintaining the integrity of the historic structure.

At this point, the site analysis shifted into its third phase, the evaluation of an expanded campus site. This phase of the site analysis assumes the replacement of the existing loop

ramp with a slip ramp closer to North Street, and the acquisition and incorporation of the First Baptist Church into the Campus design program. The campus design concept has also evolved from one which incorporates the Church in its current location to a strategy involving relocating the Church adjacent to the proposed slip ramp, to create a large contiguous site for the construction of a major new court facility.

Site Selection Criteria and Initial Site Scoping

The preliminary site scoping phase was intended to support the Site Selection Committee in identifying up to three sites for subsequent in-depth site analysis. Preliminary sites were identified by the City of Salem Planning Department, AOTC and DCAM staff, and visual observation.

These preliminary planning assumptions were used to identify potential sites:

- Due to dimensional, urban design and historic considerations, the existing state-owned Trial Court sites cannot accommodate the full 2020 program of 16 courtrooms.
- The Master Plan program will be distributed between existing and new site(s)
- Additional site(s) should be within ¼ mile radius of public transportation and the existing Trial Court complex
- Additional site(s) should provide parking for essential vehicles

Phase I Site Analysis

The following pages briefly analyze capacity of the two existing sites and several initial additional sites ***(Fig. 1):***

- Derby Street - block bounded by Derby, Lafayette and Central Streets
- Church Street parking lot
- Telephone Co. building
- MBTA commuter parking lot

Existing site - Probate and Family Court and Registry of Deeds

Small, disaggregated floor plates, mis-matched floor elevations, and historic status hamper efficient renovation layouts and building expansion at the 1.96 acre site of the Probate and Family Court and Superior Court. The 1841 Commissioners' Building and 1861-1891 Superior Court Building are listed in the National Register of Historic Places. For planning purposes, it is assumed that these buildings would not be demolished and that their exteriors would remain largely unaltered. For this reason, initial conceptual studies to increase the number of courtrooms on this site focused on expansion or replacement of the two newest structures, the circa 1912 Probate and Family Court and Registry of Deeds and the 1979 Administrative Addition. The 1912 building is more than 50 years old and thus eligible for the National Register of Historic Places.

Two and three-story frame residential buildings, now largely used as attorneys' offices, face the Courts on Federal Street. The First Baptist Church in Salem and several residential structures stand to the west.

Access: Staff, police prosecutors and Sheriff's Department vans enter the 'back' of the site from curb cuts on Bridge Street. Separate public entrances to the Probate and Family Court and Superior Court front Federal Street, as does a curb cut to handicapped public parking spaces. Walking distance from the commuter rail platform to the Probate and Family Court entrance is approximately 1000 feet; distance to the District Court entrance is 500'.

Site characteristics: The site drops approximately 14' from Federal Street to Bridge Street (approximately 5% grade). On the western property line, a cut slope marks the grade change between the higher

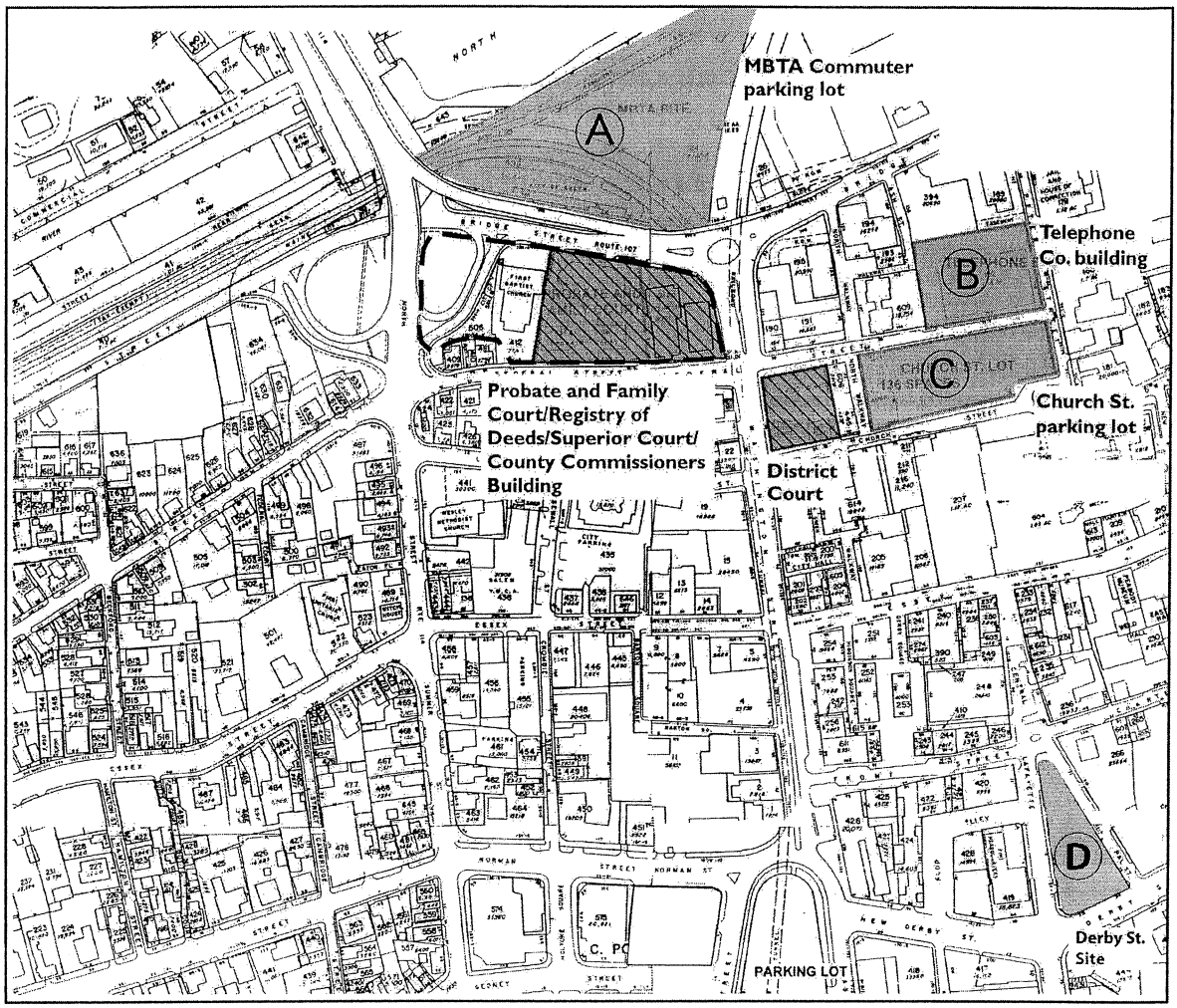

MBTA Commuter parking lot
A
Telephone Co. building
B
C
Church St. parking lot
Probate and Family Court/Registry of Deeds/Superior Court/ County Commissioners Building
District Court
D
Derby St. Site
PARKING LOT

Figure 1

church site and excavation for Court parking.

Visibility: Projecting entry bays at the Superior Court and Probate and Family Court buildings enhance visibility from Washington Street.

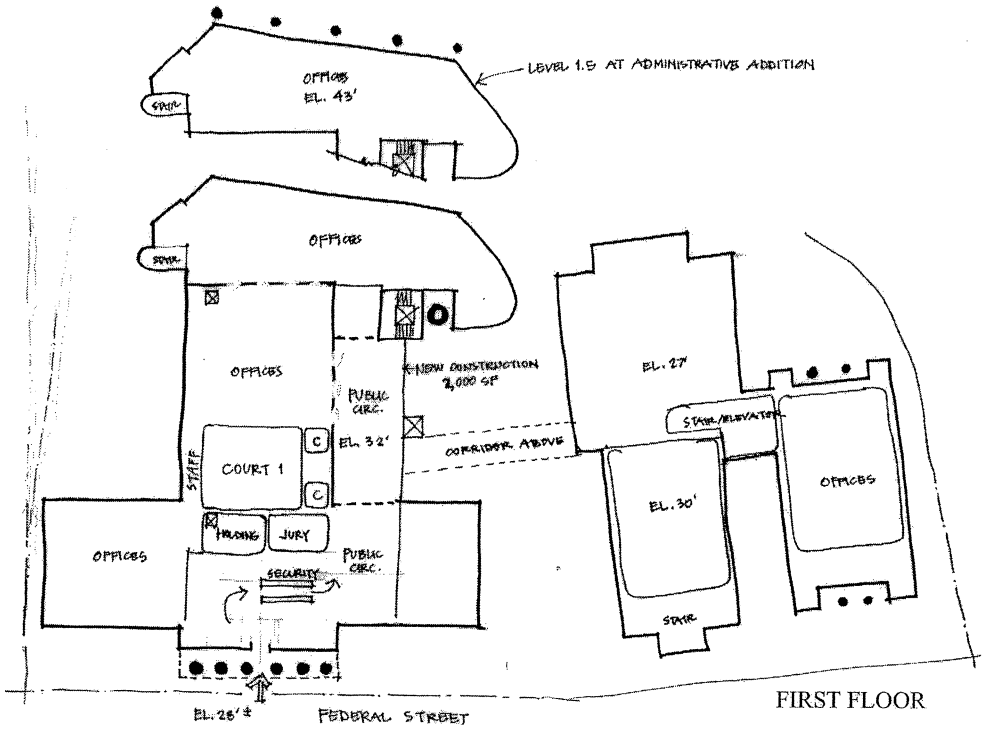
Facility conceptual design: Conceptual planning tested varying degrees of intervention, from re-use of the existing building shells, to expanding the shells, to demolition with new construction. In this cycle, planning assumed that the historic reading room of the Essex Law Library would be retained and that the library would be expanded laterally.

The Probate and Family Court (50,500 GSF) and Administrative Addition (27,000 GSF) together contain about 77,000 GSF. Using a rule of thumb of 15,000 GSF per courtroom, capacity is theoretically about 5 courtrooms. (This assumes relocation of the Registry of Deeds.) Any renovation scheme should seek to aggregate office area that is now broken up into 17' deep rooms (in the front of the building) and a constrained 36' deep (average) floorplate in the Administrative Addition. Two levels of the Administrative Addition (total 13,500 GSF) are set at intermediate or mezzanine elevations and have low utility for public access and transaction counters.

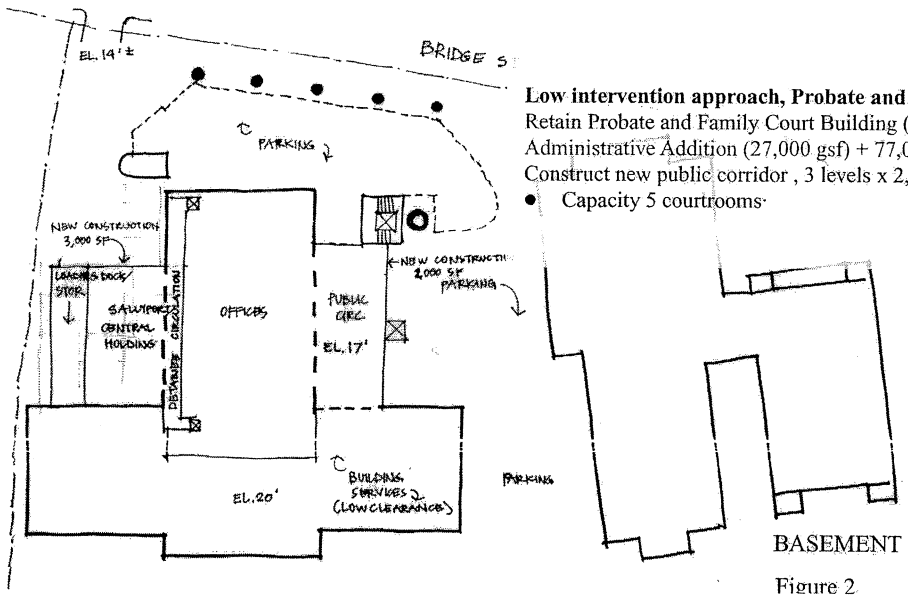
Modest intervention concept -- renovation: ***(Fig. 3-2)*** A modest-intervention conceptual design with five courtrooms would construct two courtrooms, staff circulation, shared holding areas, and attorney-client conference rooms within the second floor records hall, a 20' high clear-span space. On the same floor, a third courtroom would occupy the front of the Probate and Family Court and a small fourth courtroom would be located in the Administrative Addition; height of the latter could be increased from the existing 10-'9" floor-to-floor by cutting away part of the fourth level, above. A linear addition to the east accommodates public circulation. The basement (1/2 level below grade) would house offices and horizontal circulation to detainee elevators. Offices and a fifth courtroom occupy the first or entry-level floor.

Under the lower-intervention concept, potential exists for a bridge and elevator stop mid-level between the first and second floors to connect to the Essex Law Library on the second floor of the Superior Court building. The Law Library would expand to the south to occupy the present Superior Court Session I courtroom. This concept does not provide separate staff access for existing courtrooms in the Superior Court Building. Floors in the Superior Court and Commissioners' Buildings would lack separate staff access and might be programmed for Community Corrections, ADR, jury pool, and DA occupancy. Refer to the attached sketches.

Major intervention concept – demolish and rebuild: (Fig. 3-3) A major-intervention approach would demolish the Administrative Addition and Probate and Family Court Building. The columned Greek Revival entrance on Federal Street could be retained. Four levels of new construction, each approximately 30,000 GSF, would provide sufficient space for 8 courtrooms. Since Bridge Street is about 14' lower than Federal Street, this arrangement allows 4 levels above grade at Bridge Street and a smaller-scale 3 levels above grade at Federal Street. Potential may exist to zone the building for two separate departments and user populations with separate entrances at Bridge Street and Federal Street. A corridor connection would access the second floor of the Superior Court building, where the historic library would be expanded southward into the existing Session I courtroom. Separate curb cuts on Bridge Street could access the sallyport and approximately 25 parking spaces. Refer to the attached sketches.



FIRST FLOOR



BASEMENT

Low intervention approach, Probate and Family Court site
Retain Probate and Family Court Building (50,500 gsf) +
Administrative Addition (27,000 gsf) + 77,000 gsf.
Construct new public corridor , 3 levels x 2,100 gsf = 6,300 gsf

- Capacity 5 courtrooms·

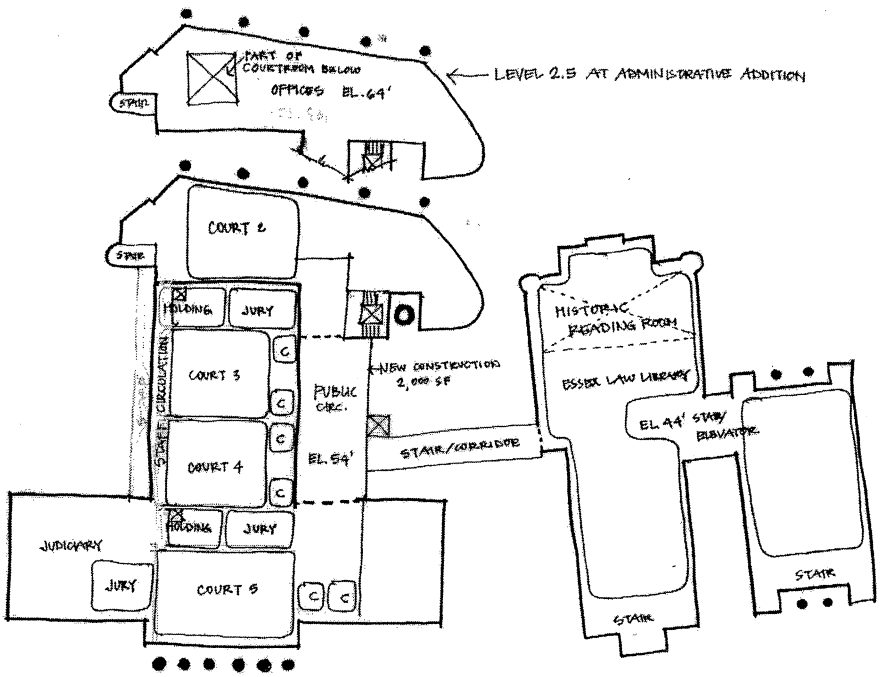
1" = 32'

Figure 2

Low intervention approach, Probate and Family Court site
Retain Probate and Family Court Building (50,500 gsf) +
Administrative Addition (27,000 gsf) + 77,000 gsf.
Construct new public corridor , 3 levels x 2,100 gsf = 6,300 gsf

- Capacity 5 courtrooms·

1" = 32'



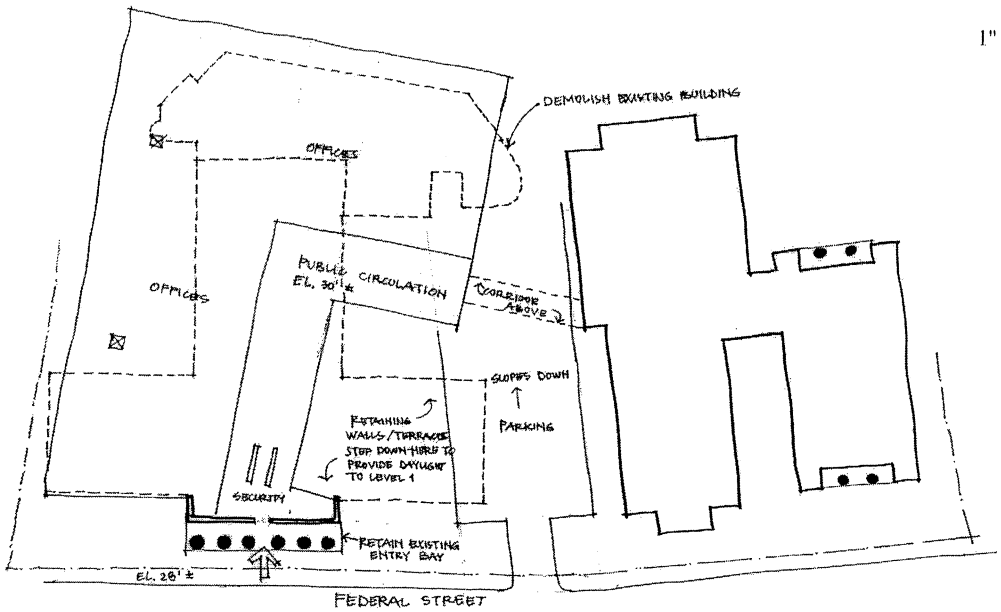
SECOND FLOOR

Figure 2

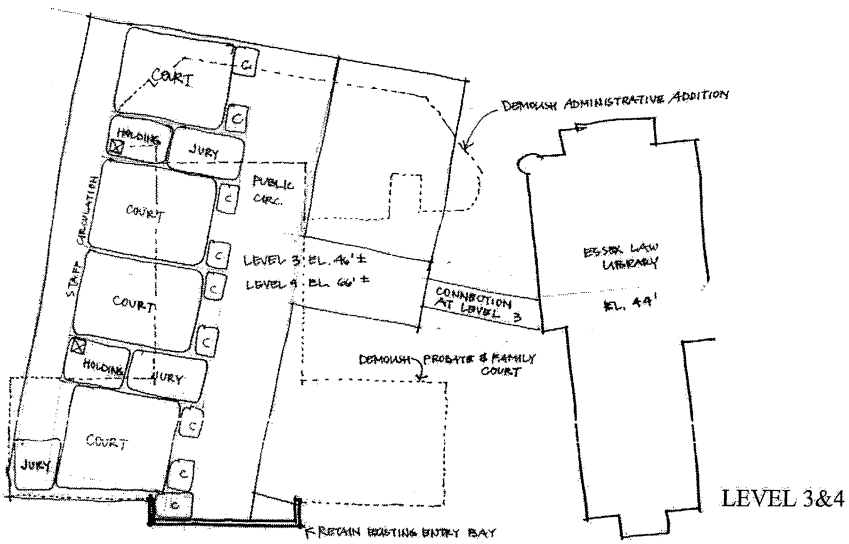
High intervention approach, Probate and Family Court site
Demolish Probate and Family Court Building and Administrative Addition
Construct new facility, 4 levels x 30,000 gsf = 120,000 gsf

- Capacity 8 courtrooms

1" = 64'



LEVEL 2



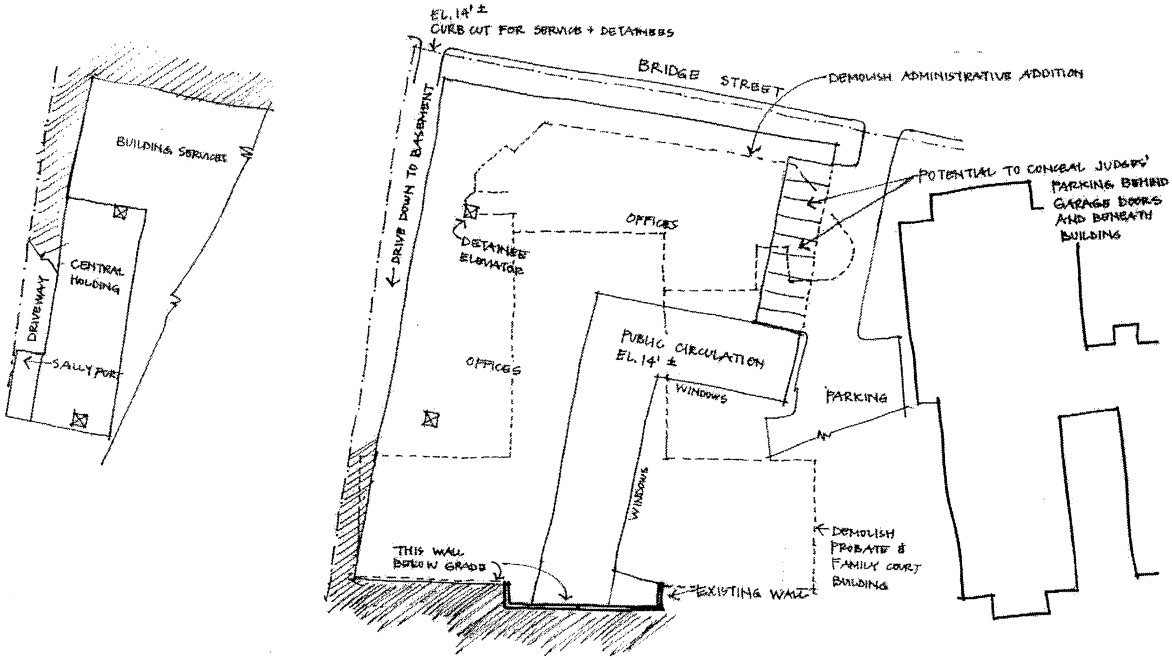
LEVEL 3&4

Figure 3

High intervention approach, Probate and Family Court site
Demolish Probate and Family Court Building and Administrative Addition
Construct new facility, 4 levels x 30,000 gsf = 120,000 gsf

- Capacity 8 courtrooms

1" = 64'



BASEMENT & LEVEL 1

Figure 3

Existing site - District Court

The District Court building has three courtrooms (the smallest only 800 SF), lacks a sallyport and separate detainee circulation, and has insufficient toilets and attorney/client conference rooms. Transaction offices are disaggregated on two levels, each with about 3,600 net occupiable SF of office space. Interior bearing walls limit opportunities for horizontal break-throughs within the existing structure; the largest continuous spaces are about 42' x 42', or 1,800 SF.

Access: The present building entrance is approximately 900 feet from the commuter rail platform and 500' from the entrance to the Probate and Family Court building. The City-owned Church Street parking lot (136 spaces) is 600' away. This lot is typically filled to capacity on weekdays.

Site characteristics: The 22,000 SF site is essentially flat. A right-of-way and abutting building with windows on the property line limit buildable site area.

Visibility: The District Court occupies a corner site with sightlines from the Superior Court building and along Washington Street.

Facility conceptual design: This 34,500 GSF building (with partial sub-basement level and full basement, first and second floors) could be expanded vertically or horizontally. Addition of one floor (approximately 9,500 GSF) would increase floor area to 44,000 GSF. This is insufficient to increase the number of courtrooms beyond 3. Floorplates would remain small and inflexible.

Horizontal expansion could extend the building width northward to the Federal Street property line, adding about 5,800 GSF each at the first and second floor for a building increase to about 46,000 GSF. Space would remain for about 8 on-site parking spaces. Again, this is insufficient to increase the number of courtrooms beyond 3, although the enlarged floorplates would become more flexible. Construction of a basement level beneath the addition would not necessarily add useful space, since the ratio of office space to courtrooms would exceed norms and the space would lack windows.

Only by combining vertical and horizontal expansion could the District Court site accommodate more than the existing 3 courtrooms. Adding one floor above the existing construction (9,500 GSF) and three floors on the parking lot to the north (3 x 5,800 GSF) would increase building area to about 61,000 GSF, sufficient for 4 courtrooms. Interior bearing walls would still constrain the interior.

Attached sketches illustrate two approaches to re-use of the District Court site. The first would create a more functional 2-courtroom facility without expanding the building. The second would enlarge the structure to create a more functional 3-courtroom facility. ***Refer to Fig. 4.***

Under the no-expansion approach, net office area could be increased by converting the small courtroom and infilling the open atrium. A new detainee elevator and second-floor corridor provide separate circulation to the two courtrooms.

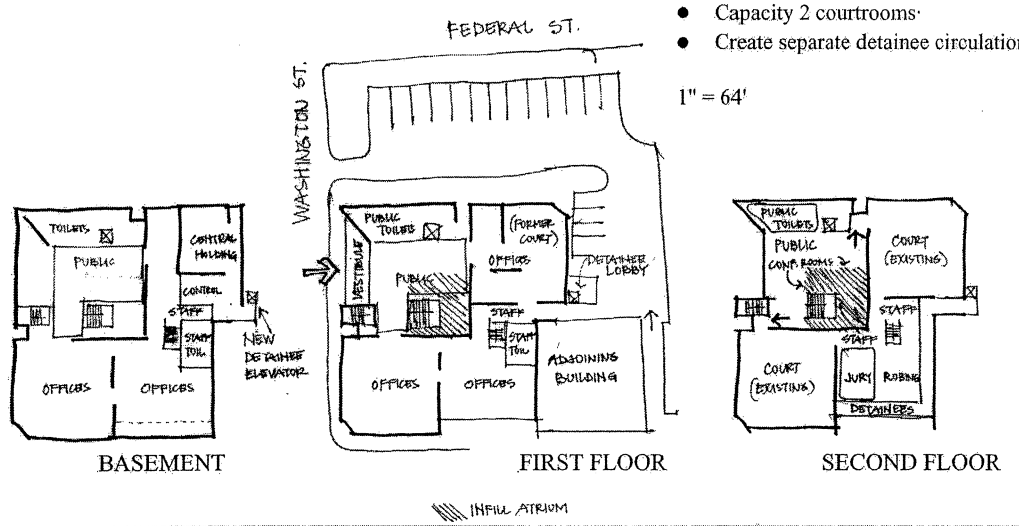
As shown in the sketch, the building expansion approach expands the second floor over the northern parking spaces to accommodate a courtroom, holding area, jury room, and attorney/client conference rooms. The single existing elevator is reassigned to detainee use and a drive-through sallyport constructed adjacent to the elevator. A new public elevator adjoins the entrance and public waiting areas; constrained public circulation and entry

security may be expanded by infilling the atrium and enclosing the recessed entrance.

Existing District Court building - No expansion

- Existing area 34,500 gsf
- Capacity 2 courtrooms
- Create separate detainee circulation

1" = 64'



Existing District Court site - Building expansion

Add 5,800 gsf at second floor, new total 40,300 gsf

- Capacity 3 courtrooms
- Add sallyport. Provide detainee circulation to 2 courtrooms
- Reassign central holding and smallest courtroom to office use

1" = 64'

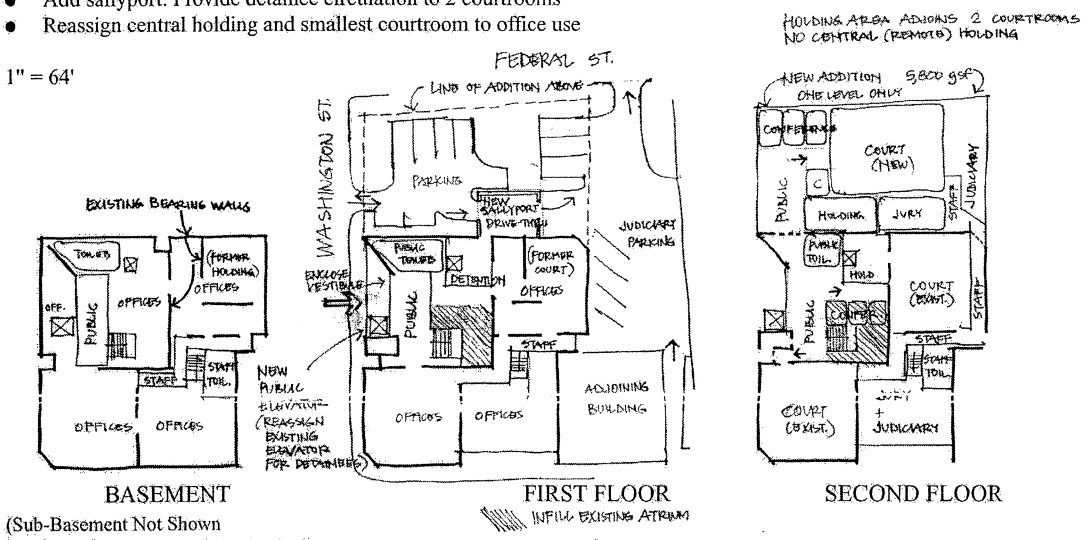


Figure 4

No Trial Court department in the year 2020 program requires 3 courtrooms. If the Housing Court (1 courtroom) and Juvenile Court (2 courtrooms) were combined in this facility, the building could be zoned such that Housing Court clients are directed to the basement-level magistrates' offices and mediation rooms while Juvenile Court clients are directed to offices and courtrooms on the first and second floors. Housing Court clients would access a second floor courtroom, co-located with Juvenile Court courtrooms, only on those days when the Court is in session.

Derby Street – city block bounded by Derby, Lafayette and Central Streets

Two parcels with a combined area of 31,000 SF occupy this triangular block bounded by Derby, Lafayette and Central Streets. Land uses to the west of the site along Derby Street (Route 114) are Fire Department headquarters and two and three story commercial buildings. To the east, a modern one-story bank and two-story restaurant give way to a high granite retaining wall at a historic cemetery and to automobile-oriented uses. To the north, a small parking area in the Central Street right-of-way becomes a pedestrian way and intersects with Essex Street, a multi-block pedestrian way with retail, cultural and residential uses and the Museum Place garage.

Access: The site is one block south of the Essex Street pedestrian mall, which has stores, restaurants, banks and other services. Distance to the commuter rail platform is 0.4 miles. Public parking is available 600' to the west at the surface lot bounded by Margin and Washington Streets, or 400' north in the 830-space Museum Place garage. This garage is reported to frequently be filled to capacity on week days.

Site characteristics: A small parking area and three contiguous structures occupy the site. To the north, a newer one-story building is in active use as the Salem Laundry. A four-story industrial building with reinforced concrete exterior, approximately 50' x 100', occupies the middle of the site. Only the first level appears to be in use. To the south, a three and four-story industrial building with brick exterior appears to match floor levels of the adjacent building. Commercial tenants occupy the first floor, while the upper floors appear underutilized or vacant. As shown in the photographs, the upper two stories have exterior reinforcing to stabilize the brick facade. Combined floor plates of the multi-story buildings total approximately 19,000 GSF. Estimated floor-to-floor height of the upper levels is 11'.

Visibility: The site is visible from the Essex Street pedestrian mall and Route 114. There are no sightlines to other Trial Court facilities.

Facility conceptual design: If the existing multi-story buildings are retained and built out to four stories above grade, the approximately 76,000 GSF plus basement (if any) building could theoretically support five courtrooms. Demolition and reconstruction of the fourth floor could be required to provide increased column bays and ceiling height suitable for courtrooms. Existing garage bays could be used for a sallyport and secure judges' parking. Minimal site area would be available for surface parking.

If an addition to the north increases building footprint to 26,000 GSF , a four-level facility of 104,000 GSF could accommodate six to seven courtrooms. No site area would be available for surface parking. Handicapped client parking would have to be located on-street.

Church Street parking lot

Two parcels with a combined area of nearly 67,000 SF make up this City-owned parking

lot bounded by three narrow streets and a pedestrian way. Stated capacity of the Church Street lot is 136 parking spaces. The lot is presently filled to capacity on weekdays. In the event that part of this site is used for a Trial Court facility, it is understood that the City wishes to retain as many public parking spaces as possible. ***Refer to Fig. 5.***

Surrounding buildings vary in scale and use from the smaller-scaled two-story former firehouse, townhouses and historic St. Peter's Church, to the 200' long former telephone company building, Museum Place parking garage, and six- and seven-story residential and office structures. A public pedestrian way and two small commercial buildings, including a historic former firehouse, separate the Church Street parking lot from the District Court site.

Access: This site lies 300' from the main entrance to the District Court building and 600' from the entrance to the Probate and Family Court and Registry of Deeds. Commuter rail service and an MBTA bus staging area are located 1000 feet to the north via Washington Street. The 830-car Museum Place garage faces the site.

Site characteristics: The irregularly shaped site, approximately 430' x 170', has extensive street frontage and minimal topographic relief. A surface parking lot with perimeter landscaping and curb cuts on Church Street and Federal Street occupies the entire site.

Visibility: Discontinuous or offset streets with narrow rights-of-way limit pass-by traffic and restrict the angle of view from nearby Washington Street.

Facility conceptual design: The City of Salem Planning Department prepared a suggested conceptual sketch of an "L" shaped Trial Court facility located at the western edge of the site. The attached sketch retains the building coverage of the City sketch, modifies the building depth for more efficient interior layout, and designates a small parking lot for essential court parking. Given a 24,000 SF footprint, a four-level facility of 96,000 GSF would theoretically have capacity for six courtrooms. The attached facility sketch illustrates potential for secure judicial parking on the basement level. Remaining public parking totals approximately 100 spaces.

Telephone Co. property on Federal Street

This property was evaluated because it is in relatively close proximity to the existing courts complex and to the MBTA Commuter rail station. The site was also considered to be potentially available for redevelopment, as it has been either for sale or under agreement at various times during the study process.

However, it suffers from poor visibility and vehicular access, being situated at the intersection of two narrow streets away from main vehicular routes in downtown Salem. The site also includes an existing structure, whose reuse potential is likely to be limited. Most important, the site is likely to be too small for the development of a new courthouse complex, whether through adaptive reuse or new construction. This site was therefore eliminated from further consideration.

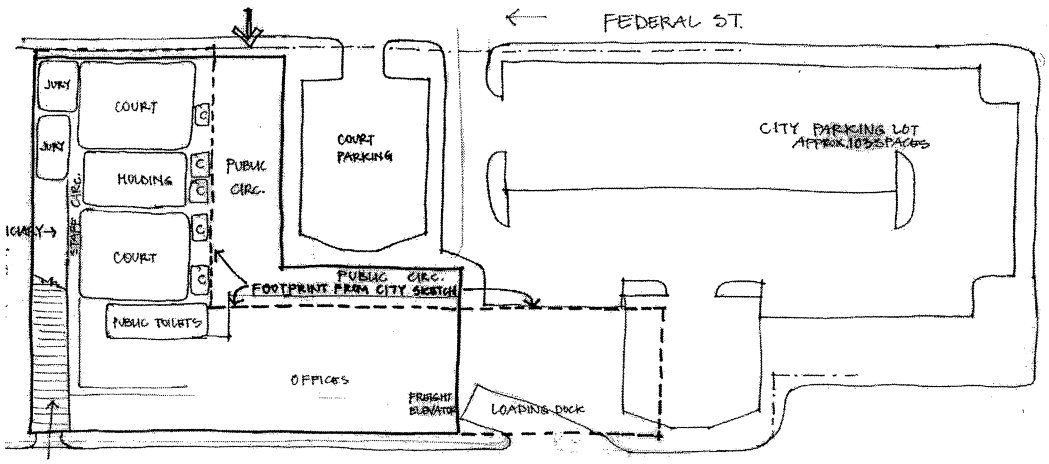
MBTA commuter parking lot

An initial conceptual site plan prepared the City of Salem Planning Department locates a new court facility on a parcel sub-divided from the larger 2.1 acre MBTA commuter rail parking lot. The generally triangular MBTA parcel is bounded by a Guilford Rail right-of-way to the south; an active Guilford Rail line and the North River, to the northwest; and the Boston-Rockport MBTA commuter rail line, to the east. The former

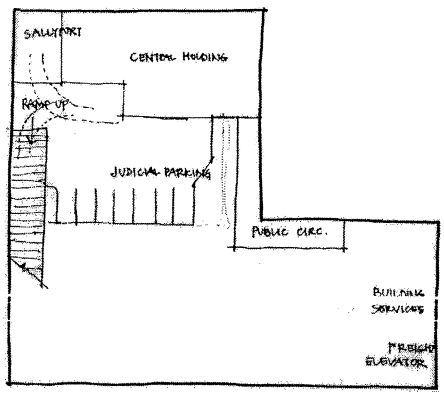
Parker Brothers industrial site across the
MBTA right-of-way has been redeveloped

Church Street parking lot, 'L' building similar to City sketch
24,000 gsf footprint x 4 levels = 96,000 gsf
Capacity 6 courtrooms

1" = 32'



LEVEL 2 (Ground Floor)
LEVELS 3 & 4 Similar



LEVEL 1 (Basement)

Figure 5

for residential use. The Guilford right-of-way and MBTA line emerge from a shared tunnel portal beneath Bridge Street. A new MBTA parking garage (approximately 1,100 spaces and five levels above the rail line) would front Bridge Street and occupy a crescent-shaped City of Salem parcel and air rights above the Guilford right-of-way. Estimated height of the garage is 60' to 65' to top of parapet. (This assumes 14' clearance for the rail line, four levels of covered parking, and a parapet or railing at the fifth level of rooftop parking.)

Access: A 'U' shaped internal street connects a new four-way intersection with Bridge Street and Washington Street with an existing access beneath the Bridge Street viaduct. A perpendicular interior street separates the garage and court structures. An MBTA bus stop and bus loop adjoin the station platform. Primary pedestrian access to the MBTA station, court, and garage from downtown Salem would be via the corner of the Washington Street extension.

Assuming the court facility entrance is located at the southeast corner, distance to the rail station and bus service is approximately 100'. Distance to the front steps of the Probate and Family Court building is approximately 1,000'.

Guilford Rail proposes to re-activate the rail spur that arcs along Bridge Street and discontinue use of the spur along the North River. This proposal creates a major security concern for any structure that might be proposed above this rail right-of-way.

Site characteristics: Site elevation varies between approximately 8' and 10' above mean high water. A concrete seawall separates the site from the North River, mean high water elevation 4.5'. The majority of the court site lies within the 100-year floodplain of elevation 10' (1929 National Geodetic Vertical Datum). A map of the Salem Board of Assessors shows a sewer easement parallel to the seawall; this runs beneath the proposed court site.

Roadway elevations at adjoining Bridge Street range between18' and 29', with elevation 27' at the proposed four-way intersection. If the bus loop is sited at the present elevation, then grade at the Washington Street extension would be approximately 7%. This grade exceeds the 5% standard of the Architectural Access Board.

Refer to a separate memo for preliminary review of regulatory constraints to development on this site. Status and results of site environmental investigations are unknown.

Visibility: The foreground MBTA garage would obstruct views to the court facility by pedestrians and drivers traveling north on Washington Street. The courthouse entrance, an important part of courthouse legibility, would not be visible to eastbound drivers on Bridge Street.

Facility conceptual design (fig. 6): Conceptual drawings prepared by the Planning Department of the City of Salem show a trapezoidal floorplate of approximately 40,000 gross SF with 350' frontage along an interior street and 350' frontage along the North River. Mean floorplate width is 110'. Given this floorplate, a two-level court structure would be required to satisfy the threshold facility size of five courtrooms (80,000 gross SF). Use of the maximum floorplate enhances long-term flexibility in interior layout. A partial sub-level could be required to provide lateral detainee circulation. Assuming a first floor elevated above the 100-year floodplain, say at elevation 13', and a floor-to-floor height of roughly 20', a two-level structure would be about 43 feet high, or 22' lower than the MBTA garage.

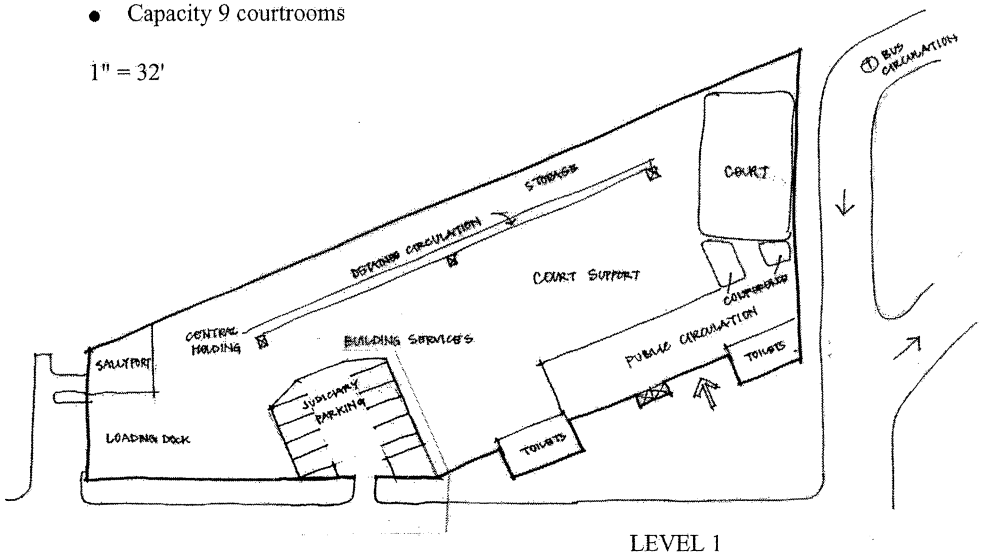
If the facility is configured with a nominal 200' length (this dimension accommodates 4 courtrooms and two detainee holding areas), the floorplate could run about 24,000 gross SF and 3 ½ levels would be required for a 5

MBTA site

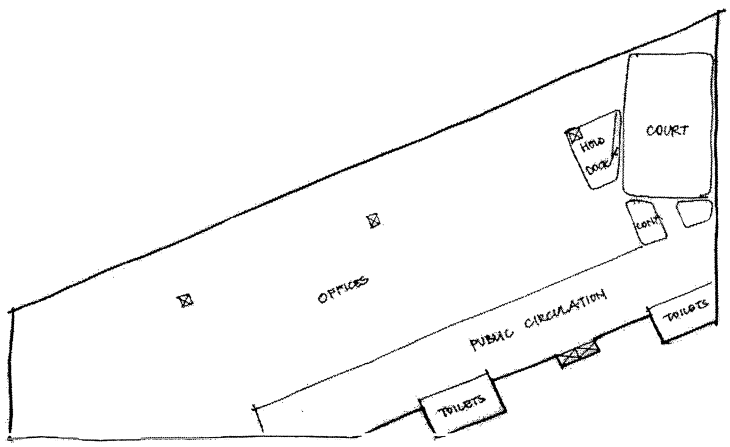
Construct new facility, 4 levels x 34,000 gsf = 136,000 gsf

- Capacity 9 courtrooms

1" = 32'



LEVEL 1



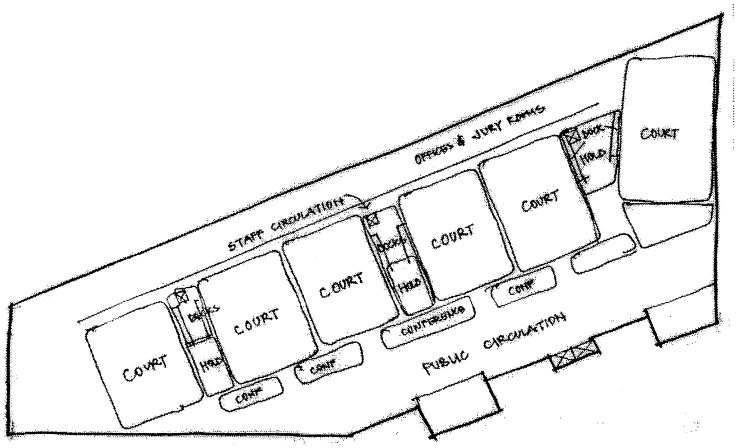
LEVELS 2&3

Figure 6

MBTA site
Construct new facility, 4 levels x 34,000 gsf = 136,000 gsf·

- Capacity 9 courtrooms

1" = 32'



LEVEL 4

Figure 6

courtroom facility. A building in this configuration would be roughly 83' high, or 20' higher than the garage.

The attached sketches illustrate the initial concept for this site of a 4-level structure of 136,000 GSF with 9 courtroom capacity.

Initial Site Scoping Summary

It became readily apparent that, of the initial set of sites reviewed, only the MBTA site (including the adjacent city-owned crescent parcel) offered the combination of capacity, visibility, proximity, access, and availability that justified further evaluation. The second phase of site analysis therefore focused on the MBTA site.

Phase II Site Analysis:

MBTA Site and Joint Development Concept Analysis

The possibility of joint development opportunities with the construction of the proposed MBTA parking garage, and the large combined area of the MBTA's riverfront site and the City of Salem's smaller crescent-shaped lot along Bridge Street, led to a second phase of site analysis. This phase considered numerous options for the coordinated development of both the MBTA parking garage and a new court facility, taking into account a number of site development issues:

Access: A complex array of access requirements for both the MBTA site and the Court site were a major determinant in developing preliminary site concepts. Access to the MBTA garage is required for pedestrians, busses, and automobiles, with auto access including both garage access and drop-off areas. The court complex requires access for detainees, judges, and service vehicles, as well as pedestrian access and drop off areas.

Visibility: One of the MBTA site's major advantages is its visibility: from the MBTA station, from the existing Courts complex, and from various approaches to downtown Salem, including from the North Street bridge across the North River. The site's riverfront location also offered potential value in providing open views from, as well as to, the Courthouse. In attempting to capitalize on this visibility, this phase of the site analysis examined numerous options for the placement of the Court facility and MBTA garage on the site. These options attempted to meet the complex access requirements for the site, while affording each facility an efficient floorplate and an appropriate level of visibility for their respective users.

Security: A major constraint in the use of the combined MBTA and city "crescent" parcel was the rail right-of-way that separates them. Guilford Transportation, the owner of the right-of-way, had announced its intention to return the ROW to service as a freight spur. While infrequent (one or two late night uses per week was suggested), the continued use of the ROW meant that design schemes spanning the ROW with programmed spaces were not viable. This security concern was reinforced after September 11, 2001. While several options explored linking court functions on the MBTA parcel with non-court functions (such as the child care center and DA's offices) on the crescent parcel, the increased security consciousness post 9-11 meant that even such a limited connection was considered inadvisable. Furthermore, even the likely close proximity of a new court facility to a major public parking garage was considered to be a potential risk.

Parking: DCAM and AOTC do not normally provide any parking for court staff or users other than a limited amount of judges' parking. However, analysis of parking availability in this congested

downtown Salem location, including parking for the Salem commuter rail station, suggested the need for a solution to the combined parking demand of the various users in the area. The MBTA's current plans to construct a parking facility of 750-800 spaces for its commuter rail patrons (replacing a 500 car surface parking lot) suggest the extent of unmet parking demand.

The joint development possibilities with the MBTA have raised the possibility of an agreement between DCAM and the MBTA to include approximately 200 additional spaces in the proposed MBTA garage to accommodate court staff and users.

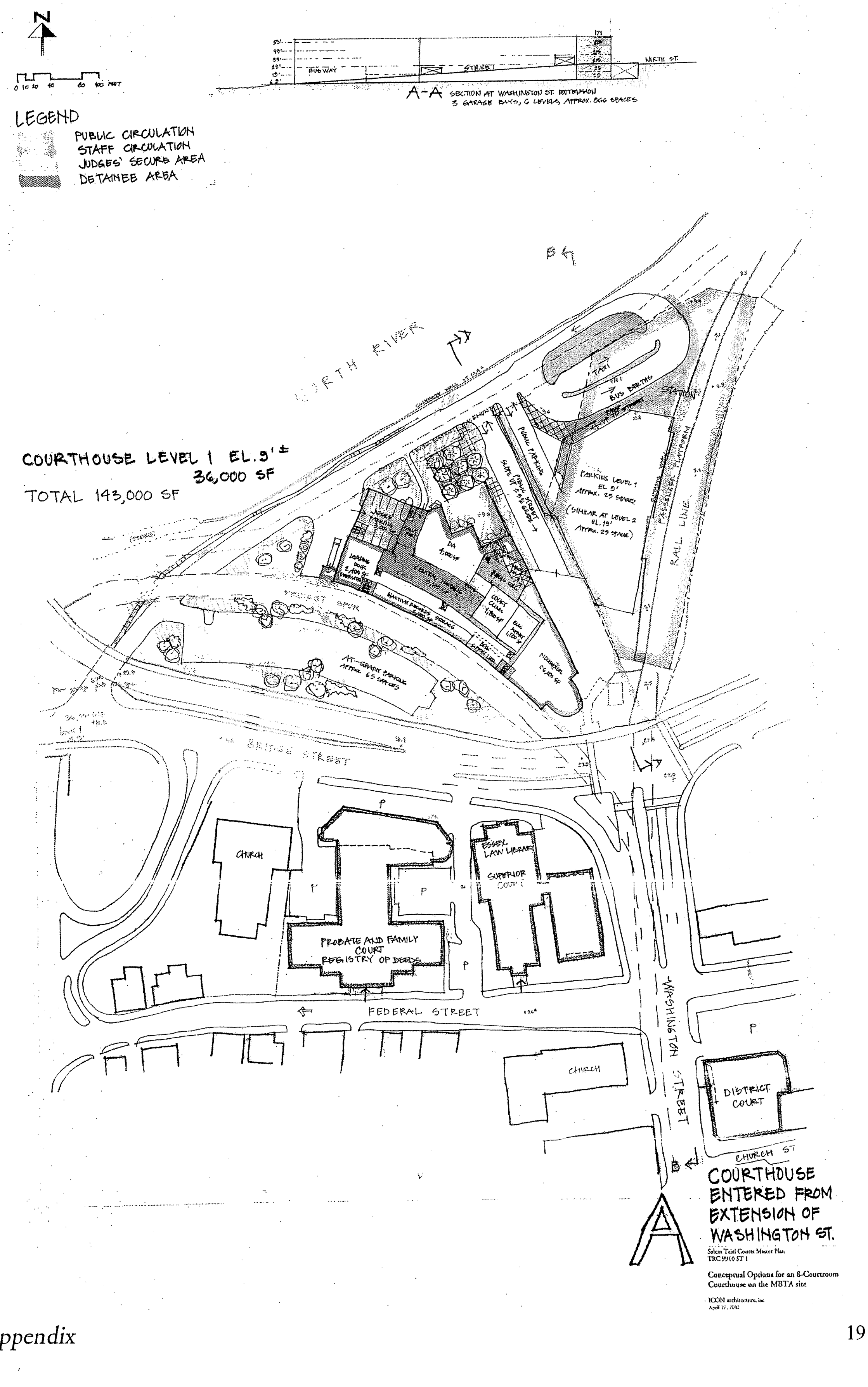
MBTA Site Joint Development Options: First Cycle

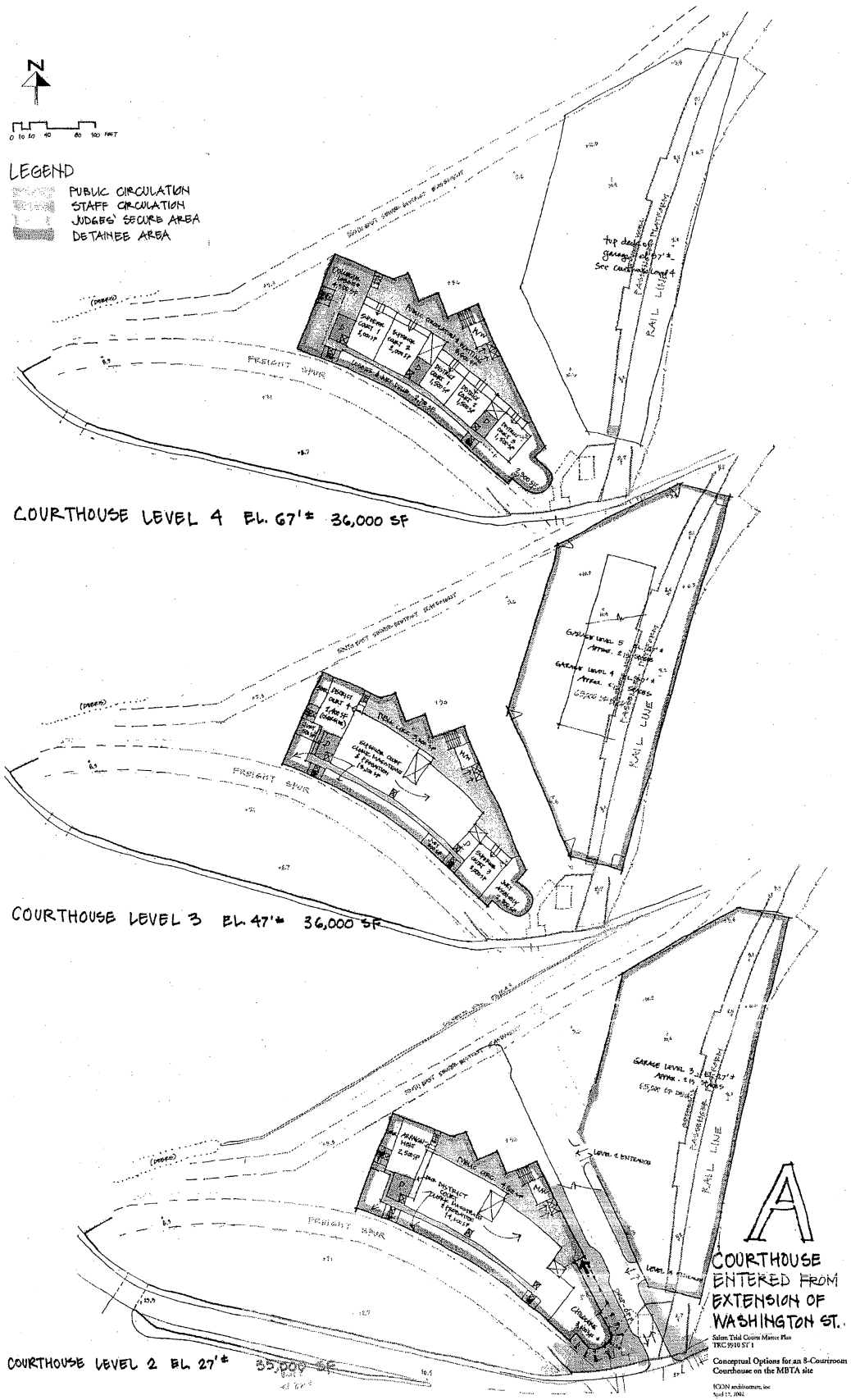
In all, over a dozen joint development concepts for the MBTA and crescent parcels, including various sub-options, were tested. These schemes were reviewed in several charrettes involving DCAM and MBTA staff and the two agencies' design teams, ICON and TAMS respectively. The options reviewed here include only those developed after September 11, 2001, when increased security concerns caused previous schemes involving air-rights development above the Guilford Transportation freight spur to be abandoned.

An initial series of five site options (A through E) were evaluated in a charrette in April 2002. In general, these options were organized around access. These schemes typically make use of a multi-level access strategy, with pedestrian access and drop-off along Bridge Street at the main transaction floor level, with lower-level access for detainees, judges parking, and service from a new circulation route along the river side of the site, which also serves the MBTA garage. These schemes also typically maintain a clear physical separation between the court facility and the MBTA garage, for both security and visibility/identity reasons.

The joint development options avoided placing any program space above the rail ROW. In some cases, the ROW is partially decked to provide vehicular access or drop-off space. One option includes an enclosed pedestrian connection between the primary court facility on the MBTA parcel and support space on the crescent parcel.

Option A -- Courthouse entered from extension of Washington St. (Fig. 7): In this option, Washington Street is extended across Bridge Street, sloping down at a 5% grade to the new riverfront access road that serves both the garage and court facility. The extended Washington Street provides access to several levels of the four


N
LEGEND
PUBLIC CIRCULATION
STAFF CIRCULATION
JUDGES' SECURE AREA
DETAINEE AREA
A-A SECTION AT WASHINGTON ST. EXTENSION
3 GARAGE BAYS, 6 LEVELS APPROX. 866 SPACES
NORTH ST.
COURTHOUSE LEVEL 1 EL. 9' ±
36,000 SF
TOTAL 143,000 SF
NORTH RIVER
STATION
RAIL LINE
BRIDGE STREET
CHURCH
PROBATE AND FAMILY COURT
REGISTRY OF DEEDS
ESSEX LAW LIBRARY
SUPERIOR COURT
FEDERAL STREET
WASHINGTON STREET
CHURCH
DISTRICT COURT
CHURCH ST
COURTHOUSE ENTERED FROM EXTENSION OF WASHINGTON ST.
A
Salem Trial Courts Master Plan
TRC9910 ST 1
Conceptual Options for an 8-Courtroom Courthouse on the MBTA site
ICON architecture, inc


N
LEGEND
PUBLIC CIRCULATION
STAFF CIRCULATION
JUDGES' SECURE AREA
DETAINEE AREA
FREIGHT SPUR
RAIL LINE
COURTHOUSE LEVEL 4 EL. 67'± 36,000 SF
COURTHOUSE LEVEL 3 EL. 47'± 36,000 SF
COURTHOUSE LEVEL 2 EL. 27'± 35,000 SF
A
COURTHOUSE ENTERED FROM EXTENSION OF WASHINGTON ST.
Salem Trial Courts Master Plan
TRC 5910 ST 1
Conceptual Options for an 8-Courtroom Courthouse on the MBTA site
ICON architecture, inc
April 17, 2002

-story garage, while the riverfront roadway leads to a bus turnaround and taxi holding area.

The riverfront road provides access to the lower level of the court facility, including judges parking, detainees, and service access. Pedestrian dropoff is provided alongside the courthouse on the Washington Street extension. Within the court facility, public circulation areas are organized along the north side of the building, overlooking a landscaped plaza and the river.

A pedestrian entry plaza is sited at the new intersection of Washington and Bridge Streets, with an arcaded "prow" establishing the building's presence. No construction takes place on the freight ROW or city parcel, except for a small decked area to enlarge the entry plaza.

Evaluation: This option provided a clear sight line from Washington Street to the river with the extension of Washington Street – a city preference, but a circuitous drop-off route for court users. The MBTA considered a garage on air rights above their commuter rail tracks to be expensive and problematic.

Option B – Courthouse shares entry plaza with garage (Fig. 8):
In this option, the courthouse and MBTA garage share a large pedestrian and automobile entry plaza accessed from the intersection of Washington and Bridge Streets. The plaza allows auto entry and exit from the parking garage and provides a drop-off area for the courthouse. Bus access to the garage is at a lower level through the city's crescent parcel, accessed from the current Bridge Street underpass. A new riverfront access road provides access to the lower level of the courthouse (for detainees, judges' parking, and service), lower level garage parking access, and a return lane for busses.

This option makes use of a portion of the crescent parcel, as part of the entry plaza, and for a two story element that houses several court support functions – a child care center, jury pool area, and DA offices. These uses are connected to the main court structure by a two story enclosed passageway across the right-of-way which also serves as the entry area for the courthouse.

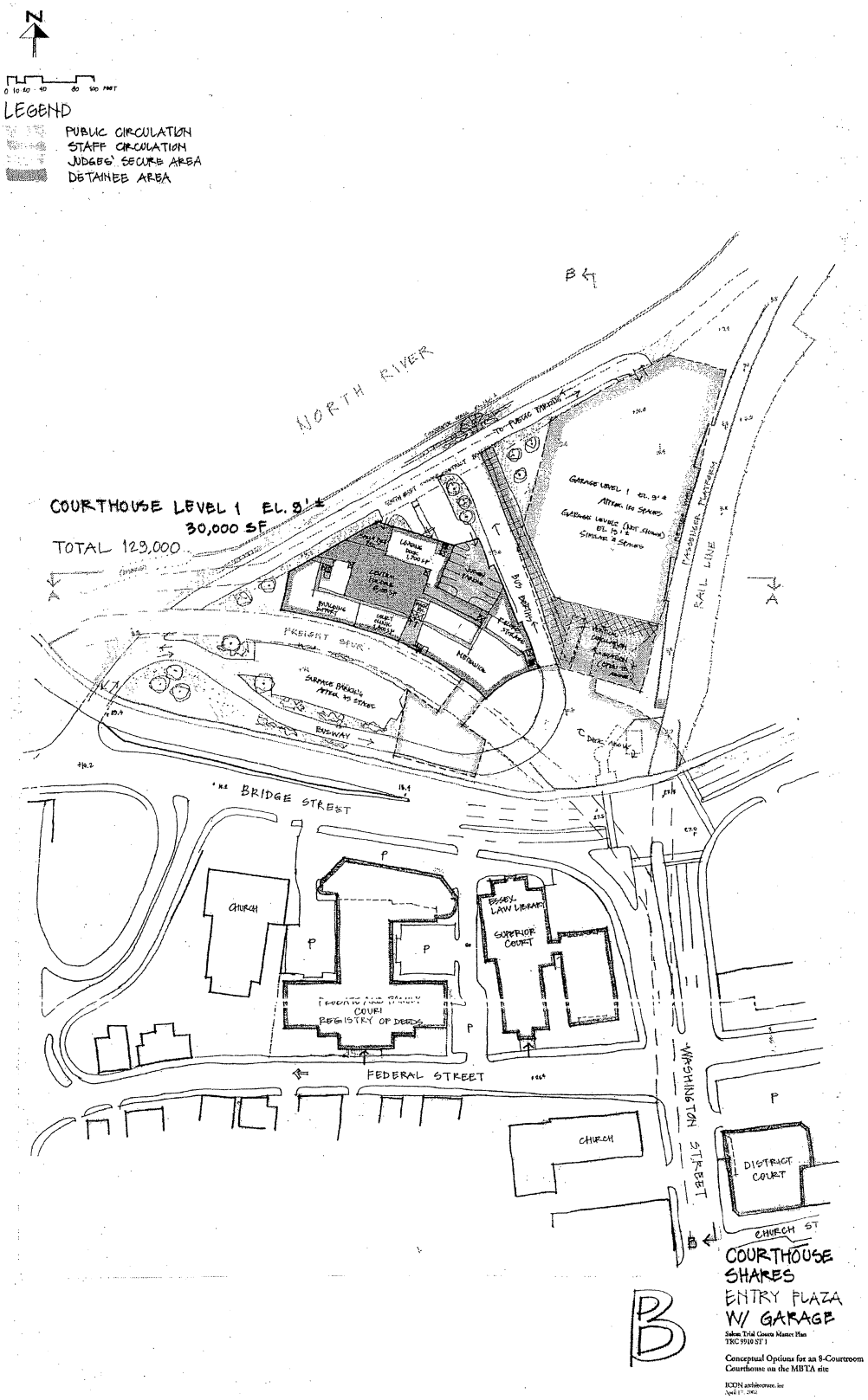
Within the courthouse, the main public orientation and circulation space is along the south side of the structure, looking back across Bridge Street to the existing courts campus.

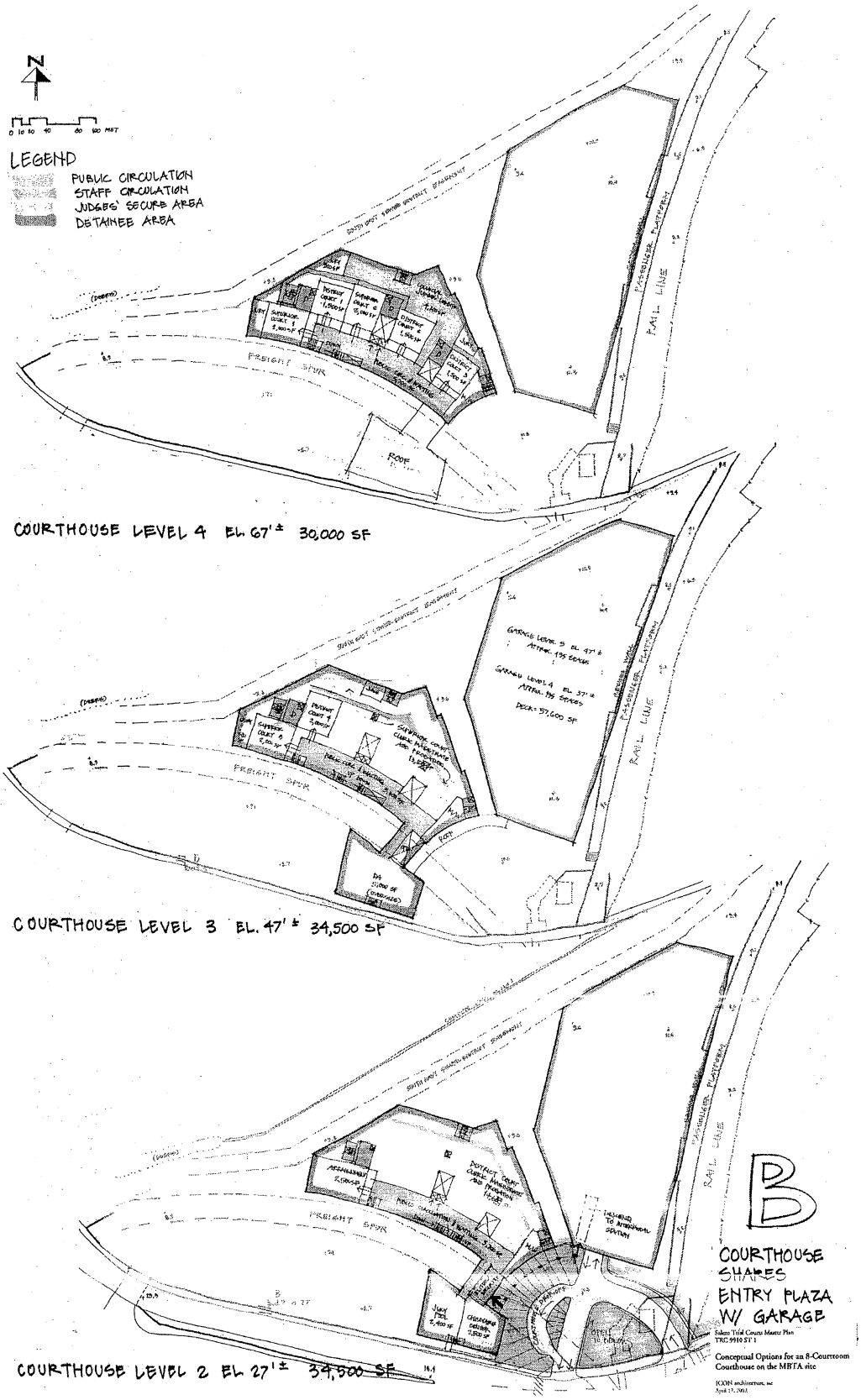
Evaluation: This scheme maintains a sightline to the river and pulls the garage away from commuter rail air rights. However, in doing so, some of the program is squeezed onto the crescent parcel, requiring a connection above the freight spur – not desirable from a security perspective.

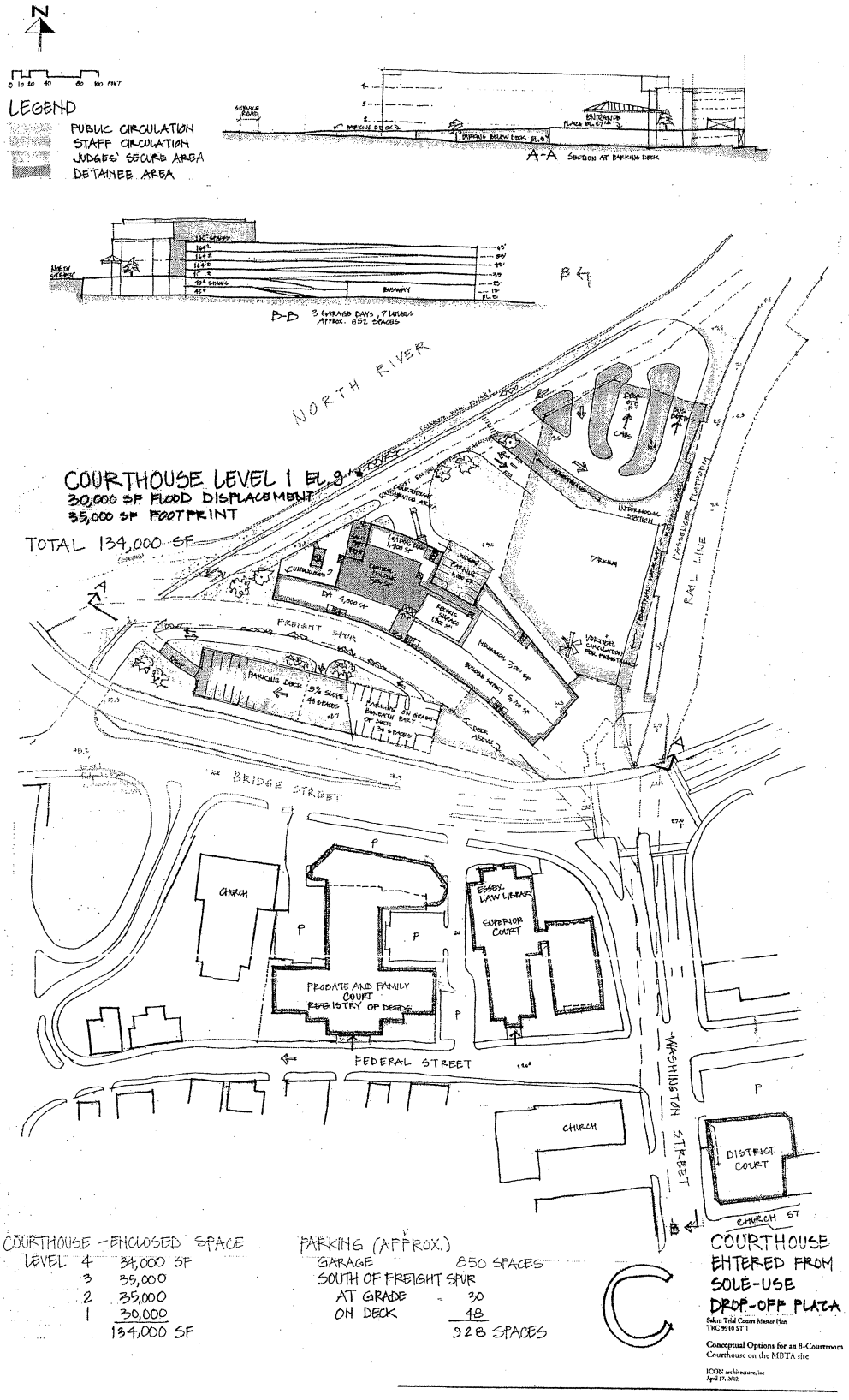
Option C – Courthouse entered from sole-use drop-off plaza (Fig. 9):
In this scheme, auto access to the MBTA garage and court drop-off and parking access are separated. Both facilities are accessible from Bridge Street at its intersection with Washington Street. The courthouse drop-off leads to a decked parking structure on the crescent parcel, with on-grade parking below. As in previous schemes, a riverfront access road provides lower level courthouse access and multi-modal access to the garage for busses, taxis, and auto drop-off and parking. Unlike other schemes, the two facilities are placed in close proximity to one another for part of their length, opening out to a landscaped area facing the river.

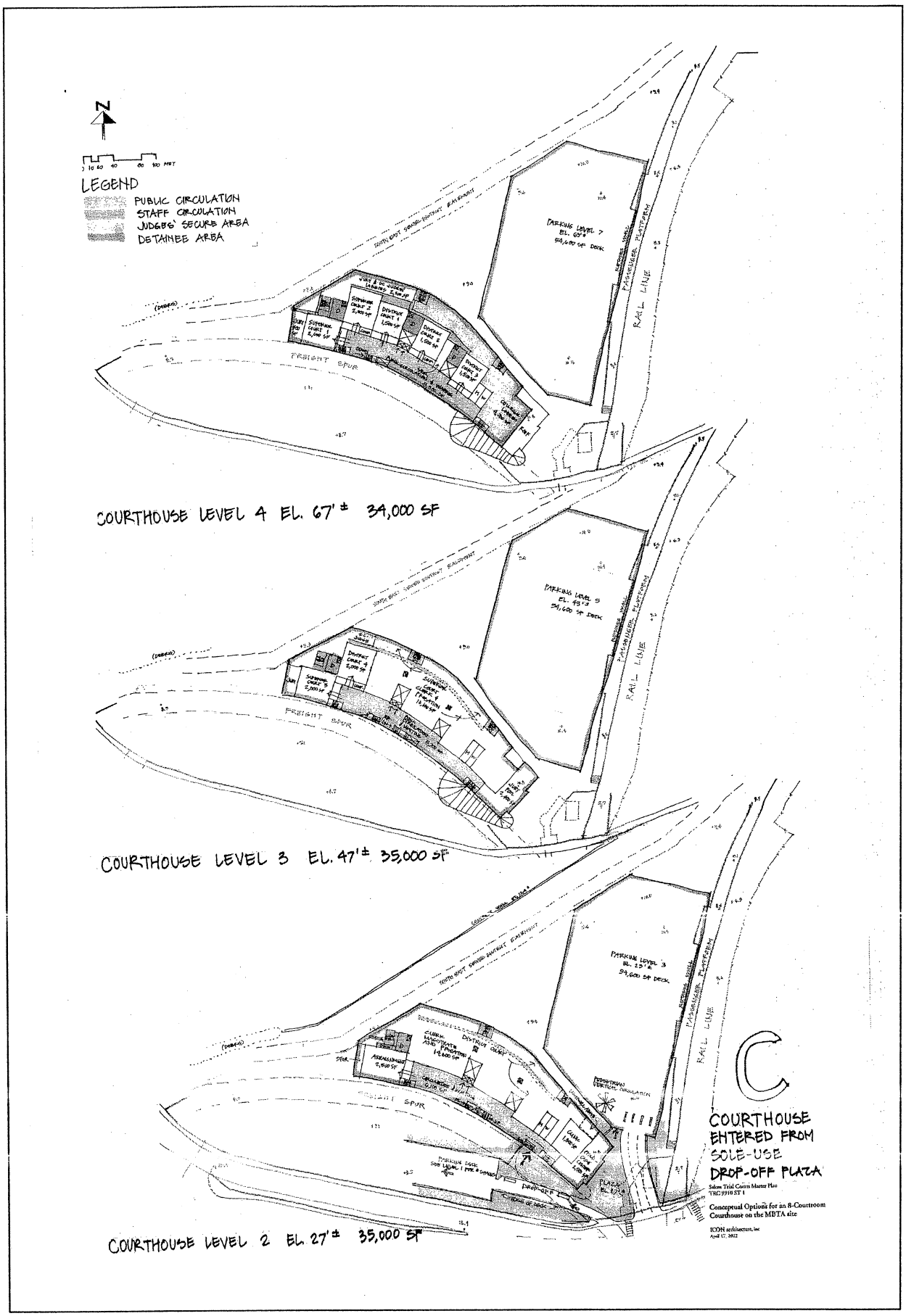
As in Option B, the courthouse's major public circulation and orientation spaces are on the south side, facing the existing courthouse complex.

Evaluation: This scheme offers efficient floorplates, but eliminates the sight line to the river. Court and garage in close proximity not desirable for security reasons.


N
LEGEND
PUBLIC CIRCULATION
STAFF CIRCULATION
JUDGES' SECURE AREA
DETAINEE AREA
NORTH RIVER
COURTHOUSE LEVEL 1 EL. 8'±
30,000 SF
TOTAL 129,000
GARAGE LEVEL 1 EL. 9'±
GARAGE LEVELS (NOT SHOWN) EL. 19'±
PASSENGER PLATFORM
RAIL LINE
FREIGHT SHED
RUNWAY
BRIDGE STREET
CHURCH
ESSEX LAW LIBRARY
SUPERIOR COURT
REGISTRY OF DEEDS
FEDERAL STREET
WASHINGTON STREET
CHURCH
DISTRICT COURT
CHURCH ST
COURTHOUSE SHARES ENTRY PLAZA W/ GARAGE
Salem Trial Courts Master Plan
TRC 9910 ST 1
Conceptual Options for an 8-Courtroom Courthouse on the MBTA site
ICON architecture, inc
April 1st, 2002


N
LEGEND
PUBLIC CIRCULATION
STAFF CIRCULATION
JUDGES' SECURE AREA
DETAINEE AREA
FREIGHT SPUR
RAIL LINE
COURTHOUSE LEVEL 4 EL. 67'± 30,000 SF
COURTHOUSE LEVEL 3 EL. 47'± 34,500 SF
COURTHOUSE LEVEL 2 EL. 27'± 34,500 SF
B
COURTHOUSE SHARES ENTRY PLAZA W/ GARAGE
Salem Trial Courts Master Plan
TRC 9910 S1 1
Conceptual Options for an 8-Courtroom Courthouse on the MBTA site
ICON architecture, inc
April 17, 2002


N
LEGEND
PUBLIC CIRCULATION
STAFF CIRCULATION
JUDGES' SECURE AREA
DETAINEE AREA
A-A SECTION AT PARKING DECK
B-B 3 GARAGE BAYS, 7 LEVELS APPROX. 852 SPACES
NORTH RIVER
COURTHOUSE LEVEL 1 EL. 9'
30,000 SF FLOOD DISPLACEMENT
35,000 SF FOOTPRINT
TOTAL 134,000 SF
RAIL LINE
FREIGHT SPUR
PARKING DECK 15% SLOPE 146 SPACES
BRIDGE STREET
CHURCH
ESSEX LAW LIBRARY
SUPERIOR COURT
PROBATE AND FAMILY COURT REGISTRY OF DEEDS
FEDERAL STREET
WASHINGTON STREET
CHURCH
DISTRICT COURT
CHURCH ST
COURTHOUSE ENTERED FROM SOLE-USE DROP-OFF PLAZA
COURTHOUSE - ENCLOSED SPACE
LEVEL 4 34,000 SF
3 35,000
2 35,000
1 30,000
134,000 SF
PARKING (APPROX.)
GARAGE 850 SPACES
SOUTH OF FREIGHT SPUR
AT GRADE 30
ON DECK 48
928 SPACES
Salem Trial Courts Master Plan
TRC 9910 ST 1
Conceptual Options for an 8-Courtroom Courthouse on the MBTA site
ICON architecture, inc
April 17, 2002


N
LEGEND
PUBLIC CIRCULATION
STAFF CIRCULATION
JUDGES' SECURE AREA
DETAINEE AREA
FREIGHT SPUR
RAIL LINE
PASSENGER PLATFORM
COURTHOUSE LEVEL 4 EL. 67' ± 34,000 SF
COURTHOUSE LEVEL 3 EL. 47' ± 35,000 SF
COURTHOUSE LEVEL 2 EL. 27' ± 35,000 SF
C
COURTHOUSE ENTERED FROM SOLE-USE DROP-OFF PLAZA
Salem Trial Courts Master Plan
TRC 9910 ST 1
Conceptual Options for an 8-Courtroom Courthouse on the MBTA site
ICON architecture, inc
April 17, 2012

Option D – Garage set back (Fig. 10):
In the three prior schemes, the courthouse and garage vie for visibility and access within the narrow site area between the MBTA commuter rail ROW and the Guildford freight spur – in effect, at the narrow apex of a triangle. In Option D, the MBTA garage is pushed back from Bridge Street, occupying more frontage along the river, while allowing the courthouse to establish a more dominant presence along Bridge Street facing the existing courts complex. A single vehicular entry from Bridge Street is provided, giving automobile access directly to the garage, with a separated, dedicated drop-off for the courthouse. Vehicles using the drop-off turnaround can proceed directly into the garage without re-entering the street system.

At a lower level, an exclusive busway separates the courthouse and garage, with queuing alongside the garage. Riverfront vehicular access is restricted to busses exiting the busway and authorized vehicles accessing the courthouse.

As in previous options, the courthouse's major public circulation and orientation spaces are on the south side, facing the existing courthouse complex.

Evaluation: This scheme places garage above commuter rail tracks and in close proximity to the courthouse –drawbacks from a cost and security perspective respectively.

Option E – Riverfront Garage (Fig. 11):
This option places the MBTA garage along the North River at the north side of the site, with the courthouse occupying the full site between the MBTA commuter rail line and freight spur. An automobile drop-off area for the courthouse only is accessed from the Washington/Bridge Street intersection. The courthouse thus becomes the dominant presence on the site. Unlike the courthouse arrangement in the previous options, which is basically linear, this scheme folds court functions around a central public space, with a view at its south end across to the existing court complex.

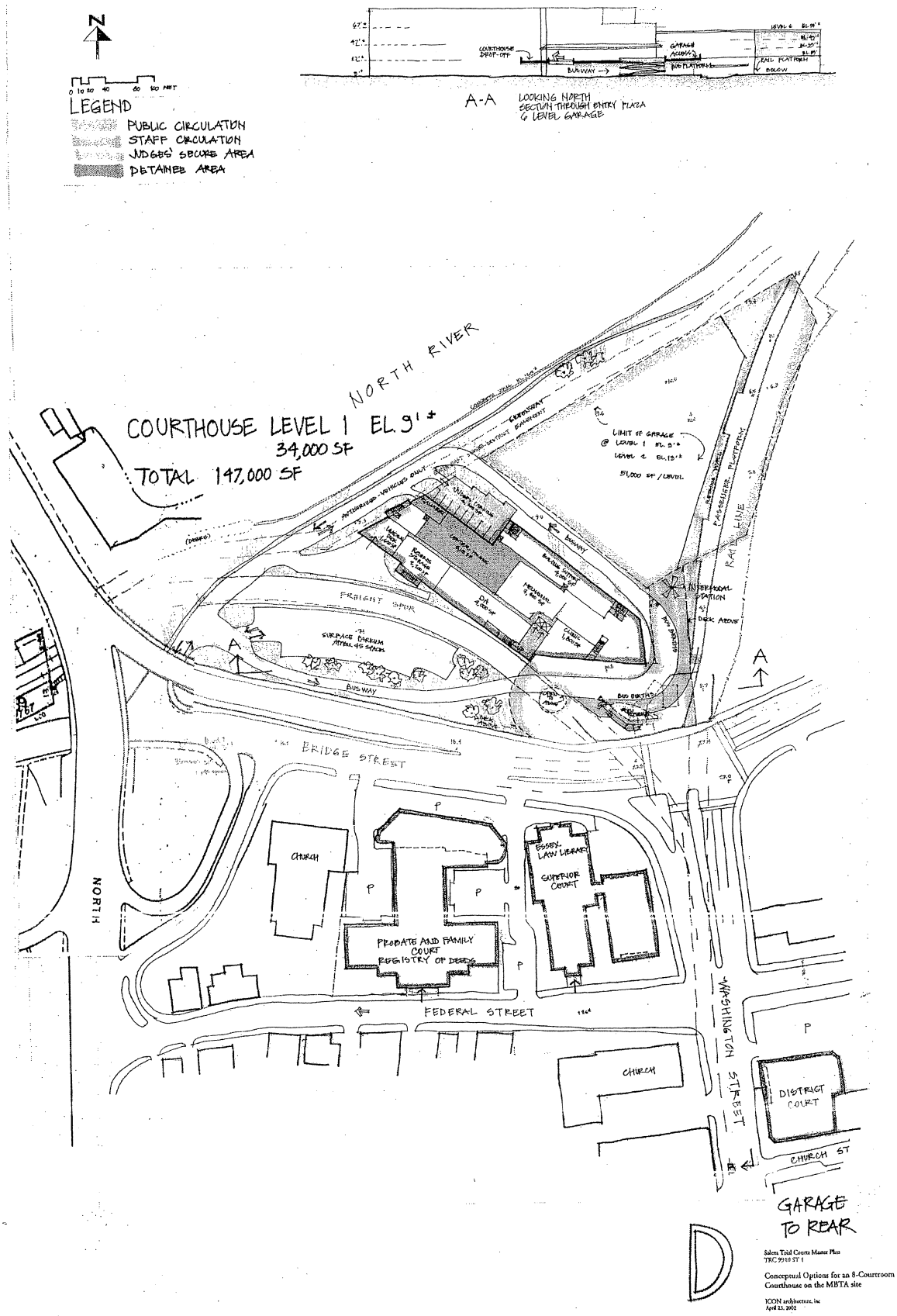
In this scheme, the courthouse and garage are separated by a lower-level access road serving court functions.

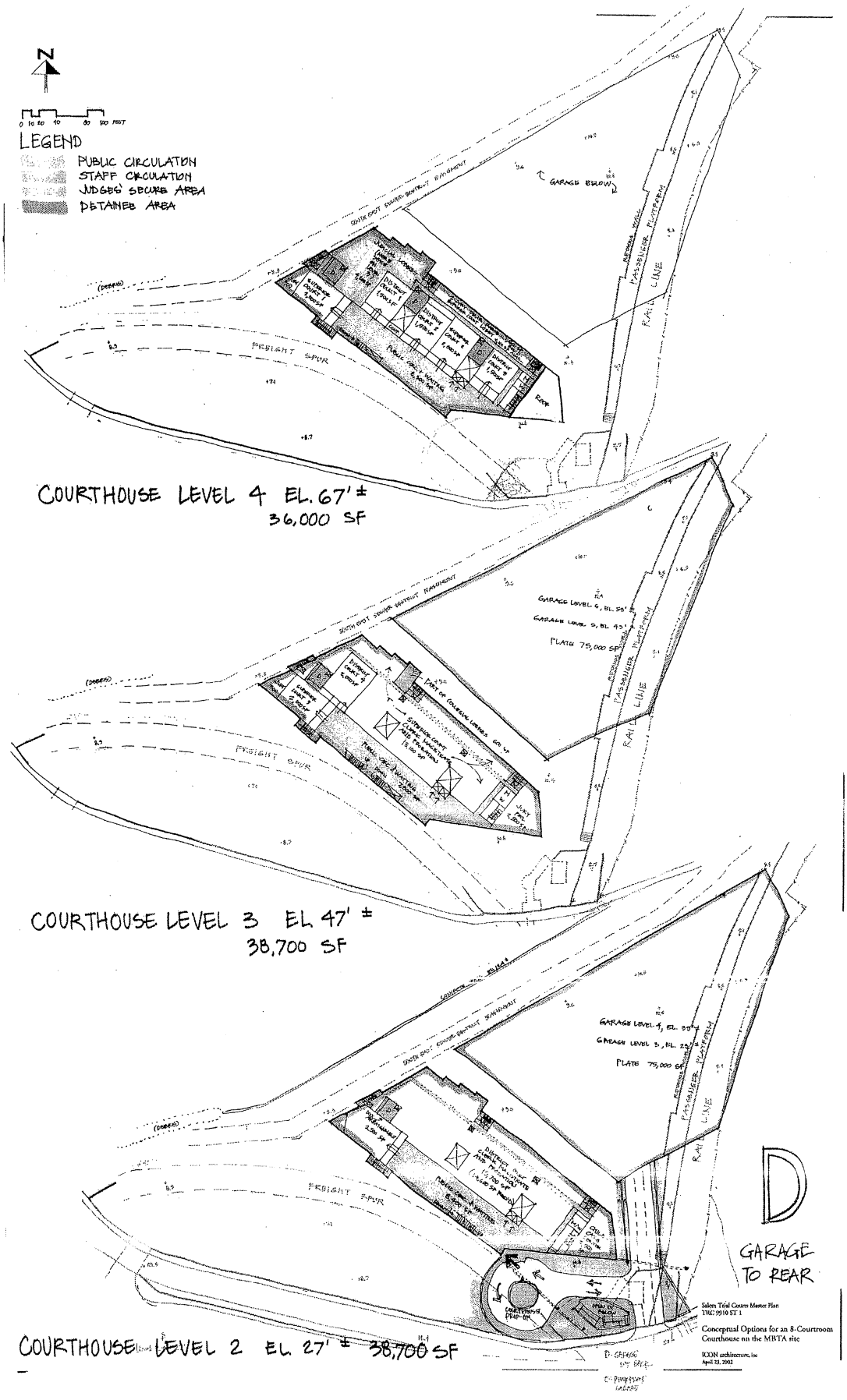
Evaluation: This scheme gives to court a positive presence at the head of Washington, not compromised by adjacent garage; both facilities have efficient floorplates. However, the riverfront garage completely blocks river views, and pedestrian walking distances from the garage to the commuter rail station are extended. Notwithstanding these issues, this scheme was determined to be worth further development in the next cycle.

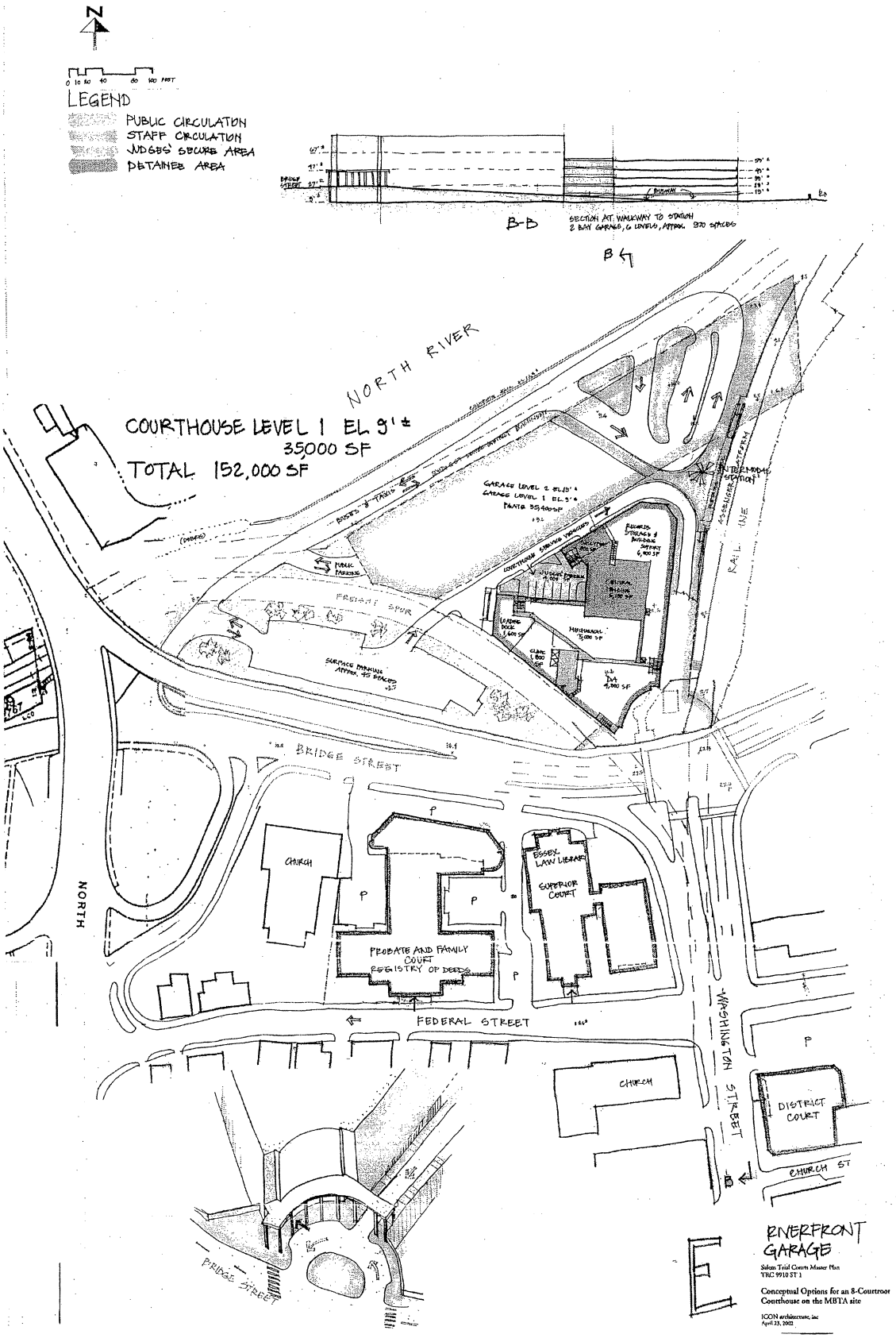
MBTA Site Joint Development Options: Second Cycle

A second cycle of MBTA site joint development options was evaluated at a follow-up charrette in May 2002. These options were developed in response to the review of the first cycle of joint development alternatives. Of the initial schemes, there was general agreement that option E, which placed the MBTA garage along the river in a linear structure, and gave the courthouse a prominent place along Bridge Street, best addressed the desire to maintain a strong identity and close visual relationship between existing and new court facilities.

Schemes F1, F2, and F3 -- "Triangle" Courthouse Options:
In this cycle of options, Schemes F1, F2, and F3 explore variations of Option E, with a riverfront garage and a "Triangle" courthouse facing Washington Street. Unlike Option E, however, these schemes also begin to address the possibility of acquiring the First Baptist Church and integrating it into the courthouse program.


N
LEGEND
PUBLIC CIRCULATION
STAFF CIRCULATION
JUDGES' SECURE AREA
DETAINEE AREA
A-A LOOKING NORTH
SECTION THROUGH ENTRY PLAZA
& LEVEL GARAGE
COURTHOUSE LEVEL 1 EL. 9'+
34,000 SF
TOTAL 147,000 SF
NORTH RIVER
LIMIT OF GARAGE
@ LEVEL 1 EL. 9'+
LEVEL 2 EL. 19'+
51,000 SF / LEVEL
FREIGHT SPUR
SURFACE PARKING
APPROX 45 SPACES
BUSWAY
BRIDGE STREET
RAILROAD
PASSENGER PLATFORM
INTERMODAL STATION
DECK ABOVE
CHURCH
ESSEX LAW LIBRARY
SUPERIOR COURT
PROBATE AND FAMILY COURT
REGISTRY OF DEEDS
FEDERAL STREET
NORTH
WASHINGTON STREET
CHURCH
DISTRICT COURT
CHURCH ST
GARAGE TO REAR
Salem Trial Courts Master Plan
TRC 9910 ST 1
Conceptual Options for an 8-Courtroom Courthouse on the MBTA site
ICON architecture, Inc
April 23, 2002


N
0 10 20 40 80 160 FEET
LEGEND
PUBLIC CIRCULATION
STAFF CIRCULATION
JUDGES' SECURE AREA
DETAINEE AREA
GARAGE BELOW
FREIGHT SPUR
RAIL LINE
PASSENGER PLATFORM
COURTHOUSE LEVEL 4 EL. 67' ±
36,000 SF
GARAGE LEVEL 6, EL. 55' ±
GARAGE LEVEL 5, EL. 45' ±
PLATE 75,000 SF
COURTHOUSE LEVEL 3 EL. 47' ±
38,700 SF
GARAGE LEVEL 4, EL. 35' ±
GARAGE LEVEL 3, EL. 25' ±
PLATE 75,000 SF
COURTHOUSE LEVEL 2 EL. 27' ± 38,700 SF
D
GARAGE TO REAR
Salem Trial Courts Master Plan
TRC 9510 ST 1
Conceptual Options for an 8-Courtroom Courthouse on the MBTA site
ROON architecture, inc
April 23, 2002


N
0 10 20 40 80 160 FEET
LEGEND
PUBLIC CIRCULATION
STAFF CIRCULATION
JUDGES' SECURE AREA
DETAINEE AREA
B-B
SECTION AT WALKWAY TO STATION
2 BAY GARAGE, 6 LEVELS, APPROX. 970 SPACES
B
NORTH RIVER
COURTHOUSE LEVEL 1 EL 9'±
35000 SF
TOTAL 152,000 SF
INTERMODAL STATION
RAIL LINE
PUBLIC PARKING
FREIGHT SPUR
SURFACE PARKING APPROX. 95 SPACES
BRIDGE STREET
CHURCH
ESSEX LAW LIBRARY
SUPERIOR COURT
PROBATE AND FAMILY COURT
REGISTRY OF DEEDS
NORTH
FEDERAL STREET
WASHINGTON STREET
CHURCH
DISTRICT COURT
CHURCH ST
BRIDGE STREET
RIVERFRONT GARAGE
Salem Trial Courts Master Plan
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Conceptual Options for an 8-Courtroom Courthouse on the MBTA site
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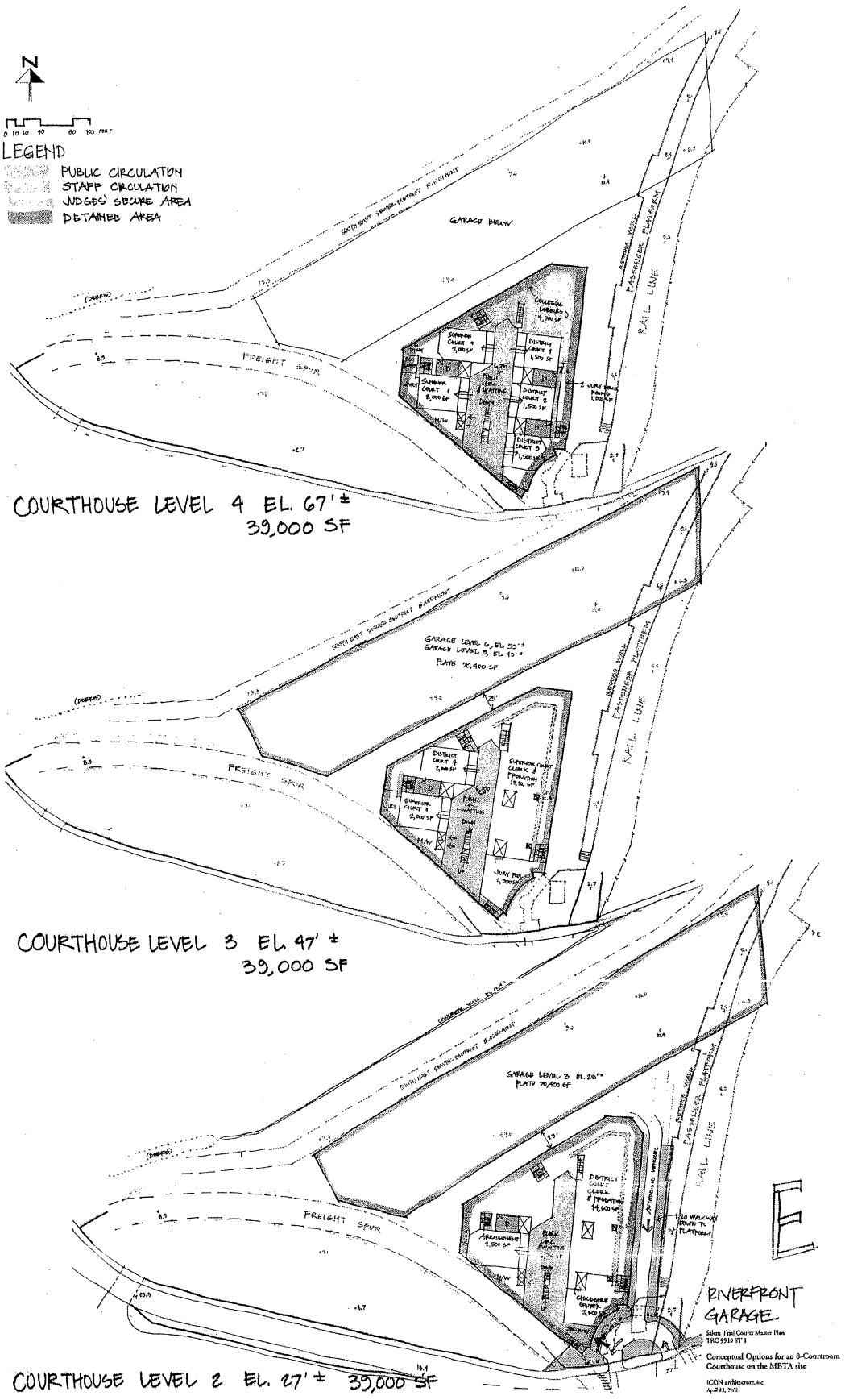
N
LEGEND
PUBLIC CIRCULATION
STAFF CIRCULATION
JUDGES' SECURE AREA
DETAINEE AREA
COURTHOUSE LEVEL 4 EL. 67'±
39,000 SF
COURTHOUSE LEVEL 3 EL. 47'±
39,000 SF
COURTHOUSE LEVEL 2 EL. 27'± 39,000 SF
FREIGHT SPUR
RAIL LINE
PASSENGER PLATFORM
GARAGE BELOW
RIVERFRONT GARAGE
Salem Trial Courts Master Plan
TRC 9910 ST 1
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ICON architecture, Inc
April 23, 2002

Schemes G1 and G2 – Relocate Bridge Street (toward the river) – enlarge court campus:
Building on the possibility of acquiring and incorporating the church, Schemes G1 and G2 begin to explore another "outside the box" strategy: relocating Bridge Street (toward the river) in order to provide a single enlarged court campus. Scheme G2 in particular addressed the city's desire to maximizing historic and water vistas.

Schemes J1 and J2 – Relocate Bridge Street (away from the river) – enlarge crescent parcel:
Schemes J1 and J2 propose relocating Bridge Street away from the river, eliminating the grade-separated intersection of Bridge and North Streets and some of the associated ramps, and creating an enlarged crescent parcel for a new court facility.

Scheme K1 – Courthouse as link from Washington Street to river:
This scheme flips the siting strategy of most of the original options, placing the courthouse on a north-south axis between Washington Street and the river along the MBTA commuter rail ROW, and locating the MBTA garage along Bridge Street, spanning the freight spur. The basis of this concept is to make use of the air rights above the freight spur, which for security reasons could not be utilized by the courthouse. The spur thus becomes an awkward interruption in the overall site, which could be utilized by the garage.

Summary Evaluation of MBTA Site Joint Development Options – Second Cycle

Review of this cycle of options with various stakeholders eliminated several strategies. In discussion of these options with the MBTA and their consultants, it became clear that the MBTA's preference was for a garage that aligned with their commuter rail tracks and not the river, and did not require air-rights construction over rail lines – either commuter or freight.

Representatives of MHD and FHWA, in an advisory discussion and site walk, discouraged options which relocated Bridge Street, either toward or away from the river. They were also reluctant to consider strategies which eliminated the grade-separated crossing at Bridge and North Streets – in particular because of the freight spur which will return to active use.

The highway officials were, however, more open to the possibility of investigating other changes to the intersection, such as relocating the loop ramp from North Street to Bridge Street. Taking this possibility together with the opportunity to acquire the First Baptist Church led to the final set of site options, the Campus Options described below.

These problems with any strategy which placed the new court facility north of Bridge Street were reinforced by an underlying concern of AOTC and DCAM – the creation of two court complexes separated by a busy street – Bridge Street – with poor pedestrian connections.

At this point, the civil and transportation engineering firm of Edwards and Kelcey, which had been MHD's consultant for ongoing improvements to Bridge Street to the east of the site, was engaged by DCAM to evaluate the preliminary engineering and traffic consequences of reconfiguring the ramps at the Bridge/North Street intersection to create an enlarged court campus between Federal, Bridge, and North Streets. This "Roadway Improvement Feasibility Study" came at an opportune time, because MHD was already contemplating funding additional roadway improvements in the area. The City of Salem and DCAM also saw this as an opportunity to create a new "front door" for downtown Salem for travelers arriving via North Street.

Preliminary Design Alternatives

ICON architecture, inc.
September 2003

New Courthouse Design Alternatives

The three design options developed for the new courthouse applied two basic courthouse configurations favored by AOTC and DCAM and utilized in other new courthouses in the Commonwealth. In this preliminary design phase, the options illustrated did not include the Juvenile Court or the Probate and Family Court within the new courthouse structure, but the same basic design principles would apply if these aditional functions were to be accommodated.

The Linear "Bar" scheme

In this scheme, courtroom pairs or "sets" are arrayed in a linear fashion along a public circulation space, with private judge and jury circulation to the rear. Courtroom sets include a security core between each pair of courtrooms for detainee holding and secure elevators to the basement detainee entry area. Judge and jury support spaces (including judges chambers and jury deliberation areas) are placed at either end of the linear courtroom complex.

The "Knuckle" scheme

In the "Knuckle" Scheme, courtroom sets wrap around a central public circulation space, with judge and jury areas in the corner between the two elements of the knuckle.

With a program calling for nine courtrooms (including a large arraignment court situated on the main transaction floor), the program naturally developed into an arrangement consisting of two courtroom floors with two courtroom sets each, plus two transaction floors at or near entry grade, and a basement area for detainees, judges parking, service and building support, and mechanical systems.

Unique features among the three alternatives are described below.

Alternative A

A "knuckle" scheme in which courthouse sets are arrayed in two legs around a corner space dedicated to judges' chambers. Situated in the northeast corner of the building, this location for the judges' chambers presents the possibility of a future link between the New Courthouse and a reconstructed Probate and Family Court building, enhancing collegiality among judges. Jury deliberation rooms are situated at the end of each wing, allowing jurors and judges to go their separate ways from courtrooms. The jury pool space is situated on an upper mezzanine level above the judges' chambers. All spaces in this corner of the building have views north and east over the North River. This scheme also features a relatively tight public atrium space wrapping around an open, sunken courtyard, which sets the relocated Church off from the new construction. In the drawing for this scheme, the church is used for a relocated Law Library (on two levels), but as in other schemes, the church could also serve as the jury pool area with the Law Library remaining in its historic setting in the Superior Court building, eliminating the need for the "Penthouse" floor.

Alternative B

A linear scheme in which courtrooms are arrayed parallel to Bridge Street at the rear of the site, with clerestory light from the north-facing Bridge Street elevation. The Federal Street entry gives access to a broad glazed public corridor, which leads into a central multistory atrium facing Federal Street to the south. The public corridors serving the courtroom floors overlook this atrium, with views of the church and out to Federal Street. With the courtroom sets occupying the entire Bridge Street frontage, support spaces for judges and juries are gathered toward the front of the building. The jury pool is located in

the historic church sanctuary area, with a new lower level providing office space for the District Attorney.

Alternative C

A linear scheme in which the courthouse sets are arrayed along the east side of the building, running from Federal Street to Bridge Street. The area for judges and juries is in the northwest corner of the building, near the corner of Bridge Street and the new North Street ramp. Additional jury deliberation rooms are situated within each courtroom set's core. This scheme also uses the main floor of the church – the original sanctuary – as the jury pool area. It is reached through the central atrium. As in Alternative B, the District Attorney's offices are in a new lower level in the relocated church building.

Probate and Family Court Building Alternatives

The Probate and Family Court Building does not meet the combined program requirements for its current primary users, the Probate and Family Court and the Registry of Deeds. The preferred option – supported by both AOTC and DCAM -- is that the ROD moves out and PFC stays, occupying the whole building with minimal renovations for the near future. This approach – while a significant improvement over current cramped conditions -- still falls short of optimum program requirements. In particular, the Probate and Family Court is programmed for five courtrooms, while the building only has three.

Beyond this interim strategy, there are several longer-range options for the P&FC building which would fully address Probate and Family Court program requirements.

Maximum Renovation (A)

PFC takes over the building with partial demolition –preserving the Federal Street wing with new construction behind. The existing west wall of the building might also be preserved in this option.

Moderate Renovation (B)

PFC takes over the building with courtyard infill on the east side of the building.

Modest Renovation (C)

PFC takes over the building using existing space – no demolition.

In each of these alternatives, the three 3 existing courtrooms would be reused, and 2 new courtrooms would be created in the current ROD area with a new secure detainee core serving at least the new courtrooms. The first floor of the current ROD area could be converted to transaction space with the new courtrooms on the second floor.

Demolition of 1970's Addition

Further evaluation suggests that the Probate and Family Court can be accommodated in the original 1912 building with the 1970's addition removed. This possibility is illustrated diagrammatically as a sub-option in the Final Report.

Superior Court/ County Commissioners Alternatives

The historic Superior Court and County Commissioner's Building is best suited for non-secure court functions. Upgrading the building for full courthouse accessibility and security would involve prohibitive costs. DCAM has completed a study of interim elevator repairs and enlargement, and an enlarged queuing area for the secure entry, that indicates that these improvements alone could cost upwards of $2 million.

Potential Users

With the construction of a new courthouse and relocation of the Superior Court, the historic building could be an appropriate location for a number of non-secure functions. These include:

Law Library

The Essex County Law Library is already in an historic space, but it needs substantially more room and improved accessibility. It could be included in the Church as part of the New Courthouse (this would require an additional level) or stay in the Superior Court building, expanding into second floor space vacated by the Superior Court, and utilizing third floor (attic) space as necessary.

Registry of Deeds

The Registry is currently utilizing 18,780 SF in the P&FC Building. Preliminary estimates indicate that it could require as much as 30,000 SF. The Registry could make good use of the major Law Library spaces if they become available. If the Law Library remains, the remainder of the building, including several large courtrooms, will provide enough space to house the Registry.

District Attorney

The District Attorney's office is currently occupying approximately 20,000 SF of leased space. DCAM and AOTC currently propose to allocate 1500-1600 SF for the DA's presence in the new building. In options for the New Courthouse, new lower level space constructed under the relocated church could be provided to the DA; space could also be provided in the Superior Court/ County Commissioner's Building in certain alternatives.

Social Services

The Social Service agencies may include the Committee for Public Counsel Services (CPSC), HAWC, CASA, etc. The Program calls for 590 SF; these agencies could use more space if available. These agencies could use space in the New Courthouse or could be located in the County Commissioners Building.

Alternatives

Three reuse scenarios were investigated, based on the criteria described earlier.

Alternative A:

Superior Court:

Registry of Deeds

Commissioners Building:

1st flr – Social Services;
2nd flr – DA

Alternative B:

Superior Court:

2/3rd flr -- Law Library;
Other floors – Registry

Commissioners Building:

Registry of Deeds

Note: *In this option, the DA could relocate to the lower floor of the church in the New Courthouse development; Social Services could go to the new courthouse or the basement of the P&FC building.*

Alternative C.

Superior Court:

2/3rd flr – Law Library;
Other: DA/ Social Services

Commissioners Building:

DA and Social Services

Note: *In this option, Registry goes off-site.*

District Court Building

With the construction of the New Courthouse, the District Court Building will become available for reuse. For the next several years, the building can serve as swing space, for the temporary relocation of other functions as sequential renovations of the P&FC and Superior Court/County Commissioners Buildings take place.

Ultimately, the District Court building ~~is~~ could be designated to be occupied by the Juvenile Court. The Juvenile Court is currently in leased space, with ten more years on the lease. ~~As detailed on the~~ According to the Implementation Schedule ~~(see Section 8)~~ for this option, final renovations to prepare the District Court building for Juvenile Court use should be completed just prior to the end of the current lease.

If the Juvenile Court is included within the new courthouse structure, the District Court building would be available for alternative use as early as 2009. Possible users include the Registry of Deeds, District Attorney's office, or disposition and redevelopment of the building and/or site for private use.