

A Trenchless Approach to Help Meet a Strict Lowell Schedule

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Smith®**

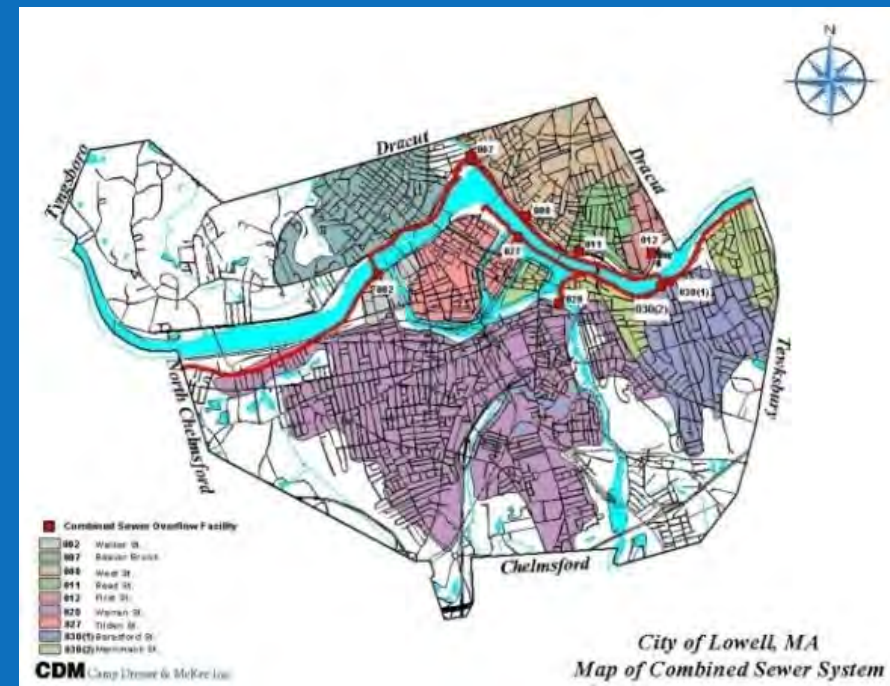


Overview

- Lowell Regional Wastewater Utility
- Long-Term CSO Control Planning
- Sewer system surcharging and street flooding
- History of Marginal Sewershed
- Development of the project
- Trenchless method selection
- Construction coordination
- Construction phase

Lowell Regional Wastewater Utility (LRWWU)

- Five member communities: Chelmsford, Dracut, Lowell, Tewksbury, and Tyngsboro
- Lowell has a combined sewer system. Other communities have separate systems
- Nine CSO outfalls/diversion structures
- 11 Pump and metering stations
- 230 miles of sewers
- 48 employees



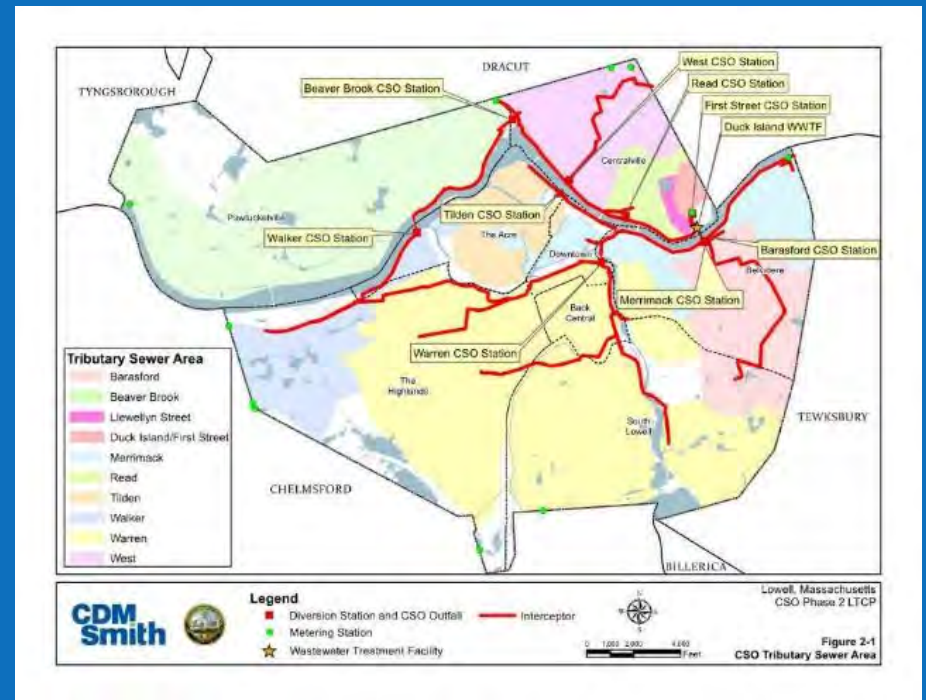
LOWELL *Alive. Unique. Inspiring.*

- Confluence of Concord River and Merrimack River
- Once one of the largest industrial complexes
- Fourth largest city in Massachusetts (100,000)
- Former textile mills have been renovated
- Canals are still a centerpiece of the city

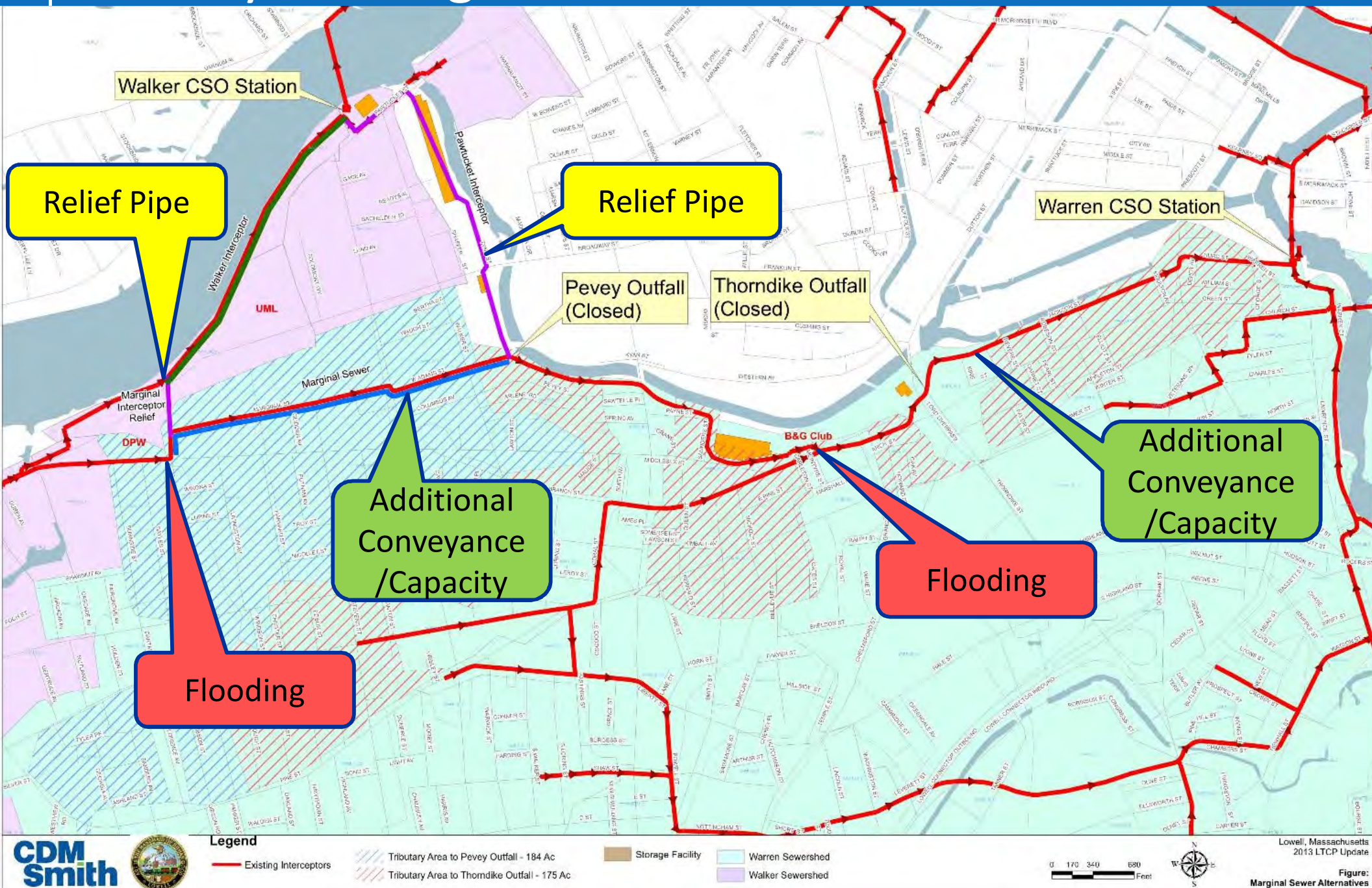


Long-Term CSO Control Planning

- CSO Phase 2 LTCP (2013)
- Sewer system surcharging and repetitive street flooding in discrete locations
- Combined sewer system improvements (sewer separation and surcharge relief)
- Top priority project

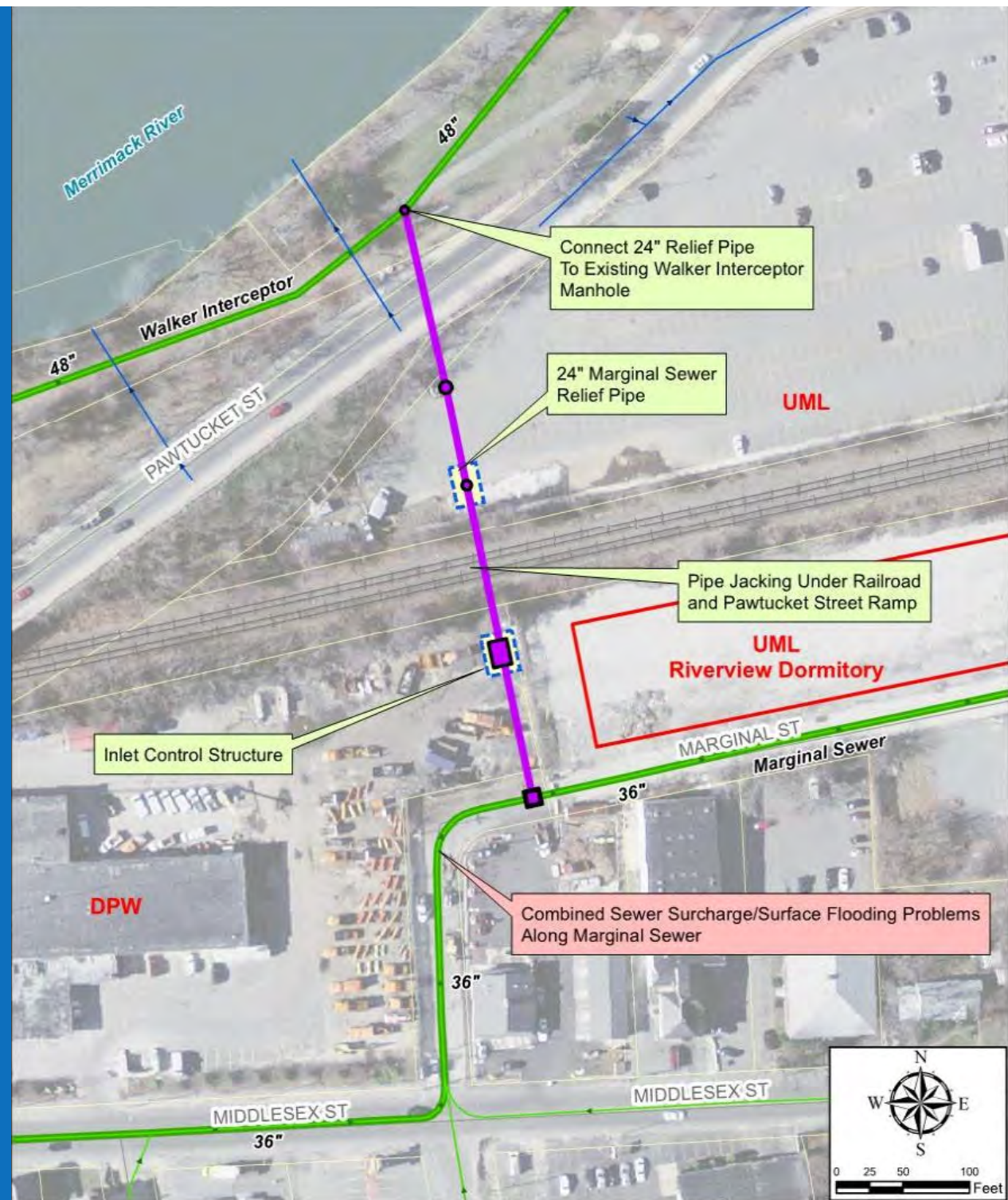


History of Marginal Sewershed



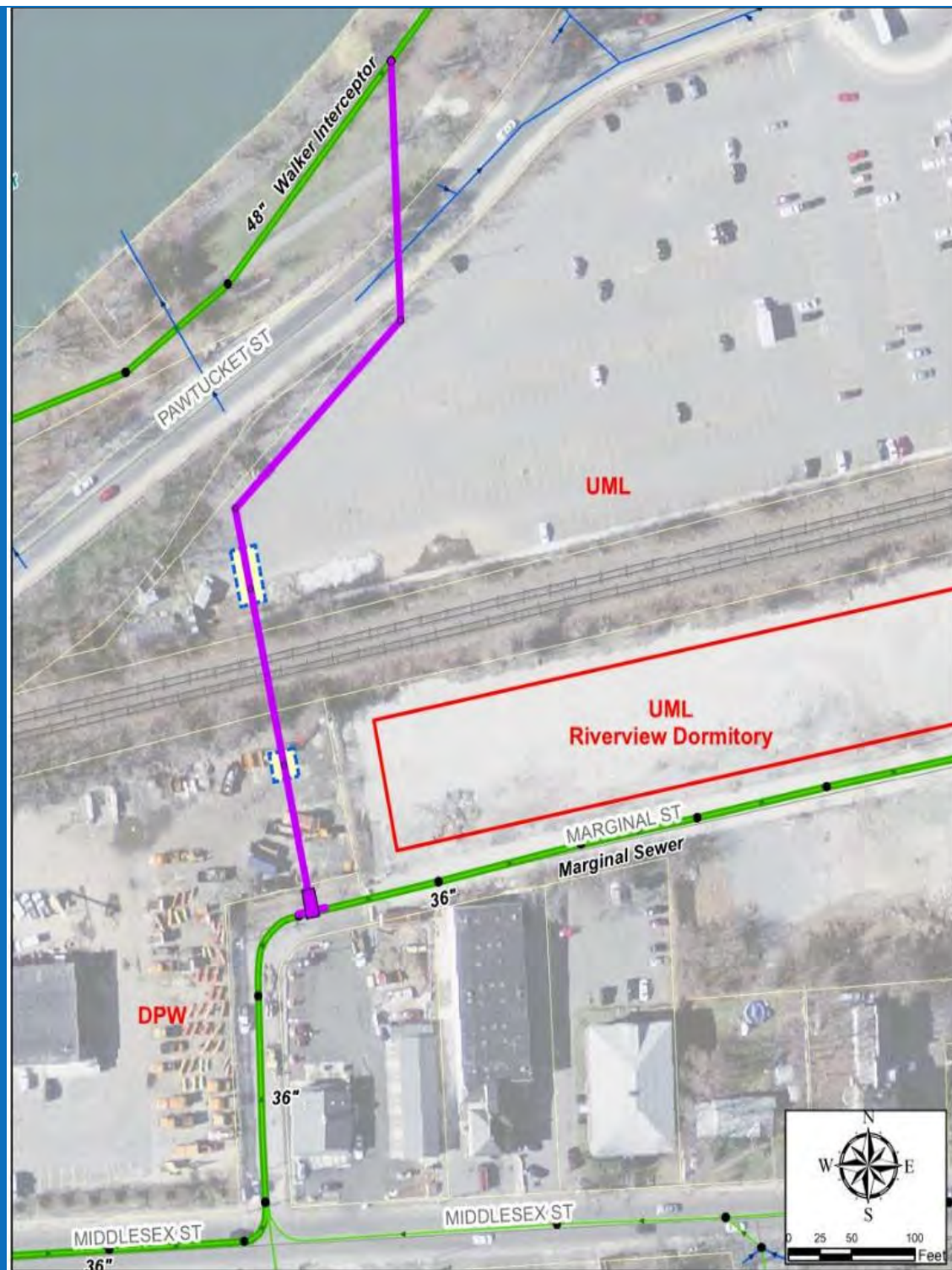
Development of the Project

- Control Level (1 year storm event)
- Basement Backups at UMass Lowell (UML) Riverview Campus Dormitory (Private)
- Surface flooding within and in front of Department of Public Works (DPW) Building
- Railroad Crossing



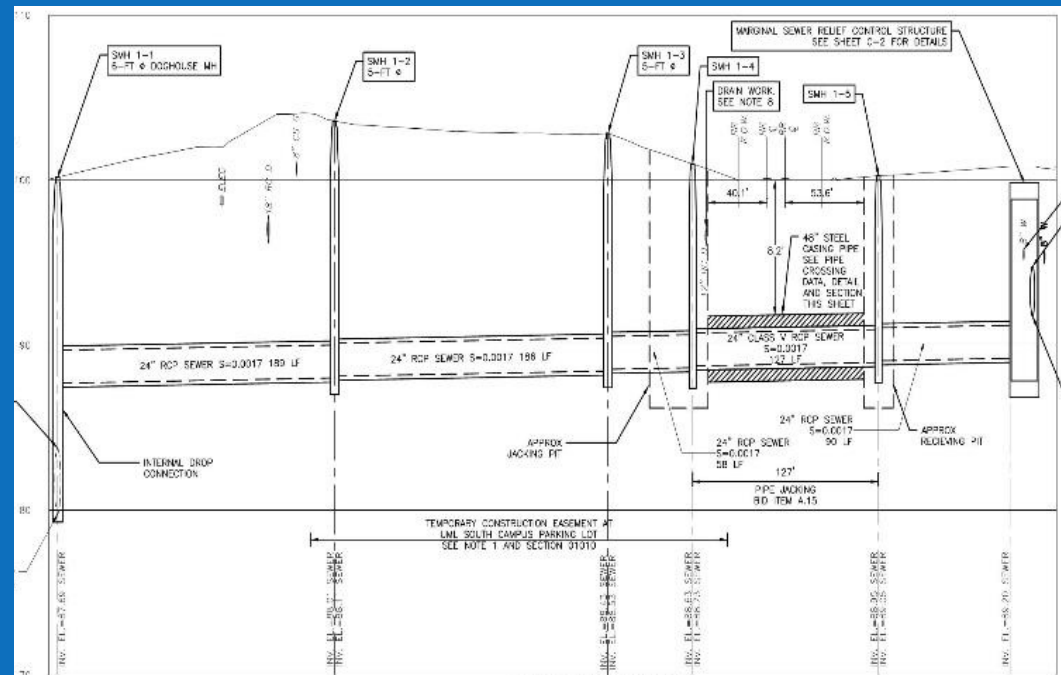
Development of Relief Pipe Alignment

- Route/Future Development
- Marginal Interceptor Relief Structure
- DPW yard
- Railroad crossing
- UML South parking lot
- Pawtucket Street
- Walker Interceptor



Field Investigation Results and Design Challenges

- Railroad crossing
- Open cut and trenchless lengths
- Previous uses of area
- Survey challenges during Winter 2015
- Silty sands based on boring program
- Groundwater



Trenchless Alternative Discussion

- Sewer design
 - Casing size (Steel 48-inches)
 - Material of carrier pipe (RC 24-inches)
- Trenchless approaches considered
 - Tunnel Boring Machine
 - Pipe Ramming
 - Hydraulic pipe jacking with shield
- Soil concerns
- Cost, noise, and tight schedule
- Vibration Monitoring
- Hydraulic pipe jacking selected

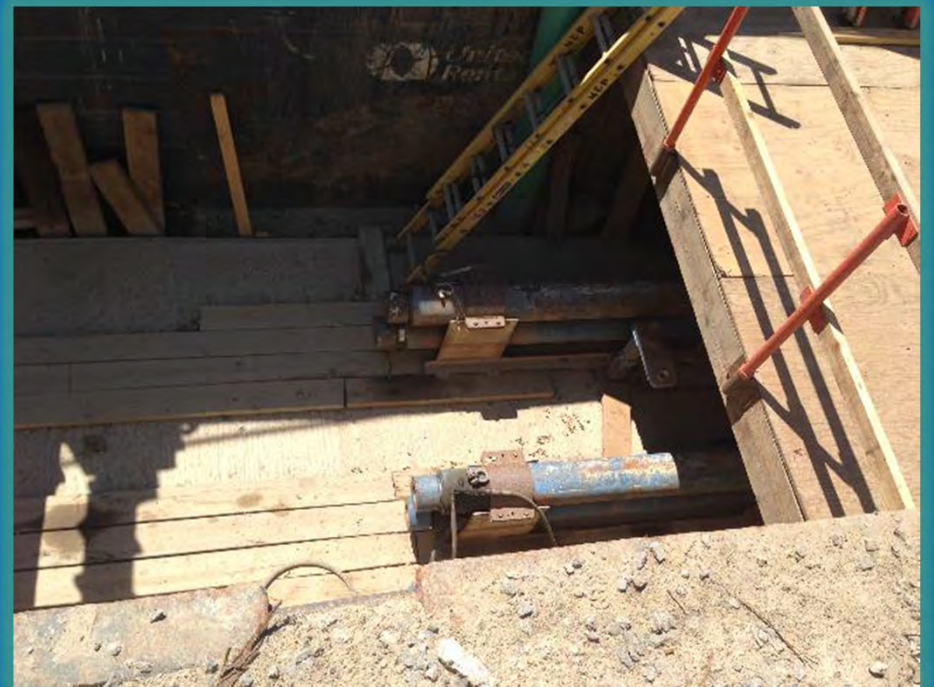
Construction Constraints

Property Owner	Schedule
UMass Lowell – South Parking Lot Temporary Easement/Construction Work Area	All final pavement and full surface restoration by August 19th! Students to move in the following week!
Riverview Dormitory	Student housing for summer programs
Railroad (Pan Am Railways/MBTA)	24/7 Jacking Operation (Railroad Flagmen) delay due to tie replacements
DPW Yard	<ul style="list-style-type: none"> All final pavement and full surface restoration by August 19th! Construction extension September 5th before yard needed for DPW winter prep (Labor Day Weekend)
Pawtucket Street/Foster Street	Temporary street shutdowns
Lowell Humane Society	Notification of jacking operation

NOTES: 1. THE TEMPORARY CONSTRUCTION EASEMENT AT LML SOUTH CAMPUS PARKING LOT IS AVAILABLE FOR USE BY THE CONTRACTOR DURING CONSTRUCTION FOR STAGING AND MATERIAL STORAGE AT NO COST TO THE CONTRACTOR. THE SITE MUST BE VACATED AND FULLY RESTORED, INCLUDING FINAL PAVING, IN ACCORDANCE WITH THE CONTRACT DOCUMENTS BY AUGUST 19, 2016. 2. SEE SECTION 02340 FOR JACKING SPECIFICATIONS. DEMOLITION AND REMOVAL OF SUBGRADE FOUNDATIONS STILL IN PLACE ALONG SEWER ALIGNMENT SHALL BE PAID FOR UNDER BID ITEM A.8a AND A.8b. 3. INSTALL TEMPORARY CHAINLINK FENCING AROUND PERIMETER OF TEMPORARY EASEMENT IN LML SOUTH CAMPUS PARKING LOT. 4. WATER MAIN WORK ON THIS SHEET TO BE INSTALLED AT NIGHT (TO BE SCHEDULED AND COORDINATED WITH LOWELL REGIONAL WATER UTILITY). 5. SEE APPENDIX C FOR UNASSIGNED (LML) ALUMINUM ORNAMENTAL FENCE SPECIFICATIONS AND DETAILS. MILL AND OVERLAY EXISTING UNDISTURBED PAVEMENT ON MARGINAL STREET AND FOSTER STREET TO WOODLICK STREET TO THE LIMITS SPECIFIED IN SECTION 02035. 6. TEMPORARILY REMOVE ~ 20 LF OF EXISTING 12" RC DRAIN LATERAL WITH JACKING PIT AREA TO FACILITATE PIPE JACKING WORK AND REPAIR DRAIN LATERAL IN KIND USING FLEXIBLE COUPLINGS AT CONNECTIONS. 7. REMOVE AND REINSTALL EXISTING LML ORNAMENTAL FENCE (APPROXIMATE EASTERN LIMIT) SEE NOTE 6. 8. TEMPORARY CONSTRUCTION ENTRANCE EAST OF EXISTING LIGHT POLE (EXISTING ENTRANCE USE PROHIBITED) TO BE RESTORED TO EXISTING CONDITIONS. 9. 25'-FT RIVERFRONT AREA. 10. SLT FENCE AND HAYBALES. 11. SMH 1-1 6-FT x 8-DOORHOUSE WH EXCAVATION SUPPORT DETERMINED BY CONTRACTOR. 12. 100 YEAR FLOOD PLAIN (APPROX 21.99 FT). 13. 24" RCP SEWER. 14. APPROXIMATE LIMIT OF WORK WITHIN 100 FOOT BUFFER ZONE. 15. REMOVE TREES. 16. APPROXIMATE WESTERN PAVING UNIT FOR PAMUCKET STREET CROSSING. 17. REMOVE AND REPLACE GUARDRAIL. 18. EXIST 48" RCP WALKER INTERCEPTOR. 19. REMOVE CHAIN LINK FENCE AND REPLACE WITH SIMILAR UML ORNAMENTAL FENCE (APPROXIMATE WESTERN LIMIT) SEE NOTE 6. 20. 100-FT BUFFER ZONE. 21. PLAN. 22. 1" = 40'. 23. 20' WIDE PERMANENT EASEMENT. 24. PIPE JACKING. 25. 24" RCP CARRIER PIPE W/ 48" STEEL CASING. 26. SEE PIPE CROSSING DATA, DETAIL AND SECTION THIS SHEET. 27. REMOVE EXISTING CONC TANK SEE NOTE 3. 28. 20" WIDE PERMANENT EASEMENT. 29. SMH 1-4. 30. SMH 1-5. 31. PIPE JACKING. 32. 24" RCP CARRIER PIPE W/ 48" STEEL CASING. 33. SEE PIPE CROSSING DATA, DETAIL AND SECTION THIS SHEET. 34. REMOVE EXIST. HYDRANT. 35. 24" RCP SEWER. 36. REMOVE AND REPLACE CHAIN LINK FENCE. 37. CONNECT 36" RCP SEWER TO EXIST. 36" BRICK SEWER. 38. SEE DETAIL ON SHEET C-2 (TYP. OF 2). 39. MARGINAL SEWER RELIEF CONTROL STRUCTURE. 40. SEE SHEET C-2 FOR DETAILS. 41. 8" COUPLING. 42. 8" DI. 43. 8" 1/8 DI BOND. 44. 8" DI. 45. 8" 1/8 DI BOND. 46. 8" DI. 47. 8" 1/8 DI BOND. 48. 8" DI. 49. 8" COUPLING. 50. RESTRAINED. 51. SEE NOTE 7 FOR PAVING LIMITS ON CITY STREET. 52. 24" SEWER WITH 48" CASING. 53. DETAIL A. 54. 48" DIA. STEEL CASING. 55. 500 RUNNER (TYP). 56. 500 BOST. (TYP). 57. ANNUAL SPACE FILLED WITH URETH. GROUT OR GULLULAR CONCRETE. 58. 24" DI PIPE (SEWER). 59. 2" GAP DB. 60. PIPE (TYP). 61. GROUT AS NECESSARY TO PREVENT WORKING SURFACE. 62. RAILROAD CROSSING SECTION 1. 63. 48" DIA. STEEL CASING. 64. 1" 3" (MAX) FROM PIPE JOINT. 65. 6" (MAX) SEPARATION (OR AS RECOMMENDED BY THE MANUFACTURER). 66. FILL ANNUAL SPACE WITH GROUT OR GULLULAR CONCRETE PER SPECIFICATIONS SECTION 02340. 67. SEAL END OF TUNNEL WITH BRICK & MORTAR OF APPROVED EQUAL (TYP). 68. FILLING SEAL AND INSULATOR NO CASING SPACER OR APPROVED EQUAL. 69. RAILROAD CROSSING SECTION 1. 70. 36" RCP SEWER INV. EL. 81.77. 71. 24" RCP SEWER S=0.0017 180 LF. 72. 24" RCP SEWER S=0.0017 188 LF. 73. 24" RCP SEWER S=0.0017 122 LF. 74. 24" RCP SEWER S=0.0017 90 LF. 75. 24" RCP SEWER S=0.0017 58 LF. 76. 24" RCP SEWER S=0.0017 38 LF. 77. 24" RCP SEWER S=0.0017 18 LF. 78. 24" RCP SEWER S=0.0017 18 LF. 79. 24" RCP SEWER S=0.0017 18 LF. 80. 24" RCP SEWER S=0.0017 18 LF. 81. 24" RCP SEWER S=0.0017 18 LF. 82. 24" RCP SEWER S=0.0017 18 LF. 83. 24" RCP SEWER S=0.0017 18 LF. 84. 24" RCP SEWER S=0.0017 18 LF. 85. 24" RCP SEWER S=0.0017 18 LF. 86. 24" RCP SEWER S=0.0017 18 LF. 87. 24" RCP SEWER S=0.0017 18 LF. 88. 24" RCP SEWER S=0.0017 18 LF. 89. 24" RCP SEWER S=0.0017 18 LF. 90. 24" RCP SEWER S=0.0017 18 LF. 91. 24" RCP SEWER S=0.0017 18 LF. 92. 24" RCP SEWER S=0.0017 18 LF. 93. 24" RCP SEWER S=0.0017 18 LF. 94. 24" RCP SEWER S=0.0017 18 LF. 95. 24" RCP SEWER S=0.0017 18 LF. 96. 24" RCP SEWER S=0.0017 18 LF. 97. 24" RCP SEWER S=0.0017 18 LF. 98. 24" RCP SEWER S=0.0017 18 LF. 99. 24" RCP SEWER S=0.0017 18 LF. 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Installation



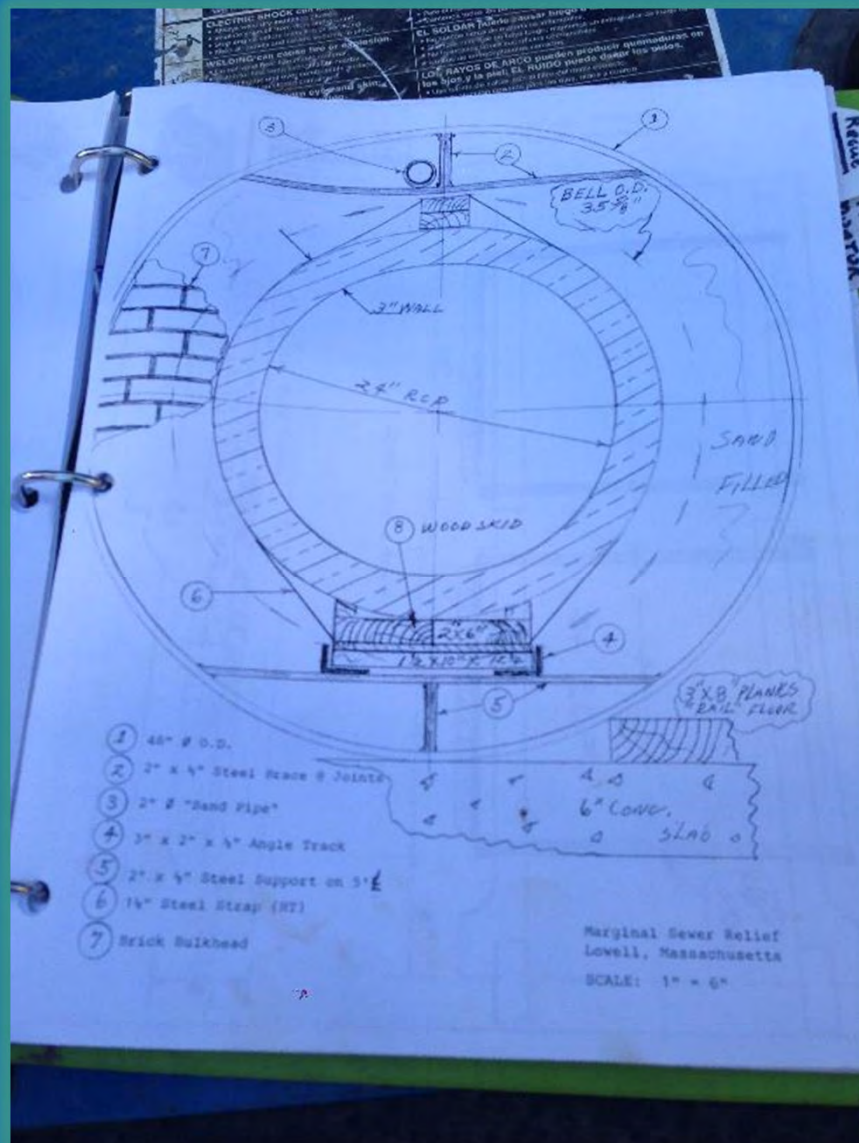














Closing



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- Questions?
(lavoiesd@cdmsmith.com)