THE COMMONWEALTH OF MASSACHUSETTS

HAMILTON CANAL DISTRICT - PROJECT D-1
BROADWAY BRIDGE AND STREETS F & G
IN THE CITY OF
LOWELL
MIDDLESEX COUNTY

50% SUBMITTAL

PENSTOCK TO BE DEMOLISHED & BACKFILLED WITH STRUCTURAL FILL

POLE TO BE REMOVED (BY OTHERS)

ALL ABANDONED UTILITIES AND UTILITY STRUCTURES SHALL BE REMOVED WITHIN THE LIMIT OF WORK, COORDINATE REMOVAL OF GAS, ELECTRIC, AND TELEPHONE UTILITIES WITH UTILITY COMPANIES

GUARDRAIL TO BE REMOVED

FENCE TO BE REMOVED

POLE SHALL REMAIN AND MAY BE USED TEMPORARILY DURING CONSTRUCTION

UNDERGROUND CATV CONDUITS TO REMAIN UNTIL TEMP CONDUIT IS INSTALLED

UNDERGROUND TELEPHONE CONDUITS TO REMAIN UNTIL TEMP CONDUIT IS INSTALLED

UNDERGROUND TELEPHONE CONDUITS TO REMAIN UNTIL TEMP CONDUIT IS INSTALLED

UG TEL & CABLE REM

PROP PENSTOCK CAP

PROP PENSTOCK CAPPING WITH 2' X 2' X 3' CONCRETE BLOCKS (TYP)

PROP TEMP CONSTRUCTION GATE

MATCH LINE

SHEET 06 OF 58

LOWELL
BROADWAY BRIDGE AND STREETS F&G DEMOLITION & SITE PREPARATION PLANS

DUTTON STREET

MERRIMACK CANAL

STREET F

STREET G

STREET G NORTHEAST

DUTTON STREET CONSTR

D1 DEMO.DWG

20-Aug-2015 6:23 PM

Plotted on LOWELL BROADWAY BRIDGE AND STREETS F&G DEMOLITION & SITE PREPARATION PLANS SHEET 06 OF 58

CONTINUED ON SHEET NO. 07

CONTINUED ON SHEET NO. 08
Prop Penstock Cap

Penstock to be demolished & backfilled with structural fill

All abandoned utilities and utility structures shall be removed within the limits of work. Coordinate removal of gas, electric, and telephone utilities with utility companies.

Prop Penstock Cap

Pole to be removed (by others)

Prop Sedimentation Barrier

Prop Tree Protection (Typ)

Match Line

Street G Northeast

Lowell
Broadway Bridge and Streets F&G
Demolition & Site Preparation Plans

Sheet 08 of 58

Plotted on Lowell Broadway Bridge and Streets F&G Demolition & Site Preparation Plans Sheet 08 of 58

D1 Demo.Dwg

20-Aug-2015 6:24 PM
PAVEMENT NOTES

SUBBASE:
- PROPOSED FULL DEPTH PARKING LOT
  - 12" GRAVEL BORROW, TYPE b
- PROPOSED FULL DEPTH PAVEMENT
  - 12" GRAVEL BORROW, TYPE b

SURFACE:
- 1.5" SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5) OVER
  - 2.5" SUPERPAVE BASE COURSE 19.0 (SBC-19.0)

FOUNDATION:
- PROPOSED CEMENT CONCRETE WALK / WHEELCHAIR RAMP
- PROPOSED BRICK TREEWAY
- PROPOSED HOT MIX ASPHALT DRIVEWAY
- PROPOSED HOT MIX ASPHALT CURB TYPE VA4 (TYP)

NOTES
- ALL SUPERPAVE HOT MIX ASPHALT SHALL BE PRODUCED USING ITEM 456.
- WARM MIX ASPHALT (WMA) TECHNOLOGY THAT IS ON THE NEAUPG QUALIFIED PRODUCTS LIST AND THAT COMPLIES WITH MASSDOT WMA SPECIAL PROVISIONS SHALL BE USED.

SEE CONSTRUCTION PLANS FOR DETAIL

TYPICAL SECTION
- 62'-0" RIGHT OF WAY
- 6" DENSE GRADED CRUSHED STONE
- 4" CEMENT CONCRETE
- PROPOSED CEMENT CONCRETE WALK / WHEELCHAIR RAMP
- PROPOSED BRICK TREEWAY
- PROPOSED HOT MIX ASPHALT DRIVEWAY
- PROPOSED HOT MIX ASPHALT CURB TYPE VA4 (TYP)

EXIST GROUND
- MEET EXIST
- STRUCTURAL SOIL
- PROP 4" VINYL, COATED CHAIN LINK FENCE
- PROP LOAM & SEED
- PROP 4" PVC GRAVITY SEWER
- PROP ORDINARY BORROW
- PROP HIGHWAY GUARD

D1 TYP.DWG
21-Aug-2015
Ploted on
LOWELL
BROADWAY BRIDGE AND STREETS F&G
TYPICAL SECTIONS
SHEET 09 OF 58
**DRAINAGE STRUCTURE DATA**

<table>
<thead>
<tr>
<th>No.</th>
<th>Type</th>
<th>Station</th>
<th>RIM ELEV.</th>
<th>INV. IN</th>
<th>INV. OUT</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>20</td>
<td>CB</td>
<td>103+78.6</td>
<td>91.78</td>
<td>(20) 87.66</td>
<td>87.78</td>
<td>R&amp;S F&amp;G</td>
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<td>PROP F&amp;C</td>
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<tr>
<td>22</td>
<td>CB</td>
<td>103+20.6</td>
<td>91.92</td>
<td>(22) 89.20</td>
<td>89.10</td>
<td>R&amp;R</td>
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<tr>
<td>23</td>
<td>CB</td>
<td>103+35.1</td>
<td>91.35</td>
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</tr>
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</table>

**LIMIT OF PAVING**

- STA 100+00
- STA 35+92.82
- STA 54+64.99

**MATCH LINE**

**DUTTON STREET**

**MERRIMACK CANAL**

**BROADWAY STREET**

**LOWELL BROADWAY BRIDGE AND STREETS F&G UTILITY PLANS WATER DRAINAGE & SEWER SHEET 20 OF 58**

**LIMIT OF PAVING**

- STA 30+92.82
- STA 100+00
- STA 300+40.99

**CONNECT PROP 12" WATER TO EXIST 16" WATER WITH 16" x 12" TEE**

**LIMIT OF PAVING**

- STA 100+00
- STA 300+40.99

**FORCE MAIN TO EXISTING SEWER MAINS**

**STREET F CONSTR**

**DUTTON STREET CONSTR**

**LIMIT OF PAVING**

- STA 100+00
- STA 300+40.99

**MATCH LINE**

**LOWELL BROADWAY BRIDGE AND STREETS F&G UTILITY PLANS WATER DRAINAGE & SEWER SHEET 20 OF 58**
CROSS AND 4 - 12" GATE VALVES

STREET G NORTHEAST
BROADWAY BRIDGE AND STREETS F&G
UTILITY PLANS
WATER DRAINAGE & SEWER
SHEET 21 OF 58

DRAINAGE STRUCTURE DATA

<table>
<thead>
<tr>
<th>NO.</th>
<th>TYPE</th>
<th>STATION</th>
<th>RIM ELEV.</th>
<th>INV. IN</th>
<th>INV. OUT</th>
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<td>29</td>
<td>CB</td>
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<td>29</td>
<td>CB</td>
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<td>82.24</td>
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<td>30</td>
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<td>28+59.9</td>
<td>83.62</td>
<td>77.80</td>
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<td>31</td>
<td>CB</td>
<td>163.7 R</td>
<td>83.60</td>
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<td>32</td>
<td>WQU</td>
<td>29+57.1</td>
<td>84.11</td>
<td>74.72</td>
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<td>33</td>
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<td>84.64</td>
<td>79.53</td>
<td>74.30</td>
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<tr>
<td>34</td>
<td>DMH</td>
<td>117.3 R</td>
<td>78.88</td>
<td>74.01</td>
<td>73.91</td>
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<tr>
<td>35</td>
<td>DMH</td>
<td>94.9 L</td>
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<td></td>
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</tr>
<tr>
<td>36</td>
<td>DMH</td>
<td>112.4 L</td>
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</tr>
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REMARKS
STORMCEPTOR

LOTELL
LOWELL
BROADWAY BRIDGE AND STREETS F&G
UTILITY PLANS
WATER DRAINAGE & SEWER
SHEET 21 OF 58

CONTINUED ON SHEET NO. 19
PLANTING SCHEDULE

<table>
<thead>
<tr>
<th>SYM</th>
<th>QUANTITY</th>
<th>BOTANICAL NAME</th>
<th>COMMON NAME</th>
<th>SIZE</th>
<th>CALIPER</th>
<th>ROOT</th>
</tr>
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<tbody>
<tr>
<td>DECIDUOUS</td>
<td>15</td>
<td>ACER RUBRUM RED SUNSET</td>
<td>RED SUNSET RED MAPLE</td>
<td>3&quot; - 3&quot; CAL.</td>
<td>B&amp;B</td>
<td></td>
</tr>
<tr>
<td>TREES</td>
<td>0.5</td>
<td>EUONYMUS FORTUNEI 'COLORATUS'</td>
<td>PURPLE LEAF WINTERCREEPER</td>
<td>QUART POT</td>
<td>8&quot; O.C.</td>
<td>CONT</td>
</tr>
</tbody>
</table>
CONSTRUCTION NOTES:
1. SEE SHEET 27 FOR TRAFFIC SIGNAL DATA.
2. RETAIN ALL EXISTING TS EQUIPMENT AND ALL TS CONDUIT UNLESS OTHERWISE NOTED.
3. RETAIN ALL EXISTING SIGNS UNLESS OTHERWISE NOTED.
4. ALL PROP PAVEMENT MARKINGS SHALL BE REFLECTORIZED THERMOPLASTIC.
5. UNLESS EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.

LIMIT OF PAVING
STA 35+82.32
N:305970.30 E:705853.27
LIMIT OF PAVING
STA 101+85.75
N:305949.30 E:705901.27
LIMIT OF PAVING
STA 105+57.15
N:305976.25 E:706106.11
LIMIT OF PAVING
STA 35+92.82
N:305970.32 E:705835.47
LIMIT OF PAVING
STA 54+64.99
N:305933.41 E:705990.96
LIMIT OF PAVING
STA 56+91.39
N:305976.29 E:706106.14
END 48+49.24

LIMIT OF PAVING
STA 101+85.75
N:305949.30 E:705901.27
END +80.11

LIMIT OF PAVING
STA 105+57.15
N:305976.25 E:706106.11
END 101

LIMIT OF PAVING
STA 35+92.82
N:305970.32 E:705835.47
END 105

LIMIT OF PAVING
STA 54+64.99
N:305933.41 E:705990.96
END 56

MATCH LINE

LIMIT OF PAVING
STA 101+85.75
N:305949.30 E:705901.27
END +80.11

LIMIT OF PAVING
STA 105+57.15
N:305976.25 E:706106.11
END 101

LIMIT OF PAVING
STA 35+92.82
N:305970.32 E:705835.47
END 105

LIMIT OF PAVING
STA 54+64.99
N:305933.41 E:705990.96
END 56

MATCH LINE
NOTES:
1. PROPOSED SIGNAL HEADS D, E, & F SHALL BE RIGID MOUNTED AND EQUIPPED WITH TUNNEL VISORS.
2. SIGNAL HEAD "A" SHALL BE FREE SWINGING WITH TUNNEL VISORS.

SEQUENCE & TIMING NOTES:
1. IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE CLEARANCE INTERVAL, THAT TRAFFIC MOVEMENT WILL NOT CHANGE DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT MOVEMENT WILL DISPLAY THE APPROPRIATE CLEARANCE INTERVALS.
2. IF CALLS EXIST ON ALL PHASES, THE ASSIGNMENT OF RIGHT OF WAY SHALL BE IN ACCORDANCE WITH THE EXISTING PREFERENTIAL PHASE SEQUENCE.
3. IF CALLS EXIST ON ALL PHASES, THE ASSIGNMENT OF RIGHT-OF-WAY FOR ANY TRAFFIC MOVEMENT SHALL DISPLAY THE APPROPRIATE CLEARANCE INTERVALS.

LIST OF MAJOR ITEMS REQUIRED

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>ITEM</th>
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</thead>
<tbody>
<tr>
<td>PEDESTRIAN SIGNAL HEAD</td>
<td>R&amp;S A</td>
</tr>
<tr>
<td>PEDESTRIAN SIGNAL HEAD</td>
<td>R&amp;S B</td>
</tr>
<tr>
<td>PEDESTRIAN SIGNAL HEAD</td>
<td>R&amp;S D,E,F</td>
</tr>
<tr>
<td>PEDESTRIAN SIGNAL HEAD</td>
<td>R&amp;S P1-P6</td>
</tr>
<tr>
<td>PEDESTRIAN SIGNAL HEAD</td>
<td>R&amp;S P1&amp;P2</td>
</tr>
<tr>
<td>PEDESTRIAN SIGNAL HEAD</td>
<td>R&amp;S P3&amp;P4</td>
</tr>
<tr>
<td>PEDESTRIAN SIGNAL HEAD</td>
<td>R&amp;S D,E&amp;F</td>
</tr>
</tbody>
</table>

NOTE 1: PROPOSED SIGNAL HEADS D, E, & F SHALL BE RIGID MOUNTED AND EQUIPPED WITH TUNNEL VISORS.
NOTE 2: SIGNAL HEAD "A" SHALL BE FREE SWINGING WITH TUNNEL VISORS.
NOTE 3: ALL PROPOSED SIGNAL DISPLAYS SHALL BE EQUIPPED W/ L.E.D. MODULES.
CONSTRUCTION NOTES:
1. RETAIN ALL EXISTING SIGNS UNLESS OTHERWISE NOTED.
2. ALL PROP PAVEMENT MARKINGS SHALL BE REFLECTORIZED THERMOPLASTIC.
3. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
4. ALL PARKING LOT MARKINGS SHALL BE PAINT.

LOWELL
BROADWAY BRIDGE AND STREETS &G
TRAFFIC PLANS
SHEET 28 OF 58
### Traffic Sign Summary

<table>
<thead>
<tr>
<th>Identification Number</th>
<th>Size of Sign (WxH)</th>
<th>Text</th>
<th>Text Dimensions (Inches)</th>
<th>Number of Signs</th>
<th>Color</th>
<th>Post Type and Number (Required)</th>
<th>Unit Dress (SF)</th>
<th>Area in Square Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>R3-7H</td>
<td>30&quot; x 30&quot;</td>
<td>SEE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR BLACK AND RED</td>
<td>2</td>
<td>WHITE BLACK</td>
<td>P5-2</td>
<td>6.25</td>
<td>12.50</td>
<td></td>
</tr>
<tr>
<td>R3-7L</td>
<td>30&quot; x 30&quot;</td>
<td>SEE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR BLACK AND RED</td>
<td>2</td>
<td>WHITE BLACK</td>
<td>P5-2</td>
<td>6.25</td>
<td>12.50</td>
<td></td>
</tr>
<tr>
<td>R7-1D</td>
<td>12&quot; x 18&quot;</td>
<td></td>
<td></td>
<td>9</td>
<td>WHITE RED</td>
<td>P5-8</td>
<td>1.50</td>
<td>13.50</td>
</tr>
<tr>
<td>R7-1L</td>
<td>12&quot; x 18&quot;</td>
<td></td>
<td></td>
<td>3</td>
<td>WHITE RED</td>
<td>P5-2</td>
<td>1.50</td>
<td>4.50</td>
</tr>
<tr>
<td>R7-1R</td>
<td>12&quot; x 18&quot;</td>
<td></td>
<td></td>
<td>3</td>
<td>WHITE RED</td>
<td>P5-2</td>
<td>1.50</td>
<td>4.50</td>
</tr>
<tr>
<td>R7-8R</td>
<td>12&quot; x 18&quot;</td>
<td></td>
<td></td>
<td>6</td>
<td>WHITE BLUE</td>
<td>P5-6</td>
<td>1.50</td>
<td>9.00</td>
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<tr>
<td>R7-8P</td>
<td>18&quot; x 9&quot;</td>
<td></td>
<td></td>
<td>1</td>
<td>WHITE GREEN</td>
<td>P5-2</td>
<td>1.125</td>
<td>1.125</td>
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<tr>
<td>R1-3H</td>
<td>5&quot; x 8&quot;</td>
<td>AS PER MASSDOT DEPARTMENT STANDARD</td>
<td>6</td>
<td>WHITE BLACK</td>
<td>6 MTD ON HS POLE/POST</td>
<td>1,125</td>
<td>1.125</td>
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</tr>
<tr>
<td>E3-1</td>
<td>Varies 12&quot;</td>
<td>COTTON ST</td>
<td>6</td>
<td>3</td>
<td>N/A</td>
<td>BLACK WHITE</td>
<td>2 MTD ON HS POLE/P - POST</td>
<td>1,125</td>
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<tr>
<td>E3-2</td>
<td>Varies 12&quot;</td>
<td>BROADWAY ST</td>
<td>6</td>
<td>3</td>
<td>N/A</td>
<td>BLACK WHITE</td>
<td>1 MTD ON HS POLE/P - POST</td>
<td>1,125</td>
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<tr>
<td>E3-3</td>
<td>Varies 12&quot;</td>
<td>STREET F</td>
<td>6</td>
<td>3</td>
<td>N/A</td>
<td>BLACK WHITE</td>
<td>1 MTD ON HS POLE/P - POST</td>
<td>1,125</td>
</tr>
<tr>
<td>E3-4</td>
<td>Varies 12&quot;</td>
<td>STREET G</td>
<td>6</td>
<td>3</td>
<td>N/A</td>
<td>BLACK WHITE</td>
<td>1 MTD ON HS POLE/P - POST</td>
<td>1,125</td>
</tr>
</tbody>
</table>

**Notes:**
1. High intensity reflective sheeting shall be used for all signs. See PHWA “STANDARD HIGHWAY SIGNS, 2004 EDITION” for text dimensions, as amended; The 1977 MASSHIGHWAY DEPARTMENT CONSTRUCTION AND TRAFFIC STANDARD DETAILS, as amended, for signs and supports; and the MASSHIGHWAY DEPARTMENT SIGN LISTINGS 1993 EDITION, as amended.
2. Official street name to be determined by the City of Lowell.
**LOWELL**

**BROADWAY BRIDGE AND STREETS F&G**

**ELECTRIC DETAILS**

**SHEET 38 OF 58**

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**STREET LIGHTING AND POWER CONDUIT AND CABLE SCHEDULE**

<table>
<thead>
<tr>
<th>PANEL</th>
<th>CURRENT SIZE</th>
<th>MOUNTING TYPE AND SIDE OF CONDUIT</th>
<th>CABLES</th>
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<tbody>
<tr>
<td>1</td>
<td>2/0/0</td>
<td>2/0/0 &amp; 2/0/0</td>
<td>L,E,N</td>
</tr>
<tr>
<td>2</td>
<td>2/0/0</td>
<td>2/0/0 &amp; 2/0/0</td>
<td>L,E,N</td>
</tr>
<tr>
<td>3</td>
<td>2/0/0</td>
<td>2/0/0 &amp; 2/0/0</td>
<td>L,E,N</td>
</tr>
<tr>
<td>4</td>
<td>2/0/0</td>
<td>2/0/0 &amp; 2/0/0</td>
<td>L,E,N</td>
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<tr>
<td>5</td>
<td>2/0/0</td>
<td>2/0/0 &amp; 2/0/0</td>
<td>L,E,N</td>
</tr>
<tr>
<td>6</td>
<td>2/0/0</td>
<td>2/0/0 &amp; 2/0/0</td>
<td>L,E,N</td>
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<tr>
<td>7</td>
<td>2/0/0</td>
<td>2/0/0 &amp; 2/0/0</td>
<td>L,E,N</td>
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<tr>
<td>8</td>
<td>2/0/0</td>
<td>2/0/0 &amp; 2/0/0</td>
<td>L,E,N</td>
</tr>
<tr>
<td>9</td>
<td>2/0/0</td>
<td>2/0/0 &amp; 2/0/0</td>
<td>L,E,N</td>
</tr>
<tr>
<td>10</td>
<td>2/0/0</td>
<td>2/0/0 &amp; 2/0/0</td>
<td>L,E,N</td>
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<tr>
<td>11</td>
<td>2/0/0</td>
<td>2/0/0 &amp; 2/0/0</td>
<td>L,E,N</td>
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<tr>
<td>12</td>
<td>2/0/0</td>
<td>2/0/0 &amp; 2/0/0</td>
<td>L,E,N</td>
</tr>
<tr>
<td>13</td>
<td>1/2/0</td>
<td>1/2/0 &amp; 1/2/0</td>
<td>L,E,N</td>
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</tbody>
</table>

**NOTES:**

1. **WARNING:** Do not expose conductors for groups of multi-wire Branch Circuits as shown, except when multi-wire neutral and each phase conductor from the group is individually identified. Identify neutral conductors, neutral conductors, and neutral conductors are not wakeable.

2. Provide a listed seal in space conductors and conductors where conductors are seen.

3. Label conductors are not wakeable.

4. Label conductors are not wakeable.

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**PANELBOARD NOTES:**

1. Circuit breakers to be shock type breakers.

2. Panelboard conduit shall be arranged in accordance with NEC requirements. Conduits shall be continuous and shall be supported every 12 inches. Conduits shall be supported every 12 inches. Conduits shall be supported every 12 inches.

3. Panelboard conduit shall be supported every 12 inches. Conduits shall be continuous and shall be supported every 12 inches. Conduits shall be supported every 12 inches. Conduits shall be supported every 12 inches.

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**PLANTER AND OR BUILDING WALL**

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**PLAN - EQUIPMENT CABLE LOCATIONS**

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**NOTES:**

1. Refer to Sheets 30 and 34 for additional information.
NOTES:
1. PROVIDE EXPANSION Joints wherever joint falls.
2. PROVIDE TOLED OXYGEN Hoses.
3. PROVIDE SMOOTH FINISH IN EMBEDDED TEMPLATING Texo Stone.

CEMENT CONCRETE

<table>
<thead>
<tr>
<th>SIDEWALK</th>
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</thead>
<tbody>
<tr>
<td>SCALE 1/12 TO SCALE</td>
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<tr>
<td>DATE: APRIL 2003</td>
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<tr>
<td>DRAWN: WALT-01</td>
</tr>
</tbody>
</table>

GRANITE CURB IN FULL DEPTH PAVEMENT

| DRAWN NOT TO SCALE |
| DATE: APRIL 2003 |
| DRAWN: WALT-01 |
LOWELL
BROADWAY BRIDGE AND STREETS F&G
CONSTRUCTION DETAILS
SHEET 45 OF 58

PRECAST TELEPHONE MANHOLE
SCALE NOT TO SCALE
DATE 12-30-2008

PRECAST CABLE PULLBOX
SCALE NOT TO SCALE
DATE 12-30-2008

CATCH BASIN WITH HOOD
SCALE NOT TO SCALE
DATE 12-30-2008

CITY OF LOWELL STANDARD
CATCH BASIN FRAME AND GRATE
SCALE NOT TO SCALE
DATE 12-30-2008

NOTES:

LOWELL
BROADWAY BRIDGE AND STREETS F&G
CONSTRUCTION DETAILS
SHEET 45 OF 58
INDEX

SHEET NO. DESCRIPTION
1 Title Sheet
2 Light, Medium & Short Span Load Diagrams
3 Heavy Load Diagrams
4 Details
5 Cored Pier Foundations

NOTES

1. For these standard drawings the Design Wind Speed for all Mast Arm Structures shall be 130 MPH.

2. For these standard drawings the Design Wind Speed for mast arm foundations located in the following counties: Plymouth, Bristol, Barnstable, Dukes, and Nantucket counties in District 5 and Berkshire county in District 1 shall be 130 MPH. The design wind speed for mast arm foundations for the remainder of the state shall be 110 MPH.

3. For these standard drawings the mast arm structure design life shall be 25 years.

4. For these standard drawings the Fatigue Category no. 2 was used and truck induced gusts were excluded in the design.

5. These standard drawings do not apply for mast arm structures at intersections with an ADT greater than 40,000 vehicles and a truck percentage of greater than 10%. The responsibility for the design of mast structures and foundations will rest with the design engineer. The structure design life will be 50 years and the fatigue category shall be no. 1. The design wind speed criteria shall be as shown in Notes Nos. 1 & 2. The design will be submitted to MassDOT for review and comment.

6. For strain pole, dual mast arm designs, or mast arms longer than 45 feet, notes 1, 2, 3 and 4 will apply. If ADT (>40,000 vehicles) and truck percentage (10%) criterion is met, note 5 design criteria (50 year design life, fatigue category no. 1, wind design speed notes 1 and 2) will apply. The responsibility for the design of these structures and foundations will rest with the design engineer. The design will be submitted to MassDOT for review and comment.

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

BROADWAY BRIDGE AND STREETS F&G
MAST ARM DETAILS

SHEET 48 OF 58

MAST ARM & FOUNDATION
Details Standard Drawings

THIS PLAN NOT DESIGNED BY
VANASSE HANSEN BRUSTLIN, INC.
IT WAS PROVIDED BY THE MASSDOT
AND ALL INFORMATION CONTAINED
HEREIN IS ASSUMED TO BE CORRECT.
LOWELL
BROADWAY BRIDGE AND STREETS F & G
MAST ARM DETAILS

SHEET 49 OF 55

LOAD DEFINITIONS - LIGHT LOADS

D1 MASTARMDET.DWG
20-Aug-2015
3:14 PM
Plotted on
LOWELL
BROADWAY BRIDGE AND STREETS F & G
MAST ARM DETAILS
SHEET 49 OF 55

LOAD DEFINITIONS - MEDIUM LOADS

STANDARD DRAWINGS
TYPE II MAST ARMS
LIGHT, MEDIUM & SHORT SPAN
LOAD DIAGRAMS
MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
12 PARK PLACE, BOSTON, MASS

THIS PLAN NOT DESIGNED BY
YANASSE HANCOOK BRUSTLIN, INC.
IT WAS PROVIDED BY THE MASSDOT
AND ALL INFORMATION CONTAINED
HEREIN IS ASSUMED TO BE CORRECT.

NOTE: ALL SIGNALS HAVE 5.0" BACKPLATES

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<thead>
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<th>DEVICE</th>
<th>DESCRIPTION</th>
<th>PROJ. AREA (FT²)</th>
<th>WEIGHT (LBS)</th>
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<tr>
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<td>36&quot; X 36&quot; REGULATORY SIGN</td>
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DEVERSION 3
OPERATIONAL SIGNING
LANE CLOSURES SHOWN FOR TEMPORARY CONSTRUCTION, 10' BI-DIRECTIONAL TRAFFIC ZONES AND STAGES AS SHOWN. THEY SHALL APPLY DURING THE WORKING DAY, OR WHILE OPERATING IN THE WORK ZONE.

TYPICAL TWO WAY STREET LANE SHIFT
NOT TO SCALE

TYPICAL TWO WAY STREET LANE CLOSURE ALTERNATING TRAFFIC
NOT TO SCALE

ROADWAY SLOPE PROTECTION

NOT TO SCALE

LEGEND
- REFLECTORIZED DRUM
- REFLECTORIZED CONE
- POLICE OFFICER/FLAGGER
- TEMPORARY TRAFFIC CONTROL SIGN
- TEMPORARY IMPACT ATTENUATOR
- MOVEABLE IMPACT ATTENUATOR
- TEMPORARY CONCRETE BARRIER

TYPE III BARRIERS

TYPE VI BARRIERS

WORK ZONE

NOTE
- SEE TAPER LENGTH FORMULA
- SEE BUFFER SPACING CHART
- SEE BUFFER SPACING CM
- SEE GENERAL NOTE 17
- SEE TEMPORARY SIGNAGE GENERAL NOTE 19
- SEE TYPICAL ROADWAY GENERAL NOTE 2

TABLE

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NOTES
- SEE BUFFER SPACING CHART
- SEE GENERAL NOTE 17

TEMPORARY TRAFFIC CONTROL PLAN GENERAL NOTES


2. ALL TEMPORARY PEDESTRIAN PATHWAYS SHALL COMPLY FULLY WITH ALL REQUIREMENTS OF THE MUTCD AND ALL APPLICABLE MASSACHUSETTS HIGHWAY, ACCESSIBLE HIGHWAY, AND AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG) REQUIREMENTS.

3. WORK HOURS SHALL BE FROM 7:00 AM TO 7:00 PM MONDAY THROUGH FRIDAY UNLESS OTHERWISE APPROVED BY THE ENGINEER. THE WORK SHALL NOT AFFECT TRAFFIC PATTERNS DURING PEAK TRAFFIC PERIODS. PEAK TRAFFIC PERIODS ARE DEFINED AS MONDAY THROUGH FRIDAY FROM 7:00 AM AND 3:00 PM.

4. ALL DRUMS SHALL BE SET AT 20' ON CENTER MAX. ON LOCAL ROADWAY AND 30' ON CENTER MAX. UNLESS OTHERWISE NOTED OR ALUMINIZED BY THE ENGINEER.

5. ALL DRUMS SHALL BE APPROXIMATELY PLACED AND MOVED AS NECESSARY TO MAINTAIN ACCURATE BUFFER ACCESS AT ALL TIMES. WORK MAY REQUIRE ADDITIONAL SIGNS, DRUMS AND OTHER TRAFFIC CONTROL DEVICES, GENERATING AND TEMPORARY FACILITIES FOR PASSAGE OF PEDESTRIAN, VEHICULAR AND EMERGENCY TRAFFIC THROUGH THE WORK AREAS, BOTH DURING AND AFTER WORKING HOURS, TO MAINTAIN SUCH ACCESS.

6. THE CONTRACTOR SHALL NOTIFY EACH UPDATED AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS.

7. FOR RESTORATIVE WORK ON LOCAL ROADWAYS, A MINIMUM OF ONE LANE OF TRAFFIC IN EACH DIRECTION ON TWO WAY STREETS SHALL BE MAINTAINED AT ALL TIMES, EXCEPT THAT DURING WORKING HOURS, TRAFFIC MAY BE REDUCED TO ONE LANE UNDER POLICE CONTROL FOR SHORT TIME PERIODS WHEN REQUIRED FOR THE WORK, AS SHOWN UNLESS OTHERWISE APPROVED BY THE ENGINEER.

8. GROUND SEPARATIONS IN EXCESS OF 2" DURING NON-WORKING HOURS WILL REQUIRE BURNING OR LAYING OFF OF LINES OR GRADING AND TEMPORARY PAVEMENT FOR PASSAGE OF PEDESTRIAN, VEHICULAR AND EMERGENCY TRAFFIC.

9. EXCAVATION EDGES IN EXCESS OF 4" INCHES DEEP SHALL BE PROTECTED DURING NON-WORKING HOURS BY BACKFILLING WITH A WEDGE OF COMPACTED GRAVEL, BORROW AT A 4:1 SLOPE PER THE DETAIL SHOWN. EXCAVATIONS IN EXCESS OF 3 FEET DEEP SHALL BE PROTECTED BY A MANHOLE APPROVED TEMPORARY CONCRETE BARRIER WITH A MINIMUM LEVEL LATERAL OFFSET TO THE EDGE OF EXCAVATION. BARRIER PLACED WITH LESS THAN THE RECOMMENDED LATERAL OFFSET, TO THE EDGE OF EXCAVATION SHALL BE ANCHORED/RESTRAINED TO PREVENT LATERAL MOVEMENT WHEN STRUCK BY ERRANT VEHICLES TRAVELING AT THE POSTED SPEED.

10. THE CONTRACTOR SHALL PROVIDE TEMPORARY IMPACT ATTENUATORS TO PROTECT ALL BLUNT-ENDS OF TEMPORARY CONCRETE BARRIER OR AS REQUIRED ON THE TRAFFIC MANAGEMENT PLAN. TEMPORARY IMPACT ATTENUATORS SHALL BE DESIGNED BY THE CONTRACTOR AND SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO THE START OF WORK. ALL TEMPORARY IMPACT ATTENUATORS SHALL BE DESIGNED FOR TEST LEVEL 2 (TL-2) ON ALL ROADWAYS HAVING A POSTED SPEED LESS THAN 45MPH AND TEST LEVEL 3 (TL-3) ON ROADWAYS HAVING A POSTED SPEED.

11. LOCAL ROADWAYS MAY BE CLOSED AND DETOURED BEGINNING 6 PM ON FRIDAY ONLY UNLESS OTHERWISE APPROVED BY THE ENGINEER.

12. TEMPORARY TRAFFIC CONTROL DEVICES AND SIGNS SHALL BE COVERED OR REMOVED DURING NON-WORKING HOURS WHEN NOT IN USE.

13. ADVISORY SPEED LIMITS (W1-1) SHALL BE USED IF APPROPRIATE AND AS DIRECTED BY THE ENGINEER.

14. SIGNS INSTALLED OUTSIDE OF TRAFFIC LANES SHALL BE 15" MINIMUM MOUNTING HEIGHT FROM THE HIGHWAY SURFACE TO THE BOTTOM OF THE SIGN.

15. SIGNS INSTALLED ON PORTABLE STANDS PLACE A MOUNTING HEIGHT FROM THE ROADWAY SURFACE TO THE BOTTOM OF THE SIGN.

16. SIGNS MOUNTED ON POSTS REQUIRE A MINIMUM 36" MOUNTING HEIGHT FROM THE ROADWAY OR SIDEWALK TO THE BOTTOM OF THE SIGN.

17. WS-9 SIGNS SHALL BE REPLACED BY WS-7 SIGNS WHEN FLAGGERS ARE USED IN LIEU OF POLICE OFFICER DETAILS.

18. LOCAL ROADWAYS MAY BE CLOSED AND DETOURED BEGINNING 6 AM OR FRIDAY ONLY UNLESS OTHERWISE APPROVED BY THE ENGINEER.

19. TEMPORARY MARKINGS SHALL BE WATER-BORNE PAINT.

20. TEMPORARY TRAFFIC CONTROL DEVICES ON FARMED AND AT ROADSIDE/FARMSITE LOCATIONS SHALL BE REFLECTORIZED DRUMS WITH TYPE C (STEADY BURN) LIGHTS FOR NIGHT TIME OPERATIONS.

21. REFLECTORIZED CONES SHALL MEET A MINIMUM OF 36 INCHES IN HEIGHT.

22. CONES MAY BE USED IN LIEU OF DRUMS OUTSIDE OF TAPER AREAS.

23. PROVIDE CLEAR ZONE AROUND MOVEABLE IMPACT ATTENUATOR DEVICES AS REQUIRED BY THE MANUFACTURER.

24. WS-9 SIGNS SHALL BE INSTALLED IN ADVANCE (100 MIN) OF AREAS WHERE UTILITY CASTINGS HAVE BEEN BURIED AND IN AREA OF VEHICULAR OPERATIONS OR AS REQUESTED BY THE ENGINEER.

25. WS-15 SIGNS SHALL BE INSTALLED IN ADVANCE (100 MIN) OF PAYMENT MILLING AREAS OR AS REQUESTED BY THE ENGINEER.

26. THERE IS NO DESIGNATED BICYCLE LANE ON THE ROADWAY WITHIN THE PROJECT LIMITS. BICYCLES ARE EXPECTED TO SHARE THE ROAD WITH GENERAL VEHICLE TRAFFIC.
NOTES:

1. ADDITIONAL ADVANCE WARNING SIGNS MAY BE NECESSARY AS DETERMINED BY THE ENGINEER.

2. CONTROLS FOR PEDESTRIAN TRAFFIC ONLY, ARE SHOWN. VEHICULAR TRAFFIC SHALL BE MENTIONED AS SHOWN ELSEWHERE.

3. STREET LIGHTING SHOULD BE CONSIDERED WHEN LOCATING CONTROL DEVICES.

4. INDICATES DIRECTION OF PEDESTRIAN TRAVEL.

5. IF THE WORK ZONE DOES NOT PERMIT PEDESTRIANS TO TRAVEL ADJACENT TO THE ООRIDE WORK ZONE (SEE NOTE 3), PEDESTRIANS ARE TO TRAVEL IN THE OPPOSITE SIDES OF THE STREET AS SHOWN IN PEDESTRIAN BYPASS TYPES I AND II, AND AS DIRECTED BY THE ENGINEER.

6. PEDESTRIAN CROSSWALKS SHALL BE A MINIMUM OF 6 FEET OF SURFACE APPLIED TAPE OR REFLECTORIZED PAINT AS DIRECTED BY THE ENGINEER.

7. ALL TEMPORARY PEDESTRIAN PATHWAYS SHALL COMPLY FULLY WITH ALL REQUIREMENTS OF THE MUTCD AND ALL APPLICABLE MAAB AND ADAAG REQUIREMENTS.

8. CONTRACTOR SHALL MAINTAIN AS WIDE OF A PEDESTRIAN ACCESS AS POSSIBLE AT ALL TIMES, AND AS DIRECTED BY THE ENGINEER.

9. TEMPORARY WHEELCHAIR RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE WITH MASSDOT, MAAB, AND ADAAG REQUIREMENTS.

10. DRUMS @ 5' O.C. --- WILL PERMIT PEDESTRIANS TO TRANSPORT CROSSING WITHOUT VIOLATING PEDESTRIAN CROSSWALKS.

11. EXISTING WHEELCHAIR RAMPS (WCR) MAY BE USED IN LIEU OF TEMPORARY WHEELCHAIR RAMPS FOR TEMPORARY DETOURS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

ADVANCE SIGN SCHEMATIC

NOTES:

SIGNS TO BE INSTALLED AT THE PROJECT LIMITS AS SHOWN.

ALL ADVANCE SIGNS TO BE IN PLACE FOR THE DURATION OF THE PROJECT.

NOTE: THE CONTRACTOR SHALL COVER ANY ADVANCE SIGNAGE IF THE SIGNAGE FROM A DAILY OPERATIONAL SETUP INTERFERES WITH THE ADVANCE SIGNING.
## TEMPORARY SIGNS

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<td>ORANGE</td>
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<td>Data 6</td>
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**Notes:**
1. Location of sample borings are shown on the map.
2. Soil borings are taken for the purposes of design and soil conditions at boring points only. Other borings are not necessary for the purpose of the sheet except as noted on the map.
3. Water levels shown on the boring logs were obtained at the time of boring operation and are not necessarily shall be the true ground water levels.
4. Figures in columns indicate number of samples required to make a grab sample. A single sample of 25 is a full grab sample falling 25 feet.
5. Borings samples are taken at a uniform rate on route the U.S. route 426 in Lawrence, KS. The boring will extend the soil and rock samples of boring the unweathered bedrock section at 10 feet on 10 feet.
6. All borings were made in April 2000.
7. Borings were made of large and small continuous boring. No. 7 was not able to calculate.
8. The North American vertical datum (NAD) is used throughout.
### Sheet 3 of 12 Sheets  
**Bridge No. L-15-089 (201)**

**Lowell**  
**Broadway Street Bridge**  
**Boring Logs**  
**Sheet 3 of 12**

---

**Notes:**

1. Location of core sample borings are shown on the plan that.
2. Numbers and boring report numbers of holes and
   the conditions at boring points shown and do not
   necessarily reflect the nature or the material.
3. Water levels shown on the boring logs were
   considered at the time of boring activity and do
   not necessarily reflect the water levels shown on
   the plan.
4. Results in columns indicate number of heads
   required to drain a 100% of the ground water
   levels.
5. Boring samples are solid and at a distance
   from the area to be tested. The borings were
   made in accordance with the specifications.
6. All borings were made in April, 2009.
7. The borings were made by Safe Boring.

---

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<td>30 ft.</td>
<td>10 ft.</td>
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---

**Diagram:**

- **Groundwater Levels**
- **Boring Logs**
- **Table Data**

---

**Page Numbers:**

- This page is the third of 12 sheets.
- Bridge No. L-15-089 (201) is referenced.

---

**Acknowledgment:**

- This document is part of a larger set of 12 sheets.
- The project is for Lowell's Broadway Street Bridge.
- The boring logs are detailed and include water levels and sample locations.

---

**Additional Information:**

- The boring samples were taken in April 2009.
- The ground water levels are noted.
- The conditions at the boring points are recorded.

---

**Contact Information:**

- For more details, contact Safe Boring.
- Additional information can be found in the 12 sheets set.

---

**References:**

- The plan that includes the location of core sample borings.
- The specification for water levels and boring conditions.
- The detailed tables for depth, water level, and sample conditions.

---

**Footer:**

- Sheet 3 of 12 Sheets  
- Bridge No. L-15-089 (201)
ELASTOMERIC BEARING PAD
NOT TO SCALE

10" PLASTIC WATERSTOP
NOT TO SCALE

SOLE PLATE DETAIL
SCALE: 1"=1'-0"

GRAVITY RETAINING WALL
TYPICAL SECTION
SCALE: 1"=1'-0"

GRAVITY RETAINING WALL
CONNECTION DETAILS
SCALE: 1"=1'-0"
TOP OF FORM ELEVATIONS FOR DECK SLAB PRIOR TO PLACEMENT OF CONCRETE

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NOTE:
After the forms are erected, the elevation at the crown should be checked. Elevations on top of the form at the crown shall be checked in the same manner as the difference between the elevations of the forms and those shown in the table. The actual elevation obtained from the top of the form at the crown should be checked.