

# O'DONNELL PARK SPLASH PARK LOWELL, MASSACHUSETTS



NOT TO SCALE

IMAGE PUBLIC DOMAIN; COURTESY OF GOOGLE

## DRAWING LIST

G-001	COVER SHEET
C-101	SITE PREPARATION & LAYOUT
C-501	DETAILS
C-701	SPECIFICATIONS
C-702	SPECIFICATIONS
C-703	SPECIFICATIONS

## GENERAL NOTES

1. ALL FEATURES SHOWN ON C-101 LAYOUT PLAN HAVE BEEN COMPILED FROM PLANS OF RECORD PROVIDED BY THE CITY OF LOWELL. THE CONTRACTOR SHALL VERIFY ALL LOCATIONS AND ELEVATIONS IN THE FIELD PRIOR TO CONSTRUCTION. ANY DISCREPANCIES THAT MAY RESULT IN A CHANGE TO THE CONTRACT SCOPE, FEE OR SCHEDULE SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION IMMEDIATELY.
2. UTILITIES SHOWN ON THE PLANS ARE BASED UPON DESIGN PLANS AND RECORD DRAWINGS PROVIDED BY THE CITY OF LOWELL. THE CONTRACTOR MUST VERIFY ALL UTILITY LOCATIONS IN THE FIELD THAT ARE IN THE SCHEDULED WORK AREA. ANY DEVIATION FROM THE INFORMATION SHOWN ON THE CONSTRUCTION DOCUMENTS MUST BE BROUGHT TO THE ATTENTION OF THE RESIDENT ENGINEER IMMEDIATELY.
3. ALL ELEVATIONS ARE BASED UPON THE CITY OF LOWELL DATUM. THE CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING HORIZONTAL AND VERTICAL CONTROL POINTS IN THE FIELD AND PROTECTING THE ORIGINAL BENCHMARK INFORMATION SHOWN.
4. THE CONTRACTOR SHALL CONTACT "DIG SAFE" TO OBTAIN A DIG SAFE NUMBER PRIOR TO ANY EXCAVATION.
5. THE CITY OF LOWELL HAS PURCHASED THE SPLASH PARK EQUIPMENT UNDER A SEPARATE CONTRACT. ALL PIPING AND CONNECTIONS ARE TO BE SUPPLIED BY THE CONTRACTOR. MANUFACTURER'S SPECIFICATIONS FOR THE SPLASH PARK EQUIPMENT ARE PROVIDED IN A SEPARATE DOCUMENT.



SPLASH PARK  
O'DONNELL PARK  
LOWELL, MA  
PREPARED FOR  
CITY OF LOWELL

PROGRESS  
NOT FOR CONSTRUCTION



City of Lowell

**Watermark**  
175 Cabot Street • Lowell, MA 01854  
Phone: 978.452.9696 • Fax: 978.453.9988

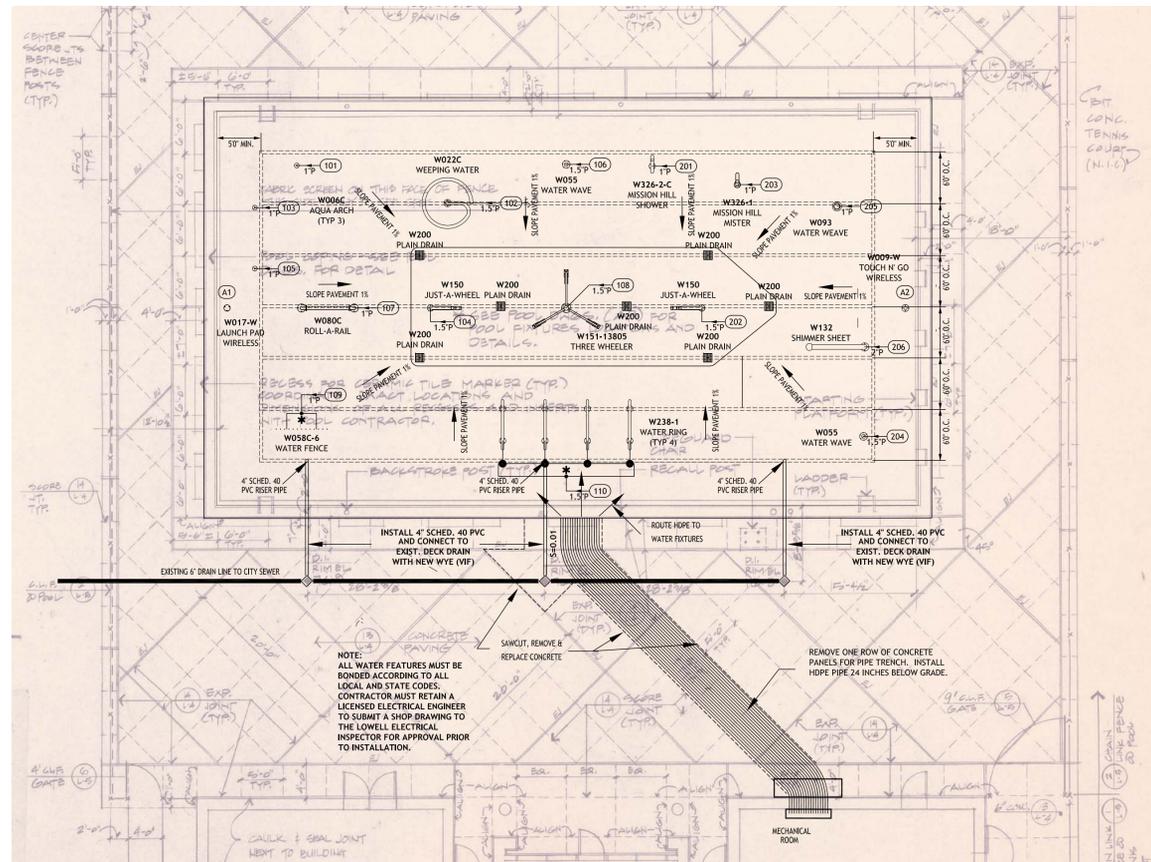
MARK	DATE	DESCRIPTION
	10/6/14	ISSUED FOR BIDS

PROJECT NO.: 140718-00  
FILE NAME: C-001.dwg  
DRAWN BY: GFF  
CHKD BY: RBB  
COPYRIGHT WATERMARK 2010

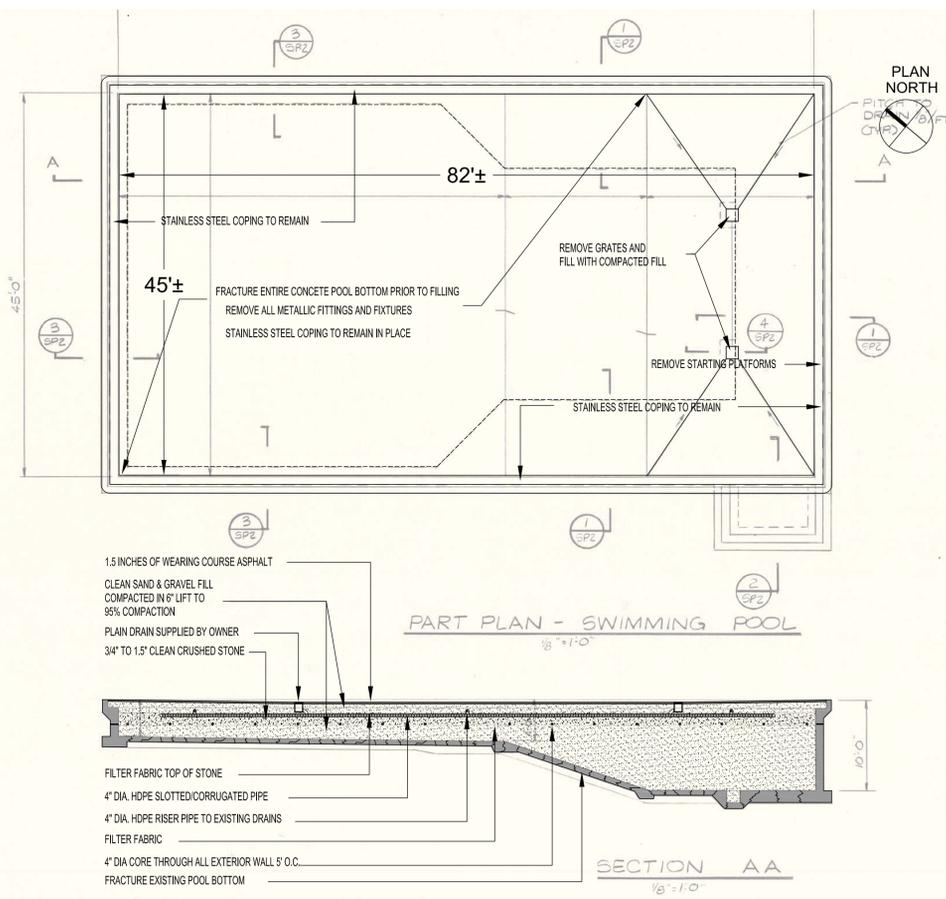
SHEET TITLE  
**COVER SHEET**

**G-001**

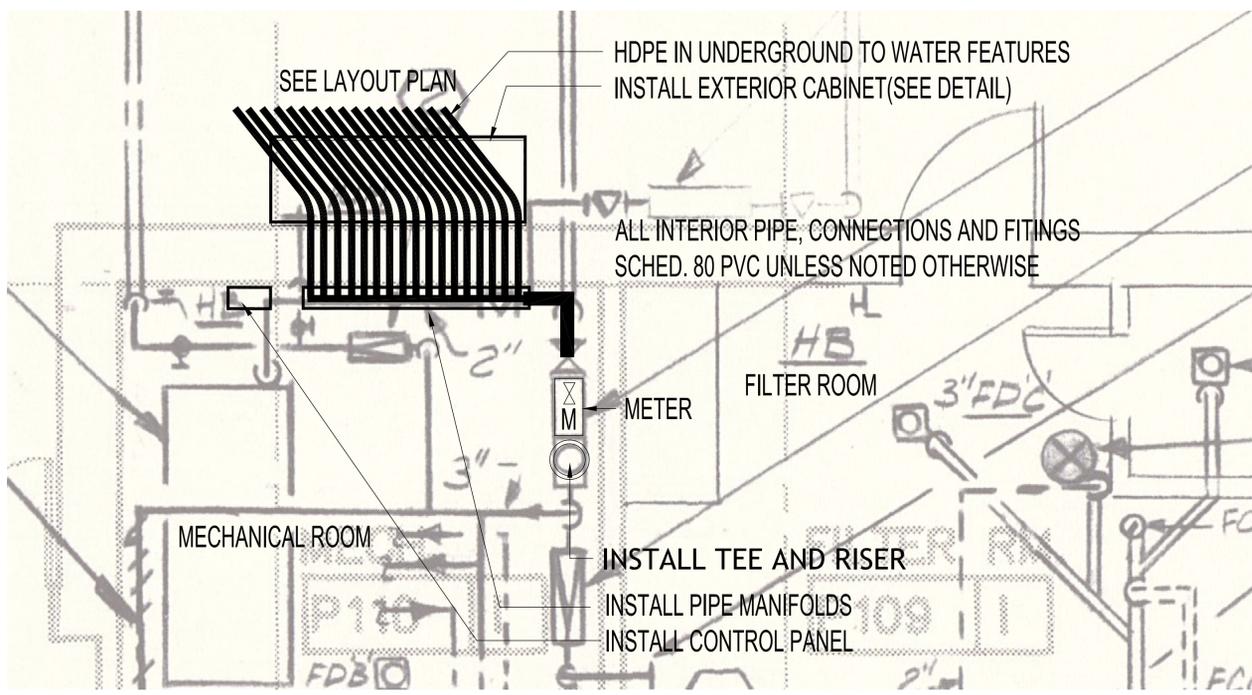
SHEET 1 OF 6



**SPLASH PARK LAYOUT**  
SCALE: 1" = 10'-0" 1

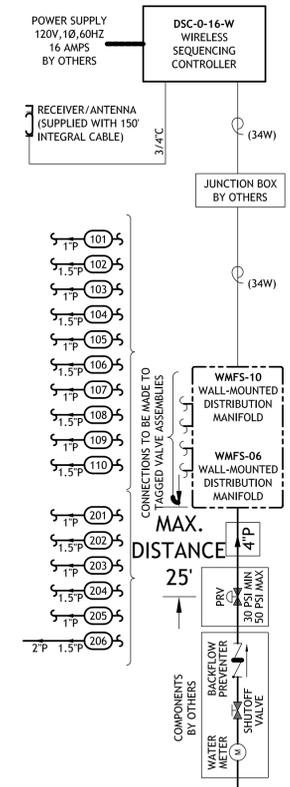


**POOL PREPARATION PLAN AND SECTION**  
SCALE: 1" = 10'-0" 2



**SPLASH PARK WATER SERVICE CONNECTION PLAN**  
SCALE: 1" = 2'-0" 3

DESCRIPTION	QTY
W006C AQUA ARCH 4" HIGH - 7" THROW 2 GPM (6) @ 3 PSI	3
W022C WEEPING WATER 10-15 GPM @ 4 PSI	1
W055 WATER WAVE 2' HIGH-2" THROW-5" WIDE 36 GPM (72) @ 3 PSI	2
W058C-6 WATER FENCE 4" HIGH 10 GPM @ 3 PSI	1
W080C ROLL-A-RAIL 8" THROW 8 GPM @ 5 PSI	1
W093 WATER WEAWE 4" HIGH - 8" SPREAD 14 GPM @ 2 PSI	1
W132 SHIMMER SHEET 32-80 GPM @ 5 PSI	1
W150 JUST-A-WHEEL 5-10 GPM (10-20) @ 6 PSI	2
W151-13805 THREE WHEELER 17" TALL 15-25 GPM @ 5 PSI	1
W238-1 WATER RING 10 GPM (40) @ 10 PSI	4
W326-1 MISSION HILL MISTER 13 GPM @ 20 PSI	1
W326-2-C MISSION HILL SHOWER WATER CONSERVING 10 GPM @ 8 PSI	1
W009-W TOUCH 'N' GO WIRELESS	1
W017-W LAUNCH PAD WIRELESS	1
W200 PLAIN DRAIN	7



- NOTES:**
- THIS DRAWING IS DIAGRAMMATIC IN NATURE. LOCATIONS RECOMMENDED FOR PLAY COMPONENTS AND DRAINS ARE APPROXIMATE. PIPING AND CONDUIT RUNS ARE SCHEMATIC. JOB CONDITIONS AND LOCAL CODES MUST DETERMINE FINAL ROUTING.
  - PIPING, CONDUIT, AND WIRE ARE BY INSTALLER.
  - PIPE SIZES ASSUME 100' MAXIMUM RUNS. LONGER RUNS MUST BE EVALUATED BY WATER ODYSSEY.
  - SYMBOL "M" INDICATES THAT THE TEE MUST BE PLACED IN THE CENTER OF THE PIPING RUN TO ENSURE BALANCED FLOW.
  - WET DECK AREA MUST BE POURED AND FORMED SO THAT WATER SHED AREA SLOPES TOWARD DRAINS.

**PLAY SCENARIO ZONES**

ACTIVATOR LABEL	A1	A2
ACTIVATOR LOCATION	W017-W LAUNCH PAD WIRELESS	W009-W TOUCH 'N' GO WIRELESS
MANIFOLD VALVE ASSEMBLY LABEL	(101) (106) (110)	(201) (206) (202) (108) (203) (110) (104) (109) (204)

PROGRAM NOT SPECIFIED

\*REFER TO ELECTRICAL SCHEMATICS AND PROGRAMMING SHEET FOR WIRING CONNECTIONS TO BE MADE TO TAGGED SOLENOID VALVE ASSEMBLIES\*

**PLUMBING LINE DIAGRAM**  
NTS 4

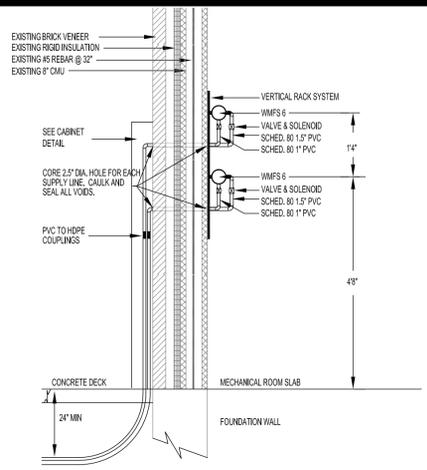
TOTAL GPM 313 MAX

File Date: 10/27/2014 1:22:58 PM File Path: \\001\Projects\1001\101150-0 - O'Donnell Park Splash Pad\6.0 Technical Information\6.1 Work Plans - Field Operations Plans\C-101.dwg

MARK	DATE	ISSUED FOR	DESCRIPTION
	10/6/14		

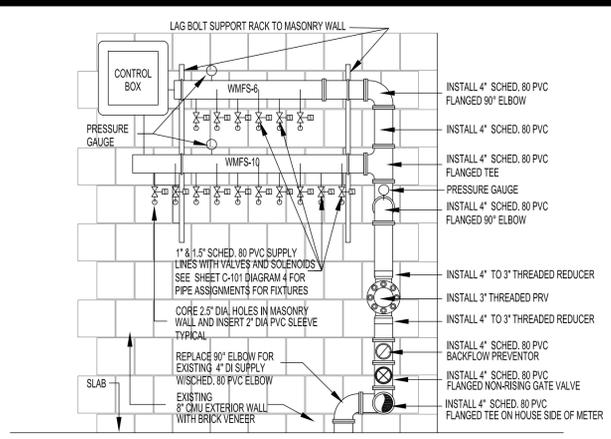
PROJECT NO: 14018-00  
FILE NAME: C-101.dwg  
DRAWN BY: RBB  
CHKD BY: GPF  
COPYRIGHT WATERMARK 2010

SHEET TITLE  
**SITE LAYOUT**



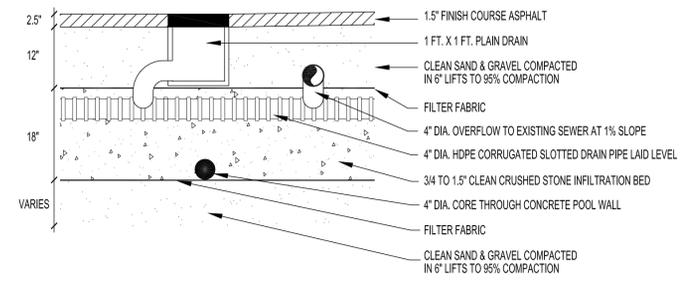
WATER SUPPLY & DISTRIBUTION SECTION

NTS



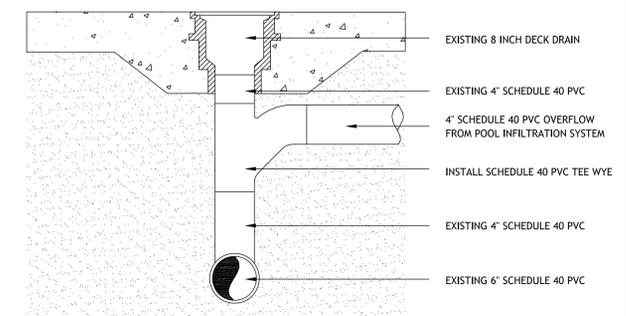
WATER SUPPLY & DISTRIBUTION DETAIL

NTS



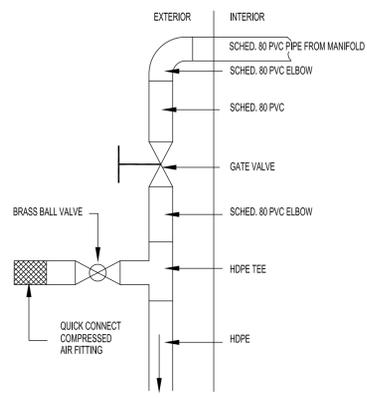
INFILTRATION SYSTEM DETAIL

NTS



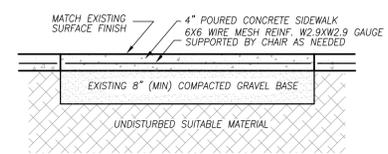
OVERFLOW CONNECTION DETAIL

NTS



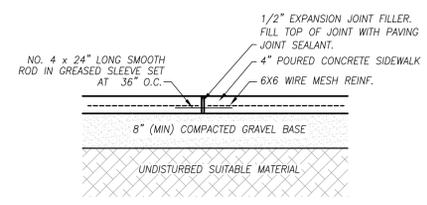
EXTERIOR PIPE DETAIL

NTS



CONCRETE DECK DETAIL

NTS



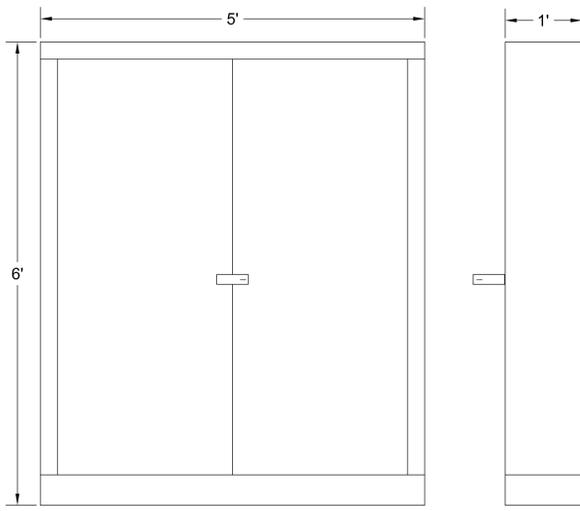
CONCRETE DECK EXPANSION JOINT DETAIL

NTS



PAVED SPLASH PAD DETAIL

NTS



STANDING TWO DOOR SINGLE ACCESS ENCLOSURE TYPE-12 STEEL

- 12 GAUGE STEEL
- SEAMS CONTINUOUSLY WELDED AND GROUND SMOOTH
- NO HOLES OR KNOCKOUTS
- STIFFENERS ON BACK OF TWO DOORS
- LIFTING EYES FOR HANDLING
- HEAVY DUTY PAD LOCK LATCH
- HEAVY GAUGE CONTINUOUS HINGES
- INTERNAL MOUNTING CHANNELS FOR ATTACHMENT TO BUILDING
- HOLLOW BACK FOR EQUIPMENT ACCESS

EXTERIOR EQUIPMENT CABINET DETAIL

NTS

MARK	DATE	ISSUED FOR BIDS	DESCRIPTION
	10/6/14		

PROJECT NO: 14018-00  
FILE NAME: C-101.dwg  
DRAWN BY: RBB  
CHKD BY: GPF  
COPYRIGHT WATERMARK 2010

SHEET TITLE  
**DETAILS**

Plot Date: 10/27/2014 1:30:18 PM File Path: J:\01 Projects\1000\101\1015-00 - C:\Donnell Park Splash Pad\6.0 Technical Information\6.1 Work Plans Field Operations Plans\C-101.dwg



2. Any and all handling of hazardous soils must be done so under a separate agreement with the City of Lowell.
3. The Owner makes no representation regarding character or extent of soil, water, or any other subsurface condition and/or utilities. The Contractor shall thoroughly investigate the site and make his own determination of subsurface conditions which may affect methods or costs of construction.
4. Obtain permission in writing from the Owner prior to any subsurface investigations.

**1.6 PROTECTION OF EXISTING CONDITIONS**

- B. Notify Dig Safe prior to any excavation. Coordinate work with utilities as required.
- C. The Contractor shall exercise extreme caution when verifying the location of underground utilities. The location of all utilities, sewer and drainage was not possible due to site constraints and the lack of record drawings. The Contractor shall request all available record drawings from the Owner and any other information that may be available for such determination.
- D. Locate and mark underground utilities to remain before beginning the work.
- E. Protect all existing utilities to remain in service; do not interrupt service except as specifically authorized in writing by authority having jurisdiction.
- F. Accurately locate by field survey the location and elevation of any active utilities exposed during construction. Record same on Record Plan.
- G. Provide barricades, fences, lights, signs, and all other safety devices required for the protection of the public and workers.

**1.7 SUPPORT-OF-EXCAVATION AND UNDERPINNING**

- A. The Contractor shall furnish, place and maintain such sheeting, shoring, and bracing at locations necessary to support the sides of excavations to prevent danger to persons or damage to adjacent building, tunnels, pavements, facilities, or utilities to prevent injurious caving or erosion or the loss of ground; and to maintain pedestrian and vehicular traffic as required by the Contract Documents, the Contractor's sequence of construction, and as directed by the Owner's Representative.
- B. In all sheeting, shoring and bracing operations, care shall be taken to prevent collapse of excavations, injury to persons or damage to adjacent structures, facilities, utilities and services. Any injuries or damage shall be the responsibility of the Contractor; and any damage to the work occurring as a result of settlement, water or earth pressure, or other causes due to inadequate bracing or other construction operations of the Contractor shall be satisfactorily repaired and made good by the Contractor, at no additional expense to the Owner.
- C. The Contractor shall comply with all federal, state, and local safety regulations, and requirements.

**1.8 GROUNDWATER AND STORMWATER CONTROL**

- A. The Contractor shall provide, at his own expense, adequate filtered sumps and pumping and drainage facilities to maintain the excavated area sufficiently dry from groundwater and/or surface runoff so as not to adversely affect construction procedures nor cause excessive disturbance of underlying natural ground.
- B. The flows of all water resulting from pumping shall be managed so as not to cause erosion, siltation of drainage systems, or damage to adjacent property. Water from the trenches, excavations, and stormwater management operations shall be disposed of in such a manner as to avoid public nuisance, injury to public health or the environment, damage to public or private property, or damage to the work completed or in progress.
- C. Any damage resulting from the failure of the dewatering operations of the Contractor, and any damage resulting from the failure of the Contractor to maintain all the areas of work in a suitable dry condition, shall be repaired by the Contractor, as directed by the Engineer, at no additional expense to the Owner. The Contractor's pumping and dewatering operations shall be carried out in such a manner as to prevent damage to the Contract work and so that no loss of ground will result from these operations. Precautions shall be taken to protect new work from flooding during storms or from other causes.

**1.9 2.2 FILL MATERIALS**

- A. Gravel Borrow: Hard, durable stone and coarse sand free of loam, clay, surface coatings, friable material, and deleterious material. Graded within the following limits as specific for MHD M1.03.0, Type B:

U.S. Sieve	% Passing by Weight
6-inch	100
1/2"	50-85
#4	40-75
#50	8-28
#200	0-8

- B. Crusher Run Stone: Hard durable angular stone and stone screenings derived from a stone quarry; free of loam, clay, surface coatings, shale, organic matter, and plastic materials. Graded within the following limits:

U.S. Sieve	% Passing by Weight
1"	100
3/4"	90-100
1/2	10-50
3/8"	0-20
#4	0-5

- C. Crushed Gravel: Hard durable stone and coarse sand; free of loam, clay, surface coatings, shale, organic matter, and deleterious materials and run through a crushing plant. Graded within the following limits as specified for M2.01.1:

U.S. Sieve	% Passing by Weight
2"	100
1.5"	95-100
1"	35-70
3/4"	0-25

- D. Ordinary Borrow: Well graded, natural inorganic soil; reused and/or imported, free of rock larger than 6 inches size, organic material, frozen material, and debris; able to be placed and compacted to specified densities.

- E. Structural Fill: Inert, hard, durable sand and gravel, free from organic material, clay, surface coatings, and deleterious materials. Graded within the following limits:

U.S. Sieve	% Passing by Weight
3-inches	100
1.2-inch	50-100
#4	30-85
#10	20-75
#60	5-35
#200	0-10 below buildings 0-5 for free draining material

- F. Stonedust Surfacing: Hard durable stone free of loam, clay, surface coatings, shale, organic matter, and deleterious materials. Graded within the following limits:

U.S. Sieve	% Passing by Weight
#4	100
#8	95-100
#16	60-75
#30	35-50
#50	25-30
#100	15-20
#200	0-10

- G. Processed Gravel for Subbase: Inert material that is hard, durable stone and coarse sand, free of loam and clay, surface coatings and deleterious materials. Graded within the following limits:

U.S. Sieve	% Passing by Weight
3 in.	100
1.5 in.	70-100
1/4 in.	50-85
#4	30-60
#200	0-10

- H. Sand Borrow: Inert material that is hard, durable grains of quartz or other hard durable rock, free of loam and clay, surface coatings and deleterious materials. The allowable amount of material passing a No. 200 sieve shall not exceed 10% by weight. Per the Massachusetts Standard Specifications for Highways and Bridges, latest edition, the maximum particle size for Sand Borrow shall be as follows:

M1.04.0 Type a	1/4 in.
M1.04.0 Type b	3/8 in.

**PART 3 - EXECUTION**

**3.1 EQUIPMENT OPERATORS**

- E. All equipment operators shall be properly licensed for the equipment being used.
- F. All equipment operators and laborers shall participate in and be familiar with the approved health and safety plan for the project.
- G. All equipment operators and laborers shall wear the OSHA approved personal protection equipment required for each task.

**3.2 EXAMINATION AND PREPARATION**

- A. Identify required lines, levels, contours, and datum.
- B. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

- C. Identify and flag known utility locations. Notify Dig Safe prior to any excavation. Notify utility company to remove and/or relocate utilities if required.
- D. Maintain and protect existing utilities to remain.

**3.3 PROTECTION OF ADJACENT WORK**

- A. Grade excavation top perimeter to prevent surface water run\_off into excavation or to adjacent properties.
- B. Protect existing concrete pool deck from damage during construction.

**3.4 TOPSOIL EXCAVATING Not Used**

**3.5 EXCAVATING AND BACKFILLING**

- A. The excavation shall be shaped to line, grade, and cross-section as indicated on the construction documents. This operation shall include any required reshaping and wetting to obtain proper compaction. All surface irregularities shall be filled with suitable material or removed and such areas recompacted until the surface is properly shaped and properly compacted. A tolerance of 3/8- inch in paved areas and 1/2-inch in non-paved areas above or below the finished subgrade elevation will be allowed provided the dimension above or below grade is not maintained for a distance longer than 50-feet and that the required crown is maintained in the subgrade.
- B. Excavation shall not interfere with 45 degree bearing splay of any foundation. Where excavation must extend within this zone, underpinning designed by a Professional Engineer registered in the Commonwealth of Massachusetts must be provided.
- C. Correct unauthorized excavation at no extra cost to Owner.
- D. Temporarily stockpile excavated material in area designated on site.
- E. All excess and unsuitable excavated soil shall be removed from the site and legally disposed offsite by the Contractor at no additional cost to the Owner.
- F. All fills shall be placed in horizontal layers. Fill shall not be placed following the natural contours of the ground. Fill shall be placed starting in the lowest areas working up to finish grades in horizontal layers in the manner specified herein. Each layer of fill shall be benched into the existing slope in order to avoid the formation of a shear plane.
- G. Backfill Material: Unless otherwise specified or directed, material used for filling and backfilling shall meet the material requirements specified herein.
  1. The material used for backfilling utility trench excavations shall be material removed from the excavations provided the reuse of these materials result in the required trench compaction and meets the requirements specified for ordinary borrow.
  2. All backfill placed within the pool shall be as shown on the Construction Documents unless otherwise specified.

- H. Backfill areas to the relative contours and elevations shown on Construction Documents. Use unfrozen and unsaturated materials.
- I. Do not backfill over wet, frozen, or spongy subgrade surfaces.
- J. Place and compact fill materials in continuous layers. Layers shall not exceed 9-inch loose thickness in areas accessible with small compactors (such as adjacent to footings and walls and within trenches). Layers shall not exceed 12-inches in loose thickness in areas accessible to large dynamic compactors.
- K. Maintain moisture content of backfill materials within plus or minus 2 percent of the optimum moisture content to attain required compaction density. Do not compact material which has excessive moisture.
- L. Employ a placement method so not to disturb or damage perimeter drainage, foundation damp-proofing, foundation waterproofing and protective cover, or utilities in trenches.

**3.6 TRENCHING**

- A. The contractor shall use a licensed and insured operator and secure the necessary Trench Excavation Permit for the work.
- B. Cut trenches sufficiently wide to enable installation of utilities and allow inspection.
- C. Hand trim excavation and leave free of loose matter.
- D. Support pipe and conduit during placement and compaction of bedding fill.
- E. Backfill trenches to required contours and elevations.
- F. Place and compact fill materials as for Backfilling.

**3.7 SUBGRADE PREPARATION**

- A. Cobbles and boulders shall be removed within 6-inches below the bottom of concrete or pavement.
- B. Proof Compaction: All exposed sub grades, including the concrete pool bottom, shall be proof-compacted as described herein.
  1. The natural sand and gravel below footings and utilities shall be proof-compacted to a firm and unyielding condition by a dynamic vibratory compactor weighing at least 200 pounds and imparting a minimum of 4 kips of force to the subgrade.
  2. The natural sand and gravel below sidewalk and pavements shall be proof-compacted to a firm and unyielding conditions by at least 4 passes of a dynamic roller that imparts a minimum of 40 kips of force to the subgrade.
  3. All soft or otherwise unsuitable material shall be removed and replaced with suitable material from excavation or borrow. The resulting area, and all other low sections, holes, or depressions shall be brought to the required grade with accepted material and the entire subgrade shaped to line, grade and cross-section and thoroughly compacted.

**3.8 COMPACTION REQUIREMENT**

- A. Fill Under Asphalt and Concrete Paving: Fill material as specified on Contract Drawings compacted to 95 percent MDD.
- B. Utilities: Pipes in trenches for utilities shall be laid on a 6 inch layer of Crushed Gravel fill material, hand trimmed to support the pipe for its full length and designed grade.

**3.9 PLACING TOPSOIL Not Used**

**3.10 PROTECTION OF EXISTING CONDITIONS**

- A. Notify Dig Safe prior to any excavation. Coordinate work with utilities as required.
- B. The Contractor shall exercise extreme caution when verifying the location of underground utilities. The location of all utilities, sewer and drainage was not possible due to site constraints and the lack of record drawings. The Contractor shall request all available record drawings from the Owner and any other information that may be available for such determination.
- C. Locate and mark underground utilities to remain before beginning the work.
- D. Protect all existing utilities to remain in service; do not interrupt service except as specifically authorized in writing by authority having jurisdiction.
- E. Accurately locate by field survey the location and elevation of any active utilities expose during construction. Record same on Record Plan.
- F. Provide barricades, fences, lights, signs, and all other safety devices required for the protection of the public and workers.
- G. Protect existing building, fence, concrete pool deck and all other above ground features from damage during construction.

**3.11 SUPPORT OF EXCAVATION AND UNDERPINNING**

- A. Any damage to persons, structures, and utilities due to settlement, movement, or other conditions caused by inadequate support work shall be made good by the Contractor without additional cost to the Owner.

**END OF SECTION**

**SECTION 32 12 00**

**FLEXIBLE PAVING**

**PART 1 - GENERAL**

**1.1 SUMMARY SCOPE:**

- A. Furnish and install the following, as shown on the plans and specified herein.
  1. Bituminous concrete roadway and parking.
  2. Prime coat and tack coat
  3. Pavement markings.

**1.2 REFERENCES**

- A. The following related items are included herein and shall mean:
  1. Commonwealth of Massachusetts, Massachusetts Highway Department Standard Specifications for Highways and Bridges, latest edition (MHD).
  2. American Society for Testing and Materials (ASTM).
  3. American Association of State Highway and Transportation Officials (AASHTO).

**1.3 SUBMITTALS**

- A. Submit the following, in accordance with the provisions of the General Conditions:
  1. Design mix for Bituminous concrete pavement.

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with Sections 405 and 420 of the Standard Specifications for Highways and Bridges, latest edition (MHD).
- B. Mixing Plant: Conform with MHD Sections M3.11.04, M3.11.05, and M3.11.06 and M3.11.07.
- C. Do not place asphalt when ambient or base surface temperature is less than 40 degrees F or base surface is wet or frozen.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver material in accordance with MHD Section 460.61.
- B. Specific delivery routes have been established for the project and shall be strictly enforced. Failure to adhere to the approved traffic plan could result in a Cease and Desist order from the City of Lowell causing serious project delays and other damages.

**PART 2 - PRODUCTS**

**2.1 PAVEMENT MATERIALS**

- A. Bituminous concrete for parking area pavement and patching shall be Class I, Type I-1, furnished in accordance with MHD Section M3, except as may be modified herein.
- B. Bituminous concrete Splash Park pavement shall consist of one finish course of bituminous concrete with a minimum finished pavement depth after rolling of 1.5 inches. Bituminous concrete material shall conform with Table A, Paragraph M3.11.03 of the Standard Specifications, except as amended herein.
- C. Prime coat of bituminous material shall be applied in conformance with MHD Section 460.62. The contractor shall submit the manufacturer's data sheet for both materials for approval prior to placement.

**2.2 EQUIPMENT**

- A. Equipment used for spreading, finishing, and compacting shall conform with MHD Section 460.63 and 460. 64.

**2.3 MIXES**

- A. Bituminous concrete pavement shall conform with MHD Section 460 Class I Bituminous Concrete Pavement Type I-1
- B. The job mix shall conform with MHD Section M3.

**2.4 QUALITY CONTROL**

- A. The Batch Plant used shall comply and conform with MHD M3.11.07
- B. Bituminous pavement shall be placed to the lines and grades shown on the construction drawings. The method used for testing surfaces shall conform with MHD Section 460.67 except as modified herein.

**PART 3 EXECUTION**

**3.1 INSTALLERS**

- A. All equipment operators and material handlers shall be properly licensed for the equipment being used.
- B. All equipment operators and laborers shall participate in and be familiar with the approved health and safety plan for the project.
- C. All equipment operators and laborers shall wear the OSHA approved personal protection equipment required for each task.

**3.2 EXAMINATION AND PREPARATION**

- A. Verify gradients and elevations of base. Make any corrections necessary to gravel borrow and crusher run stone base materials furnished. Bring finish course materials to sections and elevations shown on the drawings.
- B. Finish pavement shall terminate flush with the existing stainless steel coping along the splash park perimeter. Conform with the requirements of MHD Section 460.65.
- C. Verify compacted base is dry and ready to support paving and imposed loads. Place top course bituminous concrete in conformance with application and depth requirements as specified herein. All depths referenced shall be compacted thicknesses. Bituminous concrete for top course shall be furnished and laid in accordance with MHD Section 460 and as directed by the details.
- D. No bituminous material shall be applied when the temperature is below 40 degrees F.
- E. The Engineer may require the Contractor to remove and replace, at the Contractor's expense, any defective mix not conforming with the specified job mix formula.
- F. If, at any time before the final acceptance of the work, any soft, imperfect places or spots shall develop in the surface, all such places shall be removed and replaced with new materials and then compacted until the edges at which the new work connects with the old become invisible.
- G. Finished surfaces shall be protected from pedestrian and vehicle traffic until adequately cured.
- H. Paved surfaces may be opened to pedestrian traffic once the surface conforms with the requirements of MHD Section 460.68.

**3.3 PAVEMENT MARKINGS (Not Used)**

**END OF SECTION**

**SECTION 32 13 13**

**RIGID PAVING**

**PART 1 - GENERAL**

**1.1 SUMMARY SCOPE**

- A. Concrete patio deck.

**1.2 REFERENCES**

- A. Commonwealth of Massachusetts, Massachusetts Highway Department Standard Specifications for Highways and Bridges latest edition (MHD) Section M4.
- B. American Concrete Institute (ACI)
- C. American Association of State Highway and Transportation Officials (AASHTO)

**1.3 SUBMITTALS**

- A. Job mix design per MHD M4.03.10.
- B. Slump test per MHD M4.02.06 and M4.03.11.
- C. Test cylinder for specified strengths taken at 28 days per MHD M4.03.13.
- C. Welded Steel Wire Fabric manufacturer's data sheets conforming with MHD M8.01.2.
- D. Reinforcing bar manufacturer's data sheets conforming with MHD M8.01.0.
- E. Concrete Sealer manufacturer's data sheets conforming with MHD M9.15.0.

**1.4 QUALITY ASSURANCE**

- A. Perform work in accordance with the MHD latest edition Section M4.
- B. Perform work in accordance with the American Concrete Institute (ACI) by reference.
- C. Perform work in accordance with the American Association of State Highway and Transportation Officials (AASHTO) standards by reference.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver material in accordance with MHD M4.02.10.
- B. Store and handle materials in accordance with MHD M4.02.11.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Concrete Materials: As specified in MHD Section M4 for the compressive strengths specified on the drawings or herein.
- B. Forms: in accordance with MHD M4.02.14 B.
- C. Joint Filler: In accordance with MHD M9.14.0 and AASHTO-M153
- D. Reinforcing Steel: In accordance with MHD M8.01.0 and AASHTO-M31, Grade 60.
- E. Welded Steel Wire Fabric: In accordance with MHD M8.01.2 and AASHTO M-55.
- F. Drill Steel Rods: In accordance with MHD M8.02.0.
- G. Cement: In accordance with MHD M4.02.01 as specified on the drawings and herein.
- H. Aggregates: In accordance with MHD M4.02.02, as specified on the drawings and herein.
- I. Water: In accordance with MHD M4.02.04 as specified on the drawings and herein.
- J. Admixtures: In accordance with MHD M4.02.06 D as specified on the drawings and herein.
- K. Concrete Sealer: In conformance with MHD M9.15.0.
- L. Vitified Polymer Composite (VPC) Cast In Place Advanced Warning Strips by Armor- Tile or equal. Yellow conforming with Federal Color No. 33538.

**2.2 MANUFACTURED UNITS (Not Used)**

**2.3 EQUIPMENT**

- A. Batch Plant and Equipment shall be in conformance with MHD M4.02.08.
- B. Mixers and Agitators shall be in conformance with MHD M4.02.09.

**2.4 ACCESSORIES (Not Used)**

**2.5 MIXES**

- A. Cement Concrete Additives shall conform to MHD M4.02.05.
  1. Compressive Strength at 28 days: 4000 psi
  2. Air Entrainment: 5 - 7 percent.

- B. Proportioning shall conform to MHD M4.02.06.

- C. Material Measuring shall conform to MHD M4.02.07.

- D. Cement Mortar shall conform to MHD M4.02.15.

**2.6 FABRICATION (Not Used)**

**2.7 FINISHES (Not Used)**

**2.8 QUALITY CONTROL**

- A. Test Specimens shall be obtained in conformance with MHD M4.02.13.

**PART 3 - EXECUTION**

**3.1 INSTALLERS**

- A. Installers shall be experienced in the preparation, handling, placement and finishing of concrete products for the uses specified on the construction drawings and herein.

**3.2 EXAMINATION**

- A. The contractor shall verify that sub grade conditions conform to the specified material gradation and compaction required for the placement of concrete.
- B. Verify that proper forms, cribbing, reinforcing and expansion joints are in place prior to the placement of concrete.
- C. Verify gradients and elevations of base.
- D. Verify that site temperature and moisture conditions meet the required tolerances for the placement, finishing and curing of the concrete.

**3.3 PREPARATION**

- A. Protect sub grade materials from adverse weather conditions prior to the placement of concrete.
- B. Provide proper barriers and signage to protect new concrete surfaces for 48 hours after the placement of concrete.
- C. Moisten substrate to minimize absorption of water from fresh concrete.

**3.4 CONSTRUCTION**

**A. FORMING**

1. Place and secure forms to correct location, dimension, and profile.
2. Place joint filler in joints, vertical in position, in straight lines. Secure to formwork.
3. Place expansion joints at 20 intervals as indicated. Align joints.
4. Place joint filler between paving components and other appurtenances.
5. For Cast In Place Advanced Warning Strips, see manufacturer's recommendations.

**B. REINFORCEMENT**

1. Place reinforcement at mid\_height of slabs\_on\_grade and sidewalk.
2. Interrupt reinforcement at expansion joints.
3. Place reinforcement to achieve pavement alignment.

**C. PLACING CONCRETE**

1. Place Concrete in conformance with MHD Section 701.61.
  2. Place concrete in accordance with the American Concrete Institute (ACI) 303.1-97: Standard Specification for Cast-in-Place Architectural Concrete
  3. Do not disturb reinforcement or formwork components during concrete placement.
  4. Place concrete continuously between predetermined joints. Provide control joints every five feet at a minimum unless otherwise detailed on the plans.
- D. FINISHING**
1. Concrete Patio Deck Surfaces: Light broom, radiused, and trowel joint edges.
  2. Protect surface while curing.
  3. Apply approved sealer per manufacturer's directions.
  4. Match existing concrete patio deck pattern.

**3.5 INTERFACE WITH OTHER WORK**

1. Protect building, curbing, pavement, above ground utilities, retaining walls metal railings, sign posts, equipment, landscaping and other miscellaneous site features from concrete splashes or spills.
2. Confirm the accurate placement of sleeves,

SECTION 33 40 00  
SITE DRAINAGE & SEWERAGE

PART 1 - GENERAL

1.1 SUMMARY SCOPE

- A. Storm and drainage piping to existing catch basins, slotted drains, infiltration bed, manholes, and site surface drainage, cleanouts, fittings, frames, grates, covers and accessories.
- B. Testing and Inspections
- C. Field Verification of existing structures.

1.2 REFERENCES

- A. Commonwealth of Massachusetts, Massachusetts Highway Department Standard Specifications for Highways and Bridges latest edition (MHD), Sections 201, 220, 230, M4.05.1, M4.05.2, M4.02.14, M4.02.15, M8.01.1, M8.03.0, M8.03.2, and M9.04.9.
- B. American Concrete Institute (ACI)

1.3 SUBMITTALS

- A. Submit manufacturer's specifications for all piping materials including fittings, epoxy, maintenance and warranty information.
- B. Provide as-built drawings of existing structures that are scheduled to be verified in the field.
- C. Provide as-built drawings of installed structures.
- D. Submit manufacturer's specifications for filter fabric.

1.4 QUALITY ASSURANCE

- A. All precast units shall conform to MHD Section M4.02.14.
- B. The contractor shall verify that the drainage pipe and structures have been installed at the locations and elevations shown on the Construction drawings prior to installing and backfilling any pipe.
- C. The contractor is responsible for the operation and maintenance of the drainage structures throughout the course of the construction.
- D. All materials used for the drainage and sewerage shall conform to MHD.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Prior to delivery, all precast units shall conform with the requirements of MHD M4.02.14.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

- A. Plastic PVC Pipe shall conform to MHD M5.03.7:

Corrugated Perforated Drain Pipe and Accessories shall be made of high density polyethelen plastic (HDPE) by ADS or approved equal. Pipe shall have bell and spigot ends and be approved for H 20 loading.

2.2 PIPE ACCESSORIES

- A. Fittings: Same material as pipe molded or formed to suit pipe size and end design.
- B. Transitions: Adaptors designed for connections between HDPE and PVC.

2.3 FILTER AGGREGATE

- A. Coarse Filter Aggregate: Gravel Borrow (See Section 31 00 00)

2.4 ACCESSORIES

- A. Filter Fabric: Water pervious type, Black polyester in rolls manufactured by Miraf or Geofab or approved equal. Filter Fabric shall be medium weight non-woven.

2.5 FABRICATION

- A. Precast concrete manhole structures may be fabricated with project specific openings for installation at the specified locations and elevations shown on the construction drawings. Alterations to precast openings to adjust for field conditions or incorrect placement of openings will not be allowed.

PART 3 - EXECUTION

3.1 INSTALLERS

- A. Installers shall be experienced in the preparation, handling, placement and finishing of structures pipe and fittings for the uses specified on the construction drawings and herein.

3.2 EXAMINATION AND PREPARATION

- A. Verify that excavations are ready to receive work.
- B. Hand trim excavations. Correct over excavation with fine filter aggregate with no stone.
- C. Verify that drainage pipe and structures have been installed at the location and elevations specified on the Construction Drawings prior to completing pipe connection. All structures to be installed level.

3.3 INSTALLATION OF PIPE

- A. Install pipe, fittings, and accessories in accordance with manufacturer's instructions and in conformance with MHD Section 230. Seal joints watertight.

3.4 INSTALLATION OF PLAIN DRAIN UNITS

- A. Use units provided by the owner and install per the manufacturer's instructions and recommendations.

3.5 FIELD QUALITY CONTROL

- A. The contractor shall be responsible for establishing horizontal and vertical control for the accurate placement of drainage and sewerage structures and pipe.
- B. Any discrepancies between the existing conditions shown on the construction drawings and the as-built location of existing structures that may impact the execution of the work shall be brought to the engineer's attention immediately.
- C. The contractor shall submit an "as-built" record plan to the owner upon completion of the work.

3.7 PROTECTION

- A. Protect all underground structures from damage when setting posts.
- B. Protect all previously completed adjacent work from damage during construction or installation.
- C. Protect landscaping and other above ground site features adjacent to the proposed work.

END OF SECTION



City of Lowell

PROGRESS  
NOT FOR CONSTRUCTION

SPLASH PARK  
O'DONNELL PARK  
LOWELL, MA  
PREPARED FOR:  
CITY OF LOWELL

MARK	DATE	ISSUED FOR BIDS	DESCRIPTION
	10/6/14		

PROJECT NO: 14018-00  
FILE NAME: C-701.dwg  
DRAWN BY: RBB  
CHKD BY: GPF  
COPYRIGHT WATERMARK 2010

SHEET TITLE  
SPECIFICATIONS

C-703  
SHEET 6 OF 6

E. Structural Fill: Inert, hard, durable sand and gravel, free from organic material, clay, surface coatings, and deleterious materials. Graded within the following limits:

U.S. Sieve	% Passing by Weight
3-inches	100
1.2-inch	50-100
#4	30-85
#10	20-75
#60	5-35
#200	0-10 below buildings 0-5 for free draining material

F. Stonedust Surfacing: Hard durable stone free of loam, clay, surface coatings, shale, organic matter, and deleterious materials. Graded within the following limits:

U.S. Sieve	% Passing by Weight
#4	100
#8	95-100
#16	60-75
#30	35-50
#50	25-30
#100	15-20
#200	0-10

G. Processed Gravel for Subbase: Inert material that is hard, durable stone and coarse sand, free of loam and clay, surface coatings and deleterious materials. Graded within the following limits:

U.S. Sieve	% Passing by Weight
3 in.	100
1.5 in.	70-100
1/4 in.	50-85
#4	30-60
#200	0-10

H. Sand Borrow: Inert material that is hard, durable grains of quartz or other hard durable rock, free of loam and clay, surface coatings and deleterious materials. The allowable amount of material passing a No. 200 sieve shall not exceed 10% by weight. Per the Massachusetts Standard Specifications for Highways and Bridges, latest edition, the maximum particle size for Sand Borrow shall be as follows:

M1.04.0 Type a	1/4 in.
M1.04.0 Type b	3/8 in.

### PART 3 - EXECUTION

#### 3.1 EQUIPMENT OPERATORS

- H. All equipment operators shall be properly licensed for the equipment being used.
- I. All equipment operators and laborers shall participate in and be familiar with the approved health and safety plan for the project.
- J. All equipment operators and laborers shall wear the OSHA approved personal protection equipment required for each task.

#### 3.2 EXAMINATION AND PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

C. Identify and flag known utility locations. Notify Dig Safe prior to any excavation. Notify utility company to remove and/or relocate utilities if required.

D. Maintain and protect existing utilities to remain.

#### 3.3 PROTECTION OF ADJACENT WORK

- A. Grade excavation top perimeter to prevent surface water run\_off into excavation or to adjacent properties.
- B. Protect existing concrete pool deck from damage during construction.

#### 3.4 TOPSOIL EXCAVATING Not Used

#### 3.5 EXCAVATING AND BACKFILLING

A. The excavation shall be shaped to line, grade, and cross-section as indicated on the construction documents. This operation shall include any required reshaping and wetting to obtain proper compaction. All surface irregularities shall be filled with suitable material or removed and such areas recompacted until the surface is properly shaped and properly compacted. A tolerance of 3/8- inch in paved areas and 1/2-inch in non-paved areas above or below the finished subgrade elevation will be allowed provided the dimension above or below grade is not maintained for a distance longer than 50-feet and that the required crown is maintained in the subgrade.

B. Excavation shall not interfere with 45 degree bearing splay of any foundation. Where excavation must extend within this zone, underpinning designed by a Professional Engineer registered in the Commonwealth of Massachusetts must be provided.

- C. Correct unauthorized excavation at no extra cost to Owner.
- D. Temporarily stockpile excavated material in area designated on site.
- E. All excess and unsuitable excavated soil shall be removed from the site and legally disposed offsite by the Contractor at no additional cost to the Owner.

F. All fills shall be placed in horizontal layers. Fill shall not be placed following the natural contours of the ground. Fill shall be placed starting in the lowest areas working up to finish grades in horizontal layers in the manner specified herein. Each layer of fill shall be benched into the existing slope in order to avoid the formation of a shear plane.

G. Backfill Material: Unless otherwise specified or directed, material used for filling and backfilling shall meet the material requirements specified herein.

- 1. The material used for backfilling utility trench excavations shall be material removed from the excavations provided the reuse of these materials result in the required trench compaction and meets the requirements specified for ordinary borrow.
- 2. All backfill placed within the pool shall be as shown on the Construction Documents unless otherwise specified.

H. Backfill areas to the relative contours and elevations shown on Construction Documents. Use unfrozen and unsaturated materials.

I. Do not backfill over wet, frozen, or spongy subgrade surfaces.

J. Place and compact fill materials in continuous layers. Layers shall not exceed 9-inch loose thickness in areas accessible with small compactors (such as adjacent to footings and walls and within trenches). Layers shall not exceed 12-inches in loose thickness in areas accessible to large dynamic compactors.

K. Maintain moisture content of backfill materials within plus or minus 2 percent of the optimum moisture content to attain required compaction density. Do not compact material which has excessive moisture.

L. Employ a placement method so not to disturb or damage perimeter drainage, foundation damp-proofing, foundation waterproofing and protective cover, or utilities in trenches.

#### 3.6 TRENCHING

- A. The contractor shall use a licensed and insured operator and secure the necessary Trench Excavation Permit for the work.
- B. Cut trenches sufficiently wide to enable installation of utilities and allow inspection.
- C. Hand trim excavation and leave free of loose matter.
- D. Support pipe and conduit during placement and compaction of bedding fill.
- E. Backfill trenches to required contours and elevations.
- F. Place and compact fill materials as for Backfilling.

#### 3.7 SUBGRADE PREPARATION

- A. Cobbles and boulders shall be removed within 6-inches below the bottom of concrete or pavement.
- B. Proof Compaction: All exposed sub grades, including the concrete pool bottom, shall be proof-compacted as described herein.
  - 1. The natural sand and gravel below footings and utilities shall be proof-compacted to a firm and unyielding condition by a dynamic vibratory compactor weighing at least 200 pounds and imparting a minimum of 4 kips of force to the subgrade.
  - 2. The natural sand and gravel below sidewalk and pavements shall be proof-compacted to a firm and unyielding conditions by at least 4 passes of a dynamic roller that imparts a minimum of 40 kips of force to the subgrade.
  - 3. All soft or otherwise unsuitable material shall be removed and replaced with suitable material from excavation or borrow. The resulting area, and all other low sections, holes, or depressions shall be brought to the required grade with accepted material and the entire subgrade shaped to line, grade and cross-section and thoroughly compacted.

#### 3.8 COMPACTION REQUIREMENTS

- A. Fill Under Asphalt and Concrete Paving: Fill material as specified on Contract Drawings compacted to 95 percent MDD.
- B. Utilities: Pipes in trenches for utilities shall be laid on a 6 inch layer of Crushed Gravel fill material, hand trimmed to support the pipe for its full length and designed grade.

#### 3.9 PLACING TOPSOIL Not Used

#### 3.10 PROTECTION OF EXISTING CONDITIONS

- A. Notify Dig Safe prior to any excavation. Coordinate work with utilities as required.
- B. The Contractor shall exercise extreme caution when verifying the location of underground utilities. The location of all utilities, sewer and drainage was not possible due to site constraints and the lack of record drawings. The Contractor shall request all available record drawings from the Owner and any other information that may be available for such determination.
- C. Locate and mark underground utilities to remain before beginning the work.
- D. Protect all existing utilities to remain in service; do not interrupt service except as specifically authorized in writing by authority having jurisdiction.
- E. Accurately locate by field survey the location and elevation of any active utilities expose during construction. Record same on Record Plan.
- F. Provide barricades, fences, lights, signs, and all other safety devices required for the protection of the public and workers.
- G. Protect existing building, fence, concrete pool deck and all other above ground features from damage during construction.

#### 3.11 SUPPORT OF EXCAVATION AND UNDERPINNING

- A. Any damage to persons, structures, and utilities due to settlement, movement, or other conditions caused by inadequate support work shall be made good by the Contractor without additional cost to the Owner.

END OF SECTION

SECTION 32 12 00

FLEXIBLE PAVING

### PART 1 - GENERAL

#### 1.1 SUMMARY SCOPE:

- A. Furnish and install the following, as shown on the plans and specified herein.
  - 1. Bituminous concrete roadway and parking.
  - 2. Prime coat and tack coat
  - 3. Pavement markings.

#### 1.2 REFERENCES

- A. The following related items are included herein and shall mean:
  - 1. Commonwealth of Massachusetts, Massachusetts Highway Department Standard Specifications for Highways and Bridges, latest edition (MHD).
  - 2. American Society for Testing and Materials (ASTM).
  - 3. American Association of State Highway and Transportation Officials (AASHTO).

#### 1.3 SUBMITTALS

- A. Submit the following, in accordance with the provisions of the General Conditions:
  - 1. Design mix for Bituminous concrete pavement.

#### 1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with Sections 405 and 420 of the Standard Specifications for Highways and Bridges, latest edition (MHD).
- B. Mixing Plant: Conform with MHD Sections M3.11.04, M3.11.05, and M3.11.06 and M3.11.07.
- C. Do not place asphalt when ambient or base surface temperature is less than 40 degrees F or base surface is wet or frozen.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver material in accordance with MHD Section 460.61.
- B. Specific delivery routes have been established for the project and shall be strictly enforced. Failure to adhere to the approved traffic plan could result in a Cease and Desist order from the City of Lowell causing serious project delays and other damages.

### PART 2 PRODUCTS

#### 2.1 PAVEMENT MATERIALS

- A. Bituminous concrete for parking area pavement and patching shall be Class I, Type I-1, furnished in accordance with MHD Section M3, except as may be modified herein.
- B. Bituminous concrete Splash Park pavement shall consist of one finish course of bituminous concrete with a minimum finished pavement depth after rolling of 1.5 inches. Bituminous concrete material shall conform with Table A, Paragraph M3.11.03 of the Standard Specifications, except as amended herein.
- C. Prime coat of bituminous material shall be applied in conformance with MHD Section 460.62. The contractor shall submit the manufacturer's data sheet for both materials for approval prior to placement.



City of Lowell

PROGRESS  
NOT FOR CONSTRUCTION

SPLASH PARK  
ODONNELL PARK  
LOWELL, MA  
PREPARED FOR:  
CITY OF LOWELL

MARK	DATE	DESCRIPTION

PROJECT NO: 14018-00  
FILE NAME: C-101.dwg  
DRAWN BY: RBB  
CHKD BY: GPF  
COPYRIGHT WATERMARK 2010

SHEET TITLE  
SPECIFICATIONS

**C-704**

SHEET 7 OF 9



