MULLIGAN PARK
SPLASH PARK
LOWELL, MASSACHUSETTS

GENERAL NOTES

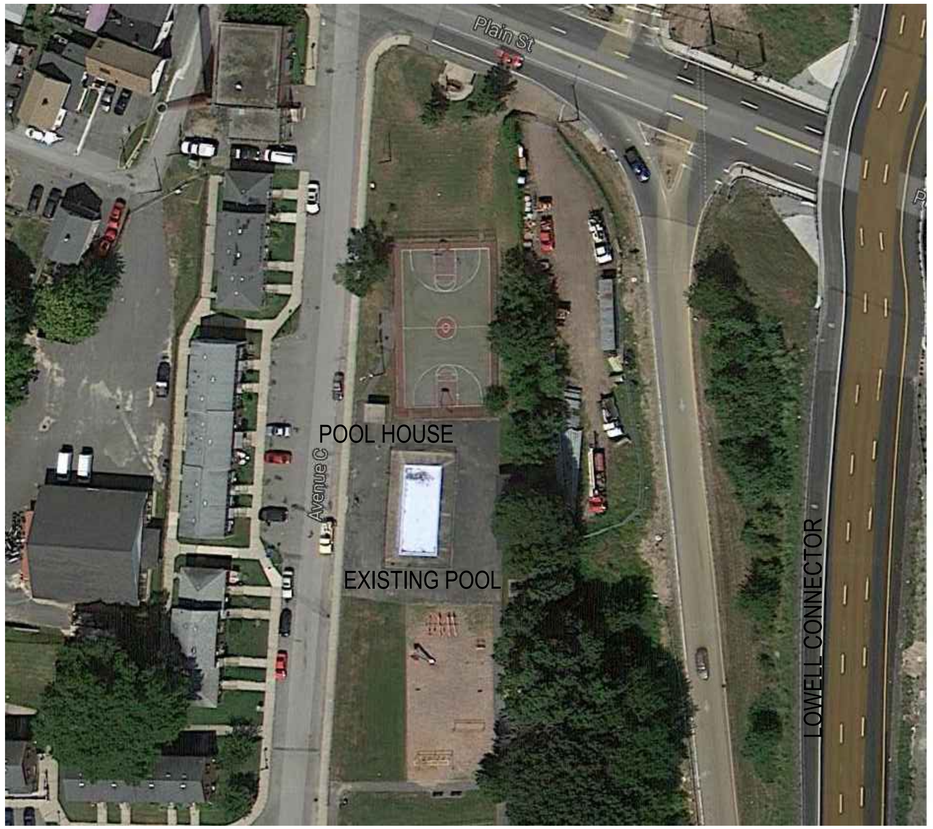
1. ALL FEATURES SHOWN ON C-101 LAYOUT PLAN HAVE BEEN COMPILED FROM PLANS OF RECORD PROVIDED BY THE CITY OF LOWELL. THE CONTRACTOR SHALL VERIFY ALL LOCATIONS AND ELEVATIONS IN THE FIELD PRIOR TO CONSTRUCTION. ANY DISCREPENCIES THAT MAY RESULT IN A CHANGE TO THE CONTRACT SCOPE, FEE OR SCHEDULE SHALL BE 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.



NOT TO SCALE

IMAGE PUBLIC DOMAIN: COURTESY OF GOOGLE

PLAN NORTH

DRAWING LIST

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

City of Lowell

PROGRESS
NOT FOR CONSTRUCTION

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

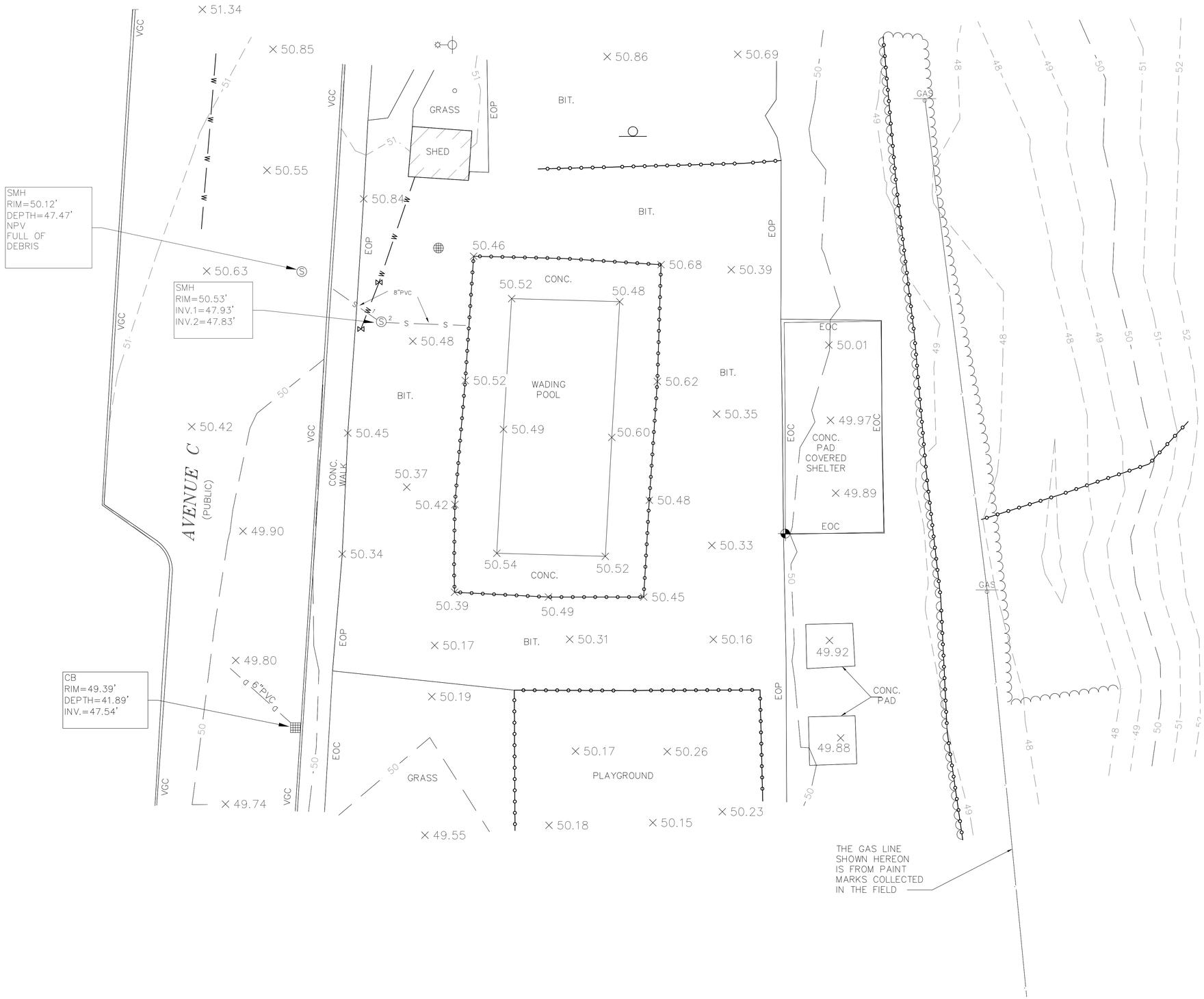
MARK	DATE	DESCRIPTION

PROJECT NO: 15006-00
FILE NAME: G-001.dwg
DRAWN BY: GPF
CHK'D BY: RBB

SHEET TITLE
COVER SHEET

G-001

Plot Date: 4/22/2015 8:59:04 AM File Path:J:\01 Projects\15XXX\15006-00 Mulligan Splash Park Pad\11.0 Working Files\11.1 Drawings\11.1.1 Sheet Files\G-001.dwg



NOTES:

1. CALL DIGSAFE PRIOR TO EXCAVATION ACTIVITIES.
2. VERIFY LOCATION OF PRIVATELY OWNED UTILITIES PRIOR TO EXCAVATION ACTIVITIES.
3. THIS PLAN WAS PREPARED FROM AN ACTUAL ON THE GROUND FIELD SURVEY CONDUCTED BY WSP ON MARCH 19, 2015.
4. THE HORIZONTAL DATUM SHOWN HEREON REFERENCES THE MASSACHUSETTS MAINLAND STATE PLANE COORDINATE SYSTEM (NAD83).
5. THE VERTICAL DATUM SHOWN HEREON REFERENCES THE CITY OF LOWELL VERTICAL DATUM. A CONVERSION OF -54.393' WAS USED TO SHIFT THE VERTICAL VALUES FROM NAVD88 TO THE CITY OF LOWELL VERTICAL DATUM.

UTILITY STATEMENTS:

1. THE LOCATION OF THE UTILITIES AS SHOWN HEREON ARE FROM VISIBLE STRUCTURES LOCATED DURING THE SURVEY. NO SUB-SURFACE UTILITY INVESTIGATION OR RESEARCH WAS DONE AT ANY LEVEL FOR THIS PROJECT. THE ACTUAL LOCATION OF ALL UTILITIES AND UNDERGROUND STRUCTURES SHALL BE CONSIDERED APPROXIMATE AND SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICES OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED.

LEGEND

	ROUND CATCH BASIN
	CATCH BASIN
	SEWER MANHOLE
GAS	GAS LINE POST
	WATER GATE
	GUY WIRE
	UTILITY POLE WITH LIGHT
	TEMP. BENCHMARK
	BASKETBALL RIM
×	SPOT GRADE
BIT	BITUMINOUS CONCRETE
TBM	TEMPORARY BENCHMARK
EOP	EDGE OF PAVEMENT
EOC	EDGE OF CONCRETE
VGC	VERTICAL GRANITE CURB
PVC	POLYVINYL CHLORIDE
INV.	INVERT
NPV	NO PIPES VISIBLE
	CHAIN LINK FENCE
S — S	SEWER LINE
D — D	DRAIN LINE
G — G	PAINTED GAS LINE
	TREE LINE
52	MINOR CONTOURS
50	MAJOR CONTOURS

0 10' 20'
Scale: 1" = 10'-0"

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City of Lowell

PROGRESS
NOT FOR CONSTRUCTION

SPLASH PARK
MULLIGAN PARK
LOWELL, MA

PREPARED FOR:
CITY OF LOWELL

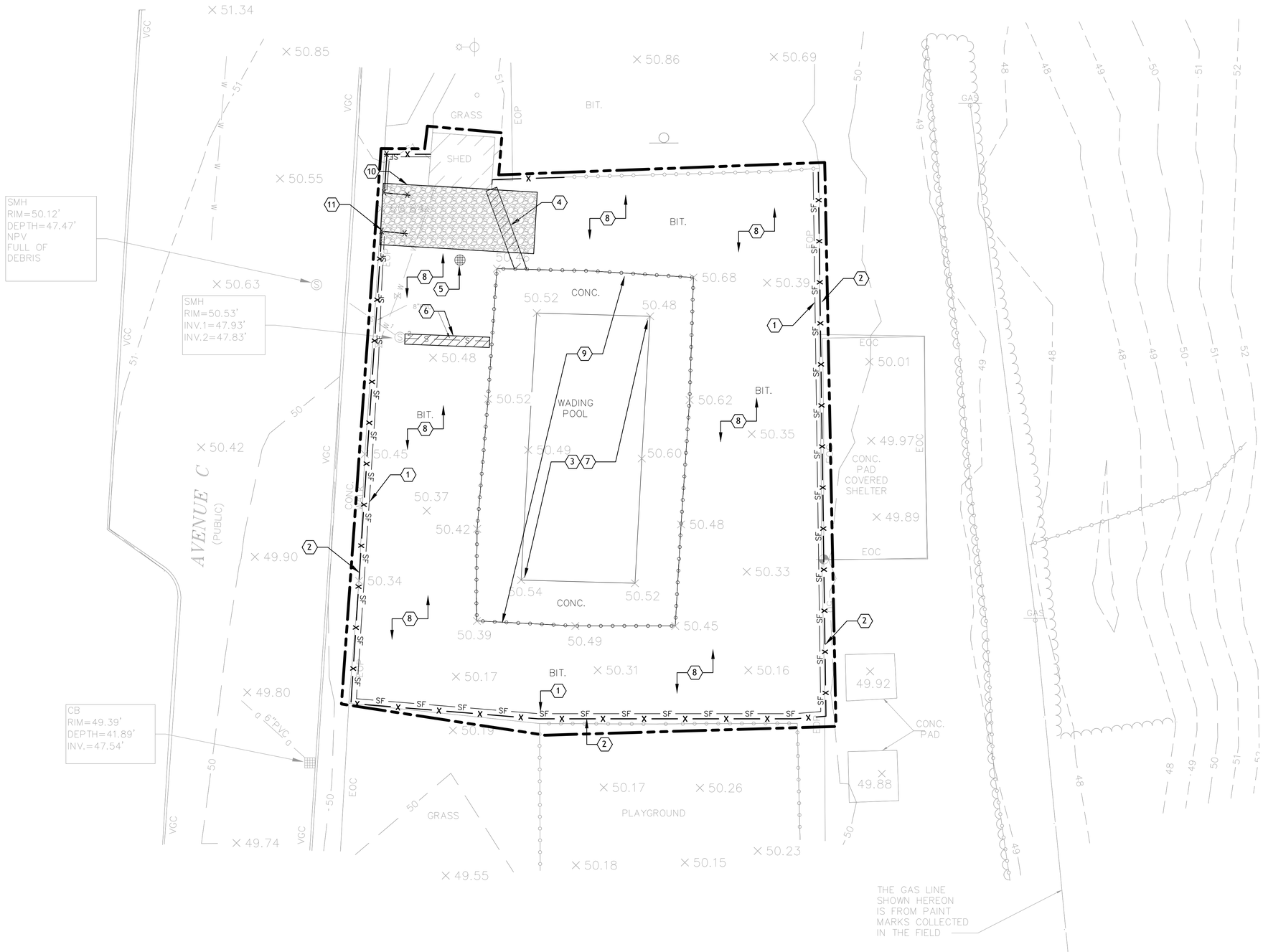
MARK	DATE	DESCRIPTION

PROJECT NO: 15006-00
FILE NAME: C-101.dwg
DRAWN BY: GPF
CHK'D BY: RBB

SHEET TITLE
EXISTING CONDITIONS PLAN

C-101
SHEET 2 OF 10

Plot Date: 4/22/2015 8:59:10 AM File Path: J:\01 Projects\15XXX\15006-00 Mulligan Splash Park Pad\11.0 Working Files\11.1 Drawings\11.1.1 Sheet Files\C-101.dwg



NOTES:

1. CALL DIGSAFE PRIOR TO EXCAVATION ACTIVITIES.
2. VERIFY LOCATION OF PRIVATELY OWNED AND PUBLICLY OWNED UTILITIES PRIOR TO EXCAVATION ACTIVITIES.
3. BACKFILL ALL OPEN EXCAVATIONS BY THE END OF THE WORK DAY EVERY DAY.

KEYNOTES:

1. INSTALL EROSION CONTROL FENCE AS FIRST TASK.
2. INSTALL TEMPORARY CONSTRUCTION FENCE.
3. REMOVE THE ENTIRE CONCRETE WADING POOL STRUCTURE, PIPING AND CHAIN LINK FENCE. RECYCLE ALL SPOILS.
4. REMOVE AND DISPOSE OF ALL UNDERGROUND PIPE AND CONDUIT ASSOCIATED WITH THE EXISTING WADING POOL AND CUT, CAP AND MAKE SAFE.
5. INSTALL TEMPORARY CATCH BASIN INLET PROTECTION.
6. REMOVE AND DISPOSE OF THE EXISTING SEWER PIPE CONNECTED TO THE CONCRETE SWIMMING POOL STRUCTURE BACK TO THE EXISTING SEWER MANHOLE AND CUT AND CAP OUTSIDE THE MANHOLE. INVERT TO BE REUSED. SEE C-104 KEYNOTES 4 AND 5.
7. REMOVE SOIL TO 12 INCHES BELOW THE BOTTOM OF CONCRETE.
8. REMOVE EXISTING BITUMINOUS PAVEMENT. RECYLE ALL SPOILS.
9. REMOVE 6 FT HIGH CHAIN LINK FENCE.
10. INSTALL 4 INCHES OF 3/4 INCH TO 1.5 INCH STONE
11. INSTALL 6 FT HIGH TEMPORARY CHAIN LINK GATE AND LOCK LATCH.

LEGEND

- LIMIT OF WORK
- SF — SILT FENCE
- X — TEMPORARY CONSTRUCTION FENCE

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PROGRESS
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SPLASH PARK
MULLIGAN PARK
LOWELL, MA
PREPARED FOR:
CITY OF LOWELL

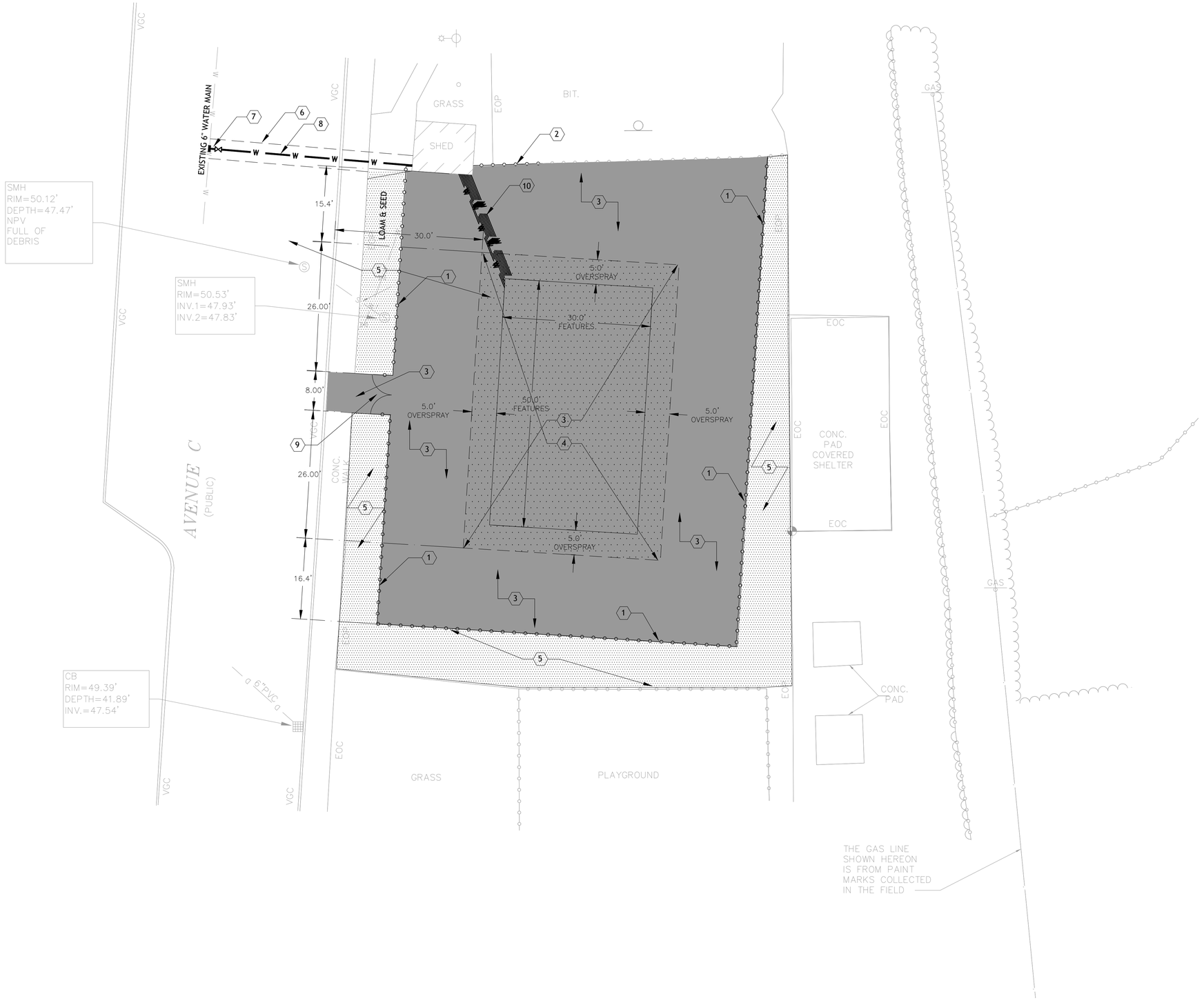
MARK	DATE	DESCRIPTION

PROJECT NO: 15006-00
FILE NAME: C-101.dwg
DRAWN BY: GPF
CHK'D BY: RBB

SHEET TITLE
DEMOLITION & EROSION CONTROL PLAN

C-102
SHEET 3 OF 10

Plot Date: 4/22/2016 8:59:16 AM File Path= J:\01 Projects\15XXX\15006-00 Mulligan Splash Park Pad\11.0 Working Files\11.1 Drawings\11.1.1 Sheet Files\C-101.dwg



NOTES:

1. CALL DIGSAFE PRIOR TO EXCAVATION ACTIVITIES.
2. VERIFY LOCATION OF PRIVATELY OWNED UTILITIES PRIOR TO EXCAVATION ACTIVITIES.
3. THERE IS A 30 INCH WATER MAIN IN CLOSE PROXIMITY TO THE 6 INCH MAIN IN AVENUE C. CONTACT THE LOWELL WATER UTILITY PRIOR TO ANY EXCAVATION ASSOCIATED WITH THE NEW 4" MAIN SERVICE. CONTRACTOR IS RESPONSIBLE FOR ANY AND ALL TRAFFIC DETAIL REQUIRED FOR THE WORK.
4. DO NOT DISCONTINUE WATER SERVICE WITHOUT APPROVAL OF THE CITY OF LOWELL WATER UTILITY, LOWELL HOUSING AUTHORITY AND LOWELL FIRE DEPARTMENT.

KEYNOTES:

1. INSTALL 6 FT CHAIN LINK FENCE. (MATCH EXISTING FABRIC)
2. INSTALL 10 FT CHAIN LINK FENCE. (MATCH EXISTING FABRIC)
3. INSTALL BITUMINOUS CONCRETE PAVEMENT.
4. APPLY NON-SLIP COATING TO NEW ALL NEW PAVEMENT. PROVIDE COLOR SAMPLES FOR SELECTION BY OWNER.
5. LOAM AND SEED
6. SAWCUT PAVEMENT FOR NEW WATER MAIN INSTALLATION.
7. INSTALL NEW 6"X4" TAPPING SLEEVE AND GATE VALVE. INSTALL CITY OF LOWELL APPROVED GATE BOX TO GRADE.
8. INSTALL 4" DIA. CEMENT LINED DUCTILE IRON WATER SUPPLY.
9. INSTALL 6 FT. HIGH CHAIN LINK FENCE GATE WITH LOCKING LATCH AND ANCHOR BAR. (SEE DETAIL)
10. SEE PIPE SCHEDULE FOR HDPE WATER SUPPLY LINES.

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City of Lowell

PROGRESS
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SPLASH PARK
MULLIGAN PARK
LOWELL, MA
PREPARED FOR:
CITY OF LOWELL

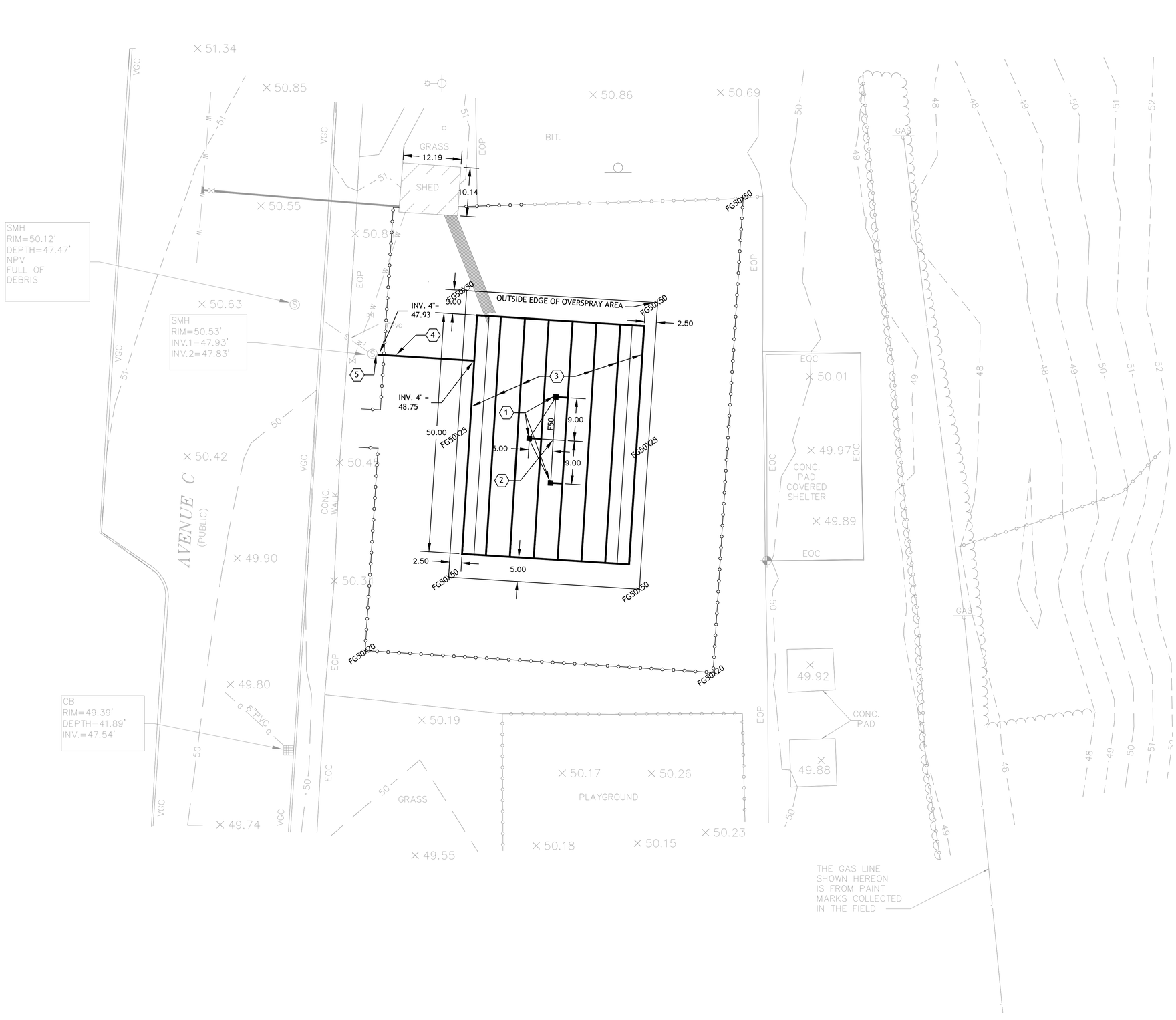
MARK	DATE	DESCRIPTION

PROJECT NO: 15006-00
FILE NAME: C-101.dwg
DRAWN BY: GPF
CHK'D BY: RBB

SHEET TITLE
SITE PLAN

C-103
SHEET 4 OF 10

Plot Date: 4/22/2015 8:59:21 AM File Path: J:\01 Projects\15XXX\15006-00 Mulligan Splash Park Pad\11.0 Working Files\11.1 Drawings\11.1.1 Sheet Files\C-101.dwg



NOTES:

1. CALL DIGSAFE PRIOR TO EXCAVATION ACTIVITIES.
2. VERIFY LOCATION OF PRIVATELY OWNED UTILITIES PRIOR TO EXCAVATION ACTIVITIES.
3. THERE IS A 30 INCH WATER MAIN IN CLOSE PROXIMITY TO THE 6 INCH MAIN IN AVENUE C. CONTACT THE LOWELL WATER UTILITY PRIOR TO ANY EXCAVATION ASSOCIATED WITH THE NEW 4" MAIN SERVICE.
4. THE CITY OF LOWELL DRAINAGE AND SEWERAGE ARE COMBINED IN ONE PIPE AT THIS LOCATION.

KEYNOTES:

1. INSTALL OWNER SUPPLIED W200 CATCH BASIN PER MANUFACTURER'S INSTRUCTIONS. SET ALL RIMS AT ELEV. 50.00.
2. CENTER OF POOL.
3. INSTALL 4" DIA. SCHED. 40 SLOTTED DRAIN PIPE WITH PERIMETER CONNECTED WITH 90° ELBOWS AND INTERIOR LATERALS CONNECTED WITH 90° TEES AND ALL PIPE LAID LEVEL AT ELEVATION 48.00.
4. INSTALL SOLID SCHED, 40 PVC TO EXISTING MANHOLE.
5. INSTALL 4" PVC BACKFLOW FLAP VALVE.

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SPLASH PARK
MULLIGAN PARK
LOWELL, MA

PREPARED FOR:
CITY OF LOWELL

MARK	DATE	DESCRIPTION

PROJECT NO: 15006-00
FILE NAME: C-101.dwg
DRAWN BY: GPF
CHK'D BY: RBB

SHEET TITLE
DRAINAGE & GRADING PLAN

C-104
SHEET 5 OF 10

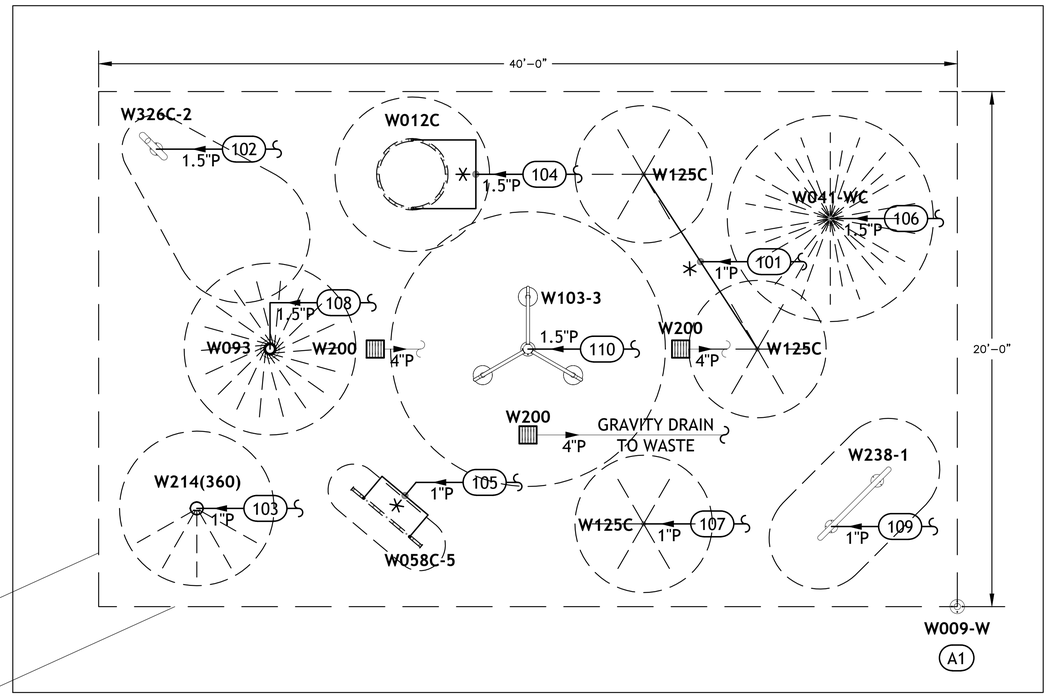
Plot Date: 4/22/2015 8:59:29 AM File Path: J:\01 Projects\15XXX\15006-00 Mulligan Splash Park Pad\11.0 Working Files\11.1 Drawings\11.1.1 Sheet Files\C-101.dwg

DESCRIPTION	QTY
W012C WATER CAGE 4' HIGH 18 GPM @ 3 PSI	1
W041-WC FOUNTAIN ON A STICK WATER CASTLE 4'-6' HIGH - 5'-10' SPREAD 20-40 GPM @ 5 - 8 PSI	1
W058C-5 WATER FENCE 4' HIGH 9 GPM @ 3 PSI	1
W093 WATER WEAVE 4' HIGH - 8' SPREAD 14 GPM @ 2 PSI	1
W103-3 FILL N' SPILL 5-15 GPM @ 6 PSI	1
W125C SIMPLE SPRAY 4' HIGH 3 GPM (9) @ 3 PSI	3
W214(360) TURN-A-ROUND 5 GPM @ 3 PSI	1
W238-1 WATER RING 10 GPM @ 10 PSI	1
W326C-2 MISSION HILL SHOWER 10 GPM @ 8 PSI	1
W009-W TOUCH N' GO WIRELESS	1
W200 PLAIN DRAIN	3

POTABLE MECHANICAL EQUIPMENT	
DSC-0-16-W SEQUENCING CONTROLLER WIRELESS	1
WMFS-10 FLANGED WALL MOUNTED DISTRIBUTION MANIFOLD (5) 1" DISCHARGES & (5) 1.5" DISCHARGES	1
05-0509 PRESSURE REDUCING VALVE 300 GPM MAX @ 20 PSI	1

TOTAL GPM 130

TRENCH FOR INDIVIDUAL WATER FEATURE SUPPLY LINES AND ELECTRIC COHNDUIT FOR WIRELESS CONTROLLER



NOTES:
1. 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.
2. PIPING, CONDUIT, AND WIRE ARE BY INSTALLER.
3. PIPE SIZES ASSUME 100' MAXIMUM RUNS. LONGER RUNS MUST BE EVALUATED BY WATER ODYSSEY. CONTRACTOR RESPONSIBLE FOR VERIFICATION OF PIPE SIZE BETWEEN DISCHARGE MANIFOLD AND FEATURES. VELOCITY NOT TO EXCEED 8FT/SECOND.
4. SYMBOL "*" INDICATES THAT THE TEE MUST BE PLACED IN THE CENTER OF THE PIPING RUN TO ENSURE BALANCED FLOW.
5. WET DECK AREA MUST BE POURED AND FORMED SO THAT WATER SHED AREA SLOPES TOWARD DRAINS.
6. ALL WATER FEATURES ARE TO BE GROUNDED PER THE NFPA 70 ELECTRIC CODE AND APPROVED BY THE CITY OF LOWELL ELECTRICAL INSPECTOR.

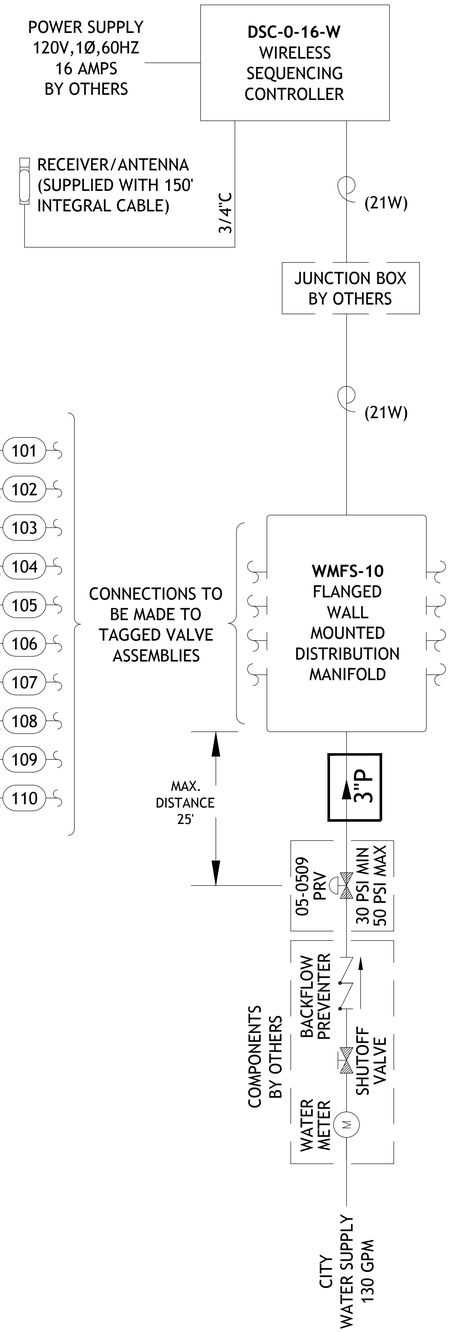
PLAY SCENARIO ZONES

ACTIVATOR LABEL	A1
ACTIVATOR LOCATION	**W009-W** TOUCH N' GO WIRELESS
MANIFOLD VALVE ASSEMBLY LABEL	101
	THRU
	110

PROGRAM NOT SPECIFIED

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

PLAN NORTH



PIPING DIAGRAM 1
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PROGRESS
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SPLASH PARK
MULLIGAN PARK
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MARK	DATE	DESCRIPTION

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DRAWN BY: GPF
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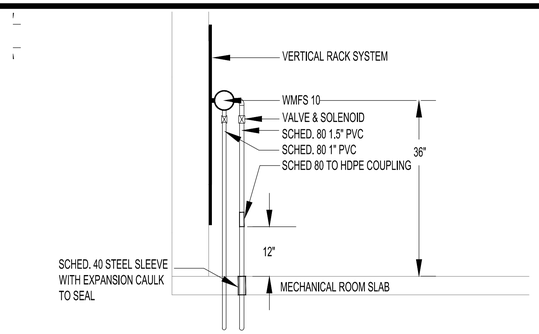
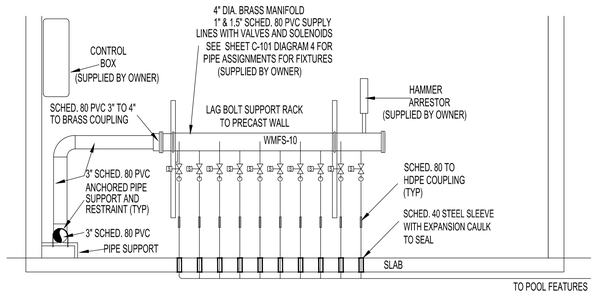
SHEET TITLE
PIPING DIAGRAM

C-105
SHEET 6 OF 10



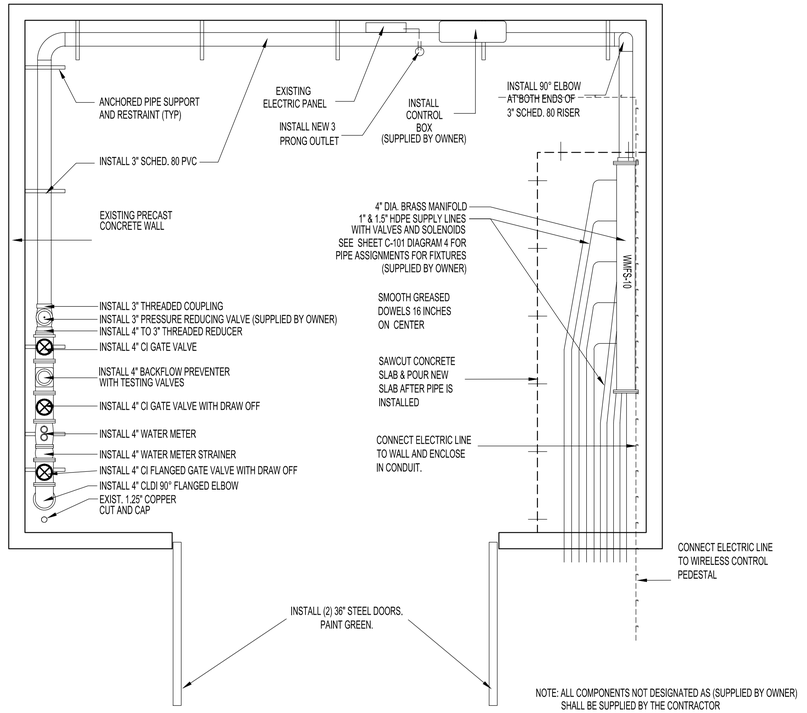
WATER SUPPLY & DISTRIBUTION SECTION

NTS



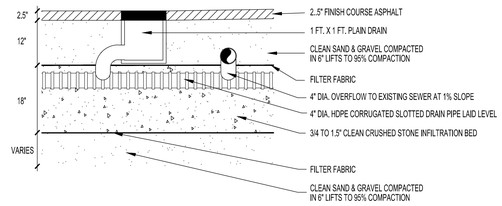
MANIFOLD INTERIOR ELEVATION

NTS



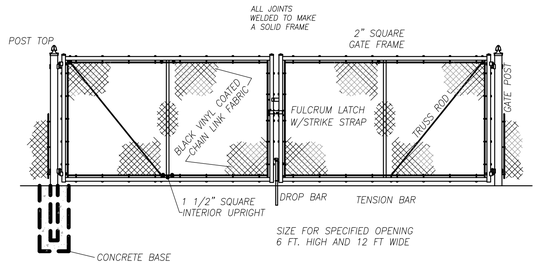
PUMP HOUSE FLOOR PLAN

NTS



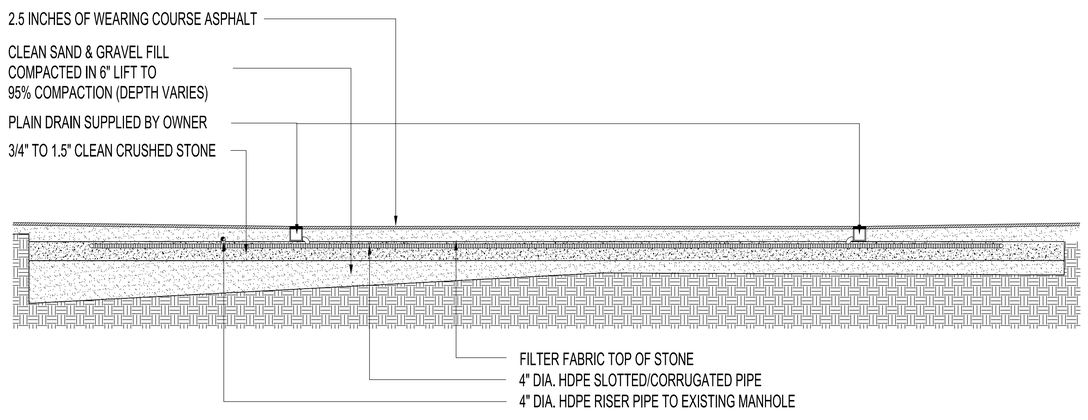
INFILTRATION SYSTEM DETAIL

NTS



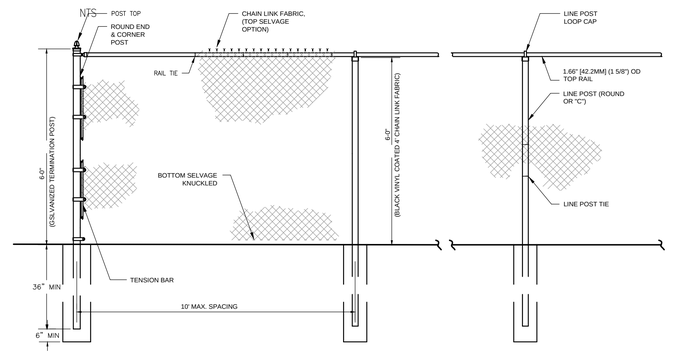
CHAIN LINK GATE DETAIL

NTS



INFILTRATION SYSTEM BELOW SPLASH PAD

NTS

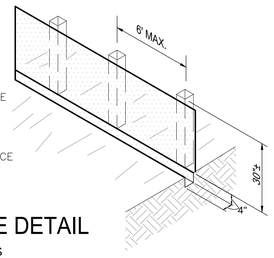


CHAIN LINK FENCE DETAIL

NTS

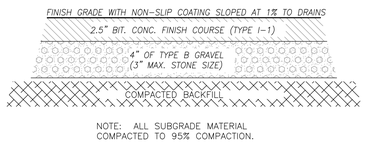
NOTES:

1. SET POSTS AND EXCAVATE A 4" x 4" TRENCH UPSLOPE ALONG THE LINE OF POSTS.
2. STAPLE WIRE FENCING TO THE POSTS.
3. ATTACH THE FILTER BARRIER FABRIC TO THE WIRE FENCE AND EXTEND IT INTO THE TRENCH.
4. BACKFILL AND COMPACT THE EXCAVATED SOIL.



SILT FENCE DETAIL

NTS



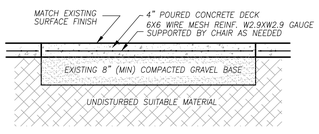
NOTE: ALL SUBGRADE MATERIAL COMPACTED TO 95% COMPACTION.

PAVED SPLASH PAD DETAIL

NTS

TRENCH DETAIL

NTS

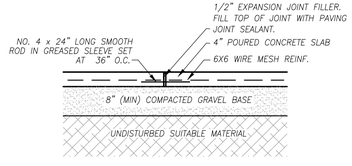


PROVIDE CONTROL JOINTS TO MATCH EXISTING PATTERN AND EXPANSION JOINTS TO MATCH EXISTING PATTERN

NOTE: ALL SUBGRADE MATERIAL COMPACTED TO 95% COMPACTION.

CONCRETE SLAB DETAIL

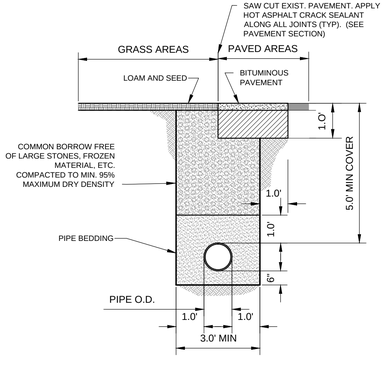
NTS



MATCH EXISTING EXPANSION JOINT LAYOUT

CONCRETE SLAB EXPANSION JOINT DETAIL

NTS



TRENCH DETAIL

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SPLASH PARK
MULLIGAN PARK
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PREPARED FOR:
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MARK	DATE	DESCRIPTION

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DRAWN BY: GPF
CHK'D BY: RBB
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SHEET TITLE
DETAILS

C-501
SHEET 7 OF 10

SECTION 09 90 00

PAINTING AND COATING

PART 1 GENERAL

1.1 SCOPE

A. Section includes surface preparation and field application of non-slip pavement surface paint/coating.

1.2 SUBMITTALS

A. Product Data: Submit data on finishing products.

B. Submit Material Safety Data Sheets (MSDS) for all materials to be kept on site by construction superintendent.

C. Decorative pattern design and color scheme.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Conform to regulatory restrictions of certain types or categories of paint materials and VOC regulatory requirements. All materials and applications must comply with 310 CMR 7.25.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Store, apply, and dispose of materials in environmental conditions required by manufacturer's instructions.

B. Do not dispose of any materials in building drains.

C. Provide adequate ventilation as recommended by manufacturer and required by regulation.

PART 2 PRODUCT

2.1 PAINTS AND COATINGS

A. Paint/coatings shall be a decorative non slip coating by Superior Industries, Inc. or approved equal. The paint/coating shall be approved for exterior application on cured asphalt pavement and available in multiple colors.

2.2 COMPONENTS

A. Accessory Materials: Refer to selected manufacturer's recommendations.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine the entire surface scheduled for priming and painting and confirm that the surface is ready to receive Work. Verify asphalt curing requirement for selected product.

B. Measure moisture content of porous surfaces using electronic moisture meter. Do not apply finishes unless moisture content is less than 15 percent.

3.2 PREPARATION

A. Correct minor defects and clean surfaces affecting work of this section.

B. Asphalt Pavement: Remove foreign matter. Remove oil and grease with solution of tri-sodium phosphate, rinse well and allow to dry.

3.3 APPLICATION

A. Roll, brush or spray per manufactures recommendations. Protect all adjacent structures, concrete deck, fencing, equipment and landscaping from spills, splashes, drips and spray.

B. Cleaning: As work proceeds, promptly remove finishes where spilled, splashed, or spattered.

3.4 SCHEDULE - EXTERIOR SURFACES

A. Splash Park Cured Asphalt Pavement:

1. Primer: Apply primer approved for asphalt paving, if required by manufacturer. A primer coat is not required for approved products that note asphalt surfaces as self-priming.
2. Finished splash park pedestrian surface shall be painted with a decorative multi-colored, non-slip pattern or design approved by the owner. The design will include at least three colors.
3. 2nd Coat: Skid Guard 100 by Superior Industries, Inc., or equal.
4. 3rd Coat: Skid Guard 100 by Superior Industries, Inc., or equal.

END OF SECTION

SECTION 22 11 13
FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Submittals
B. References
C. Summary
D. Quality Assurance
E. Warranty
F. Workmanship

1.2 SUBMITTALS:

A. Product Data
1. The Contractor shall supply Shop Drawings and Product Data comprising engineering design sheets and/or specifications of the piping as supplied by the piping manufacturer. The Product Data shall contain, at a minimum, the engineering specifications of the piping, the manufacturer and the location of fabrication. In addition, the Contractor shall provide the following Product Data: welding (fusion) specifications for approval, weld procedure qualifications and welder qualifications.
2. Manufacturer shall have a written specification for all standard fittings which establishes Quality Control criteria and tolerances. The manufacturer shall certify that materials used to manufacture the piping meet the requirements of this specification.

B. Installation Instructions

1.3 REFERENCES:

A. American Society of Mechanical Engineers (ASME).
1. ASME B31.3 - Process Piping.

B. American Society of Testing Materials (ASTM).
1. ASTM D3035-95 Standards Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
2. ASTM D3261-03 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
3. ASTM D3350-96 Standard Specification for Polyethylene (PE) Plastic Pipe and Fittings.
4. ASTM F714-97 Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
5. ASTM D1785-06 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
6. ASTM D2467 -13a Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
7. ASTM F477-07 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

C. American Water Works Association (AWWA).
1. AWWA C906 Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4" Through 63" for Water Service.

D. Plastics Pipe Institute (PPI).
1. PPI Handbook of Polyethylene Piping - Inspections, Tests and Safety Considerations, 1999.
2. PPI TR-31 - Underground Installation of Polyolefin Piping, Section 7, System Testing.

E. National Sanitation Foundation
1. NSF Standard 14 - Plastic Piping Components and related materials.

1.4 SUMMARY:

A. Summary of facility distribution pipe network:
1. The new water supply piping shall be 3-inch Schedule 80 polyvinyl chloride (PVC) pipe and 4-inch cement lined ductile iron (CLDI).
2. All above ground distribution piping shall be 3-inch, 1-inch or 1.5-inch Schedule 80 PVC pipe. The diameter of the pipe shall be dictated by the requirement of the individual pipe of equipment. See Sheet C-501 for details and layout.
3. All new subsurface distribution piping shall be 1-inch or 1.5-inch high density polyethylene (HDPE) piping, SDR 11. The diameter of the pipe shall be dictated by the requirement of the individual pipe of equipment. See Sheet C-105.
4. All Schedule 80 (3 or 4) -inch or larger pipe and pipe fittings shall be joined by flanges.
5. All Schedule 80 2-inch or smaller PVC pipe and pipe fittings shall be joined be threaded connections.
6. Socket welded PVC pipe and fittings shall only be used with the approval of the Engineer or Owner.
7. All subsurface HDPE piping shall be continuous runs with no fittings, where possible.
8. Subsurface HDPE piping that requires fittings shall be butt fusion or electrofusion fittings, as approved by the Engineer.
9. Contractor shall install an isolation valve between the PVC and HDPE transition, as shown in the Drawings.

1.5 QUALITY ASSURANCE:

A. Quality control, inspection procedures, and reports shall be considered part of the submittal package.

1.6 WARRANTY:

A. The Contractor shall provide a warranty for all piping for a period 12 months from date of installation or a period of 18 months from date of delivery, whichever is more stringent.

1.7 WORKMANSHIP:

A. All foreign material/debris shall be kept out of the system during construction.

B. At the conclusion of the work, thoroughly clean the entire piping by flushing with water or other means to remove all dirt, stones, pieces of wood, or other material, which may have entered during the construction period. All debris shall be removed from the pipeline. The lowest segment outlet shall be flushed last to ensure debris removal.

C. Workmanship shall be first quality and in accordance with the best practices of the trade. Only workmen skilled in the tasks assigned to them shall be employed.

PART 2 - PRODUCTS

2.1 SECTION INCLUDES:

A. Piping Materials
B. Pipe Fittings
C. Gate Valves

2.2 PIPING MATERIALS:

A. High Density Polyethylene Piping
1. The subsurface piping, as shown in the Drawings, Shall be constructed of high density polyethylene (HDPE) grade PE3408/3608 resin.
2. Pipe shall be manufactured from a PE 3408/3608 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material will meet the specifications of ASTM D3350-99 with a cell classification of PE:345464C. Pipe shall have a manufacturing standard of ASTM F714.
3. Pipe shall be SDR 11 (160 psi) unless otherwise specified on the Drawings.
4. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material.
5. HDPE Piping shall be provided by ISCO Industries, LLC or equivalent, as approved by the Engineer.

B. Polyvinyl Chloride Piping
1. All PVC Schedule 80 pipe shall be manufactured from a Type I, Grade I Polyvinyl Chloride (PVC) compound with a Cell Classification of 12454 per ASTM D1785.
2. The pipe shall be manufactured in strict compliance to ASTM D1785 and D2665 (where applicable), consistently meeting and/or exceeding the Quality Assurance test requirements of these standards with regard to material, workmanship, burst pressure, flattening, and extrusion quality.
3. The pipe shall be manufactured in the USA, using domestic materials, by an ISO 9001 certified manufacturer.
4. All pipe shall be stored indoors after production at the manufacturing site until shipped from factory.
5. This pipe shall carry the National Sanitation Foundation (NSF) seal of approval for potable water applications.
6. PVC pipe shall be manufactured by Charlotte Pipe and Foundry Company or equivalent, as approved by the Engineer.

C. Cement Lined Ductiled Iron Pipe and Fittings
1. The Contractor shall furnish, lay, joint, test and disinfect all ductile iron pressure pipe, fittings (including special castings, if any) and appurtenant materials and equipment, all as indicated on the drawings and as herein specified.
2. All joints in buried exterior pipelines shall be either push-on joints or mechanical joints, except as indicated otherwise on the drawings.
3. All joints on bends, gates, and castings will be mechanical.
4. All pipe, fittings, and accessories shall conform with the requirements of MHD M5.05.1, M5.06.0, M5.05.3 and M9.11.0 for water pipe fittings, cast iron, copper pipe and tubing, and cement lined ductile iron.
5 Warning tape. See submittals.
6. All pipe shall be designed in accordance with the above mentioned standards, and shall be manufactured in accordance with the AWWA Standards listed in the Reference Section of this specification.
7. Pipe for use with sleeve type couplings shall be as specified above except that the ends shall be plain (without bells or beads). The ends shall be cast or machined at right angles to the axis.
8. Fittings shall conform with the requirements of the above sq. in. Unless otherwise indicated or specified, fittings shall be all bell fittings.
9. Where it is necessary to joint pipe of different type, the Contractor shall furnish and install the necessary adapters. Adapters shall have ends, conforming with the above specifications for the appropriate type of joint, to receive the adjoining pipe. Adapters joining two classes of pipe may be of the lighter class provided that the annular space in bell-and-spigot type joints will be sufficient for proper jointing.
10. Couplings for buried pipe shall be of cast iron and shall be Dresser Style 53, Rockwell Style 431, Baker Allcast, or approved equal products. The couplings shall be provided with galvanized steel bolts and nuts.
11. Couplings shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
12. All pipe and fittings shall be lined and coated as specified below.
13. The inside of pipe and fitting shall be given a cement lining and bituminous seal coat in accordance with A 21.40. Particular care shall be used to insure proper bonding of the seal coat. Lining shall be double thickness.
14. The outside of pipe and fittings shall be coated with the standard bituminous coating specified under the appropriate American Standard Specification for the pipe and fittings, or use a polyethylene encasement system conforming with AWWA C105/A21.50.
15. Care shall be taken in handling and laying pipe and fittings to avoid damaging any part of the pipe or fittings.
16. Any fitting or pipe showing a crack and any fitting or pipe which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work site.
17. Except as otherwise approved, all cutting shall be done with a machine having rolling wheel cutters, or a mechanical saw. All cut ends shall be examined for possible cracks caused by cutting.
18. Cut ends to be used with push-on joints shall be carefully chamfered to prevent cutting the gasket when the pipe is laid or installed.
19. Each pipe and fitting shall be cleared of all debris, dirt, etc., before being laid and shall be kept clean until accepted in the complete work.
20. Pipe and fittings shall be laid accurately to the lines and grades indicated on the drawings or as required. The deflection of alignment at a joint shall not exceed the appropriate permissible deflection as specified in the tabulation titled PIPE DEFLECTION ALLOWANCES.

PIPE DEFLECTION ALLOWANCES

Maximum permissible deflection, in.*

Size of Pipe, in.	Push-on joint	Mechanical Joint
4	17	28
6	17	24
8	17	18
10	17	18
12	17	18
14	10	12
16	10	12

*Maximum permissible deflection f or 18 ft. length; maximum permissible deflections for other lengths shall be in proportion of such lengths to 18 ft.

2.3 PIPE FITTINGS:

A. HDPE Pipe Fittings
1. Butt Fusion Fittings - Fittings shall be PE3408/3608 HDPE, Cell Classification of 345464C as determined by ASTM D3350-99. Butt Fusion Fittings shall have a manufacturing standard of ASTM D3261. Molded and fabricated fittings shall have the same pressure rating as the pipe unless otherwise specified on the Drawings. Fabricated fittings are to be manufactured using a Data Logger. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the quality control records.
2. Electrofusion Fittings - Fittings shall be PE3408/3608 HDPE, Cell Classification of 345464C as determined by ASTM D3350-99. Electrofusion Fittings shall have a manufacturing standard of ASTM F-1055. Fittings shall have the same pressure rating as the pipe unless otherwise specified on the Drawings.
3. Flanged and Mechanical Joint Adapters - Flanged and Mechanical Joint Adapters shall be PE 3408/3608 HDPE, Cell Classification of 345464C as determined by ASTM D-3350. Flanged and Mechanical Joint Adapters shall have a manufacturing standard of ASTM D-3261. Fittings shall have the same pressure rating as the pipe unless otherwise specified on the Drawings.
4. HDPE fittings shall be provided by ISCO Industries, LLC or equivalent, as approved by the Engineer or Owner.

B. PVC Pipe Fittings
1. PVC fittings shall be manufactured from PVC compound with a cell class of 12454 per ASTM D-1784 and conform with National Sanitation Foundation (NSF) standards 14 and 61.
2. PVC fittings shall be iron pipe size (IPS) conforming to ASTM D-2466.
3. PVC fittings to be produced by a single manufacturer.
4. Solvent cements shall conform to ASTM D-2564, primer shall conform to ASTM F-656.
5. PVC pipe fittings shall be manufactured by Charlotte Pipe and Foundry Company or equivalent, as approved by the Engineer or Owner.

2.4 STREET CONNECTION GATE VALVES :

Below grade gate valves shall be 4-inch Mueller (or approved equal) approved by the City of Lowell Water Department.equal.

A. Cast Iron gate valves shall be 4-inch and shall be in conformance with MHD Section 301.60
1. Materials and Construction Methods - The Contractor shall furnish, set, set, joint, test and disinfect all valves, including valve boxes and all incidental work thereto as herein specified. The valves shall conform to AWWA Standard for Resilient-Seated Gate Valves, Designation C509. Gate Valves shall open right. Resilient-Seat gate valves shall have a valve body with 100 percent holiday-free epoxy coating in the waterway. The valve coating shall conform to AWWA Standards for Protective Interior Coatings for Valves and Hydrants, Designation C550, and AWWA Standard for Fusion Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines, Designation C213, insofar as applicable.
2. Each buried valve shall be provided with a valve box. Valve boxes shall be of rough, even-grained cast iron and of the adjustable, slip, heavy pattern. type. They shall be designed and constructed so as to prevent the direct transmission of traffic loads to the pipe or valve. The upper or sliding section of the box shall be provided with a flange having sufficient bearing area to prevent undue settlement. The lower section of the box shall be designed to enclose the operating nut and stuffing box of the valve and fit over the gate valve bonnet or butterfly valve operator. The boxes shall be adjustable through at least 6 inches. vertically without reduction of the lap between sections to less than 4 inches.
3. The inside diameter of the boxes shall be at least 5.5 inches and the length shall be as necessary for the depth of the valves with which the boxes are to be used.
4. Covers shall be close fitting and substantially dirt tight. The top of the cover shall be flush with the top of the box rim.
5. Gates and gate boxes shall be set in the pipe lines as indicated and specified. All valves shall be carefully erected and supported in their respective positions free from all distortion and strain. Care shall be taken to prevent damage or injury to the valves or appurtenances during handling and installation. Care shall be taken to see that the spigot ends are securely seated in the bell ends. Each gate shall be tightly closed before being placed in the line and shall remain so until the joints on each side are completely made. Gate boxes shall be set for all gates. Valve boxes shall be set plumb and centered over the valve operating nut. They shall be carefully fitted together and to the gate and securely held during backfilling. The earth around them shall be thoroughly tamped in place and the cover set to the finish grade.
6. All materials shall be carefully inspected for defects in workmanship and materials, all debris and foreign material cleaned out of valve opening and seats, all operating mechanisms operated to check their proper functioning, and all nuts and bolts checked for tightness. Valves and other equipment which do not operate easily or are otherwise defective shall be repaired or replaced at the Contractor's expense.

2.5 PUMP HOUSE GATE VALVES, METER AND BACKFLOW PREVENTER :

A. Cast Iron gate valves shall be Wilkins 4-inch and shall be in conformance with MHD Section 301.60

B. Cast Iron backflow preventer shall be Wilkins 4-inch or approved equal.

C. Cast iron Water meter and strainer assembly shall be Neptune 4 equipped for remote meter reading attachments. Meter reading instrument will be installed by the City of Lowell Water Utility.

D. All gate valves shall have draw offs installed.

PART 3 - EXECUTION

3.1 SECTION INCLUDES:

B. General
C. Hauling, Unloading, and Distributing Pipe
D. Inspection
E. Installation
F. Pipe Leak Testing
G. Valve Installation

3.2 GENERAL:

A. Pipe and Fittings
5. The materials of construction for the piping shall be as indicated on the Drawings.
6. The size of piping shall be as indicated on the Drawings.
7. The installation of piping shall be in accordance with manufacturer's recommendations.

3.3 HAULING, UNLOADING AND DISTRIBUTING PIPE:

A. During loading, transportation and unloading, every precaution shall be taken to prevent injury to the pipe. No pipe shall be dropped from cars or trucks, or allowed to roll down slides without proper retaining ropes.

B. The ends of all sections of pipe shall be appropriately capped from shipment and shall remain capped until immediately prior to joining. If sections of piping remain exposed during non-work hours, the ends shall be appropriately secured to prevent easy access.

C. During transportation each pipe shall rest on suitable pads, strips, skids or blocks securely wedged or tied in place.

D. Each pipe length shall be inspected before being laid to verify that it is not cracked or otherwise damaged. Any pipe damaged shall be replaced by the Contractor, at no additional cost to the Owner.

3.4 INSPECTION:

A. The Contractor shall inspect all pipes for defects before installation and joining.

B. Defective, damaged or unsound pipe will be rejected.

3.5 INSTALLATION:

A. HDPE Pipe Installation
1. The Contractor shall join sections of HDPE pipe into continuous lengths on the jobsite above ground.
2. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements of 400 degrees Fahrenheit, alignment, and an interfacial fusion pressure of 75 PSI. The butt fusion joining will produce a joint weld strength equal to or greater than the tensile strength of the pipe itself.
3. All field welds shall be made with fusion equipment equipped with a Data Logger. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the Quality Control records.
4. Sidewall fusions for connections to outlet piping shall be performed in accordance with HDPE pipe and fitting manufacturer's specifications. The heating irons used for sidewall fusion shall have an inside diameter equal to the outside diameter of the HDPE pipe being fused. The size of the heating iron shall be ¼ inch larger than the size of the outlet branch being fused.
5. Mechanical joining will be used where the butt fusion method cannot be used. Mechacnical joining will be accomplished by either using a HDPE flange adapter with a ductile iron back-up ring or HDPE mechanical joint adapter with a ductile iron back-up ring.
6. Socket fusion, hot gas fusion, threading, solvents, and epoxies will not be used to join HDPE pipe.

B. PVC Pipe Installation
1. Installation shall comply with the latest installation instructions published by manufacturer and shall conform to all local plumbing, building, and fire code requirements.
2. All PVC socket welded piping shall be jointed with solvent cement. Solvent cement joints shall be made in a two step process with primer manufactured for thermoplastic piping systems and solvent cement conforming to ASTM D 2564.
3. The system shall be protected from chemical agents, fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agents not compatible with PVC compounds.
4. All PVC piping shall be cut square to avoid joint failure. Following the cut, the Contractor shall removal all burrs from the piping and chamfer the edge 10 to 15 degrees.
5. The Contractor shall use a primer compliant with ASTM F 656 shall be used prior to cementing on both the pipe and fitting.
6. The Contractor shall use cement compliant with ASTM D 2564 for joining the pipe and fitting. The cement shall be applied to both the outside of the pipe and inside of the fitting in an even and continuous layer.
7. Joint Setting and Curing Times:

Recommended Initial Joint Set Time

Temperature Range	Pipe Sizes ½" to 1 1/4"	Pipe Sizes 1 ½" to 3"	Pipe Sizes 4" to 8"	Pipe Sizes 10" to 16"
60° - 100° F	15 min	30 min	1 hr	2 hr
40° - 60° F	1 hr	2 hr	4 hr	8 hr
0° - 40° F	3 hr	6 hr	12 hr	24 hr

Recommended Curing Time Before Pressure Testing

Relative Humidity (60% or Less*)	Cure Time Pipe Sizes ½" to 1 1/4"		Cure Time Pipe Sizes 1 ½" to 3"		Cure Time Pipe Sizes 4" to 8"		Cure Time Pipe Sizes 10" to 16"
Temperature Range During Assembly and Cure Period	Up to 180 psi	Above 180 psi to 370 psi	Up to 180 psi	Above 180 psi to 315 psi	Up to 180 psi	Above 180 psi to 315 psi	Up to 100 psi
50° - 100° F	1 hr	6 hr	2 hr	12 hr	6 hr	24 hr	24 hr
60° - 80° F	2 hr	12 hr	4 hr	24 hr	12 hr	48 hr	48 hr
0° - 40° F	8 hr	48 hr	16 hr	96 hr	48 hr	8 day	8 day

*For relative humidity above 60%, allow 50% more cure time.

Watermark
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City of Lowell

PROGRESS
NOT FOR CONSTRUCTION

SPLASH PARK
MULLIGAN PARK
LOWELL, MA

PREPARED FOR:
CITY OF LOWELL

MARK	DATE	DESCRIPTION

PROJECT NO: 15006-00
FILE NAME: C-700.dwg
DRAWN BY: RBB
CHK'D BY: GPF
COPYRIGHT WATERMARK 2010

SHEET TITLE
SPECIFICATIONS

C-701
SHEET 9 OF 10

3.6 PIPE LEAK TESTING:

A. CLDI, HDPE and PVC Pipe Leak Testing

1. The Contractor shall test the integrity of the piping using an appropriate hydrostatic testing method.
2. Water shall be the medium used for the hydrostatic test. The hydrostatic testing method must conform to the standard American Water Works Association (AWWA) standard C906 and guidelines set forth by the Plastics Pipe Institute (PPI) Handbook of Polyethylene Pipe. The hydrostatic test shall test pressures 1-½ times the design pressure of the pipe in accordance with ASME B31.3 or 2-½ times the expected normal operating pressure, but not less than 15 psig.
3. The Contractor shall fill the piping with water and bleed all air from the high point in the piping.
4. Once the piping is pressurized, the pressure must remain within 5 percent of the initial pressure for a 5 minute period to be considered leak free.
5. If the piping fails the tightness test, or where there is evidence of piping failure, the Contractor shall repair to the satisfaction of the Engineer and Owner. The cost of locating the leaking/defective piping section and/or joint and the cost of making the necessary repairs shall be borne solely to the Contractor.
6. Each complete section of pipe shall be tested upon completion of the entire piping and backfilling process.
7. After the completion of each tightness test, the Contractor shall provide copies of all field logs and documentation of the tightness test to the Engineer and Owner.

3.7 VALVE INSTALLATION:

A. Valve installation shall be in full compliance with manufacturer specifications and be pressure tested by Contractor.

END OF SECTION

SECTION 31 00 00
EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY SCOPE

A. All earthwork and related items including, but not limited to:
1. Trenching, excavating, and backfilling for utilities;
2. Backfilling and compacting required for drainage pipe;
3. Backfilling concrete pool and installation of infiltration bed;
4. Backfilling and compacting under all pavements and concrete decking;
5. Excavation and backfilling water supply and distribution.
6. Saw cutting and removal of pavement and concrete.

B. Shoring, sheeting, and bracing.

C. Providing, placing, and compacting fill materials and/or removal of excess or unsuitable material.

D. CLASSES OF EXCAVATION
1. Unclassified Excavation: Removal of materials regardless of the nature of the material encountered, the moisture content thereof, and the type of equipment required for excavating; and the disposal of excavated materials not required or suitable for backfill.
2. Earth Excavation:
   a. Water Distribution: Removal of material associated with the construction of trenches for water distribution lines.
3. Rock Excavation: Not Used
4. Borrow Excavation: Obtaining and transporting to the job site suitable materials for the backfill, embankment, and subgrade, where sufficient suitable backfill is not available from excavation.
5. Trench Excavation: Class A Trench Excavation: Removal and satisfactory disposal of materials for the construction for all structures and piping associated with the installation of utilities and drainage. Class A trench excavation does not include the removal of materials classified as salvaged topsoil, rock, pulverized pavement, and concrete or muck excavation.
6. Saw Cutting Concrete - Saw cut existing concrete decking to excavate trench for splash park water distribution lines, new concrete decking and backfill as required.
7. Embankment: Not Used
8. Salvaging Topsoil: Not Used
9. Fine Grading and Compacting: Grading, shaping and compacting of excavations, backfill, embankments and original ground upon which pavement, surfacing, base, sub base, or structures are to be placed.

E. Comply with all regulations and laws of the authorities having jurisdiction. Provide all labor, materials, equipment, and services required for compliance.

F. Obtain and pay for all necessary permits. Submit two (2) copies of all permits obtained at least one week prior to contacting Dig Safe, and start of earthwork activities.

G. Comply with all safety provisions required by OSHA and Commonwealth of Massachusetts including, but not limited to, 19 CFR Part 1926: Occupational Safety and Health Standards - Excavations, and 520 CMR 14.00: Excavation and Trench Safety..

H. Comply with provisions of the "Manual for Accident Prevention in Construction" of the Associated General Contractors of America.

I. Do not close or obstruct any public road or right of way without proper permits; obtain and pay for police detail if required for work in the public way.

1.2 REFERENCES

A. Commonwealth of Massachusetts, Massachusetts Highway Department Standard Specification for Highways and Bridges (MHD).

B. Massachusetts Department of Environmental Protection Division of Water Supply, "Erosion and Sedimentation Control Guidelines".

C. The following American Society for Testing and Materials (ASTM) standards area applicable to the work of this section:
Moisture Density Relationship: ASTM D1557
(Modified Proctor):
Relative Density: ASTM D2049.
In-Place Density: ASTM D6938.
Liquid Limit: ASTM D423.
Plastic Limit & Plasticity Index: ASTM D424.
Percentage of Wear: ASTM C131 or C535 as applicable.
Sieve Analysis: ASTM D422.
Percent Passing No. 200 Sieve: ASTM D1140

1.3 SUBMITTALS

A. Backfill Materials: Submit a representative sample of sand and gravel backfill and infiltration bed stone. Additional samples and analysis shall be submitted if a change in material occurs at the borrow source.

B. Excavation and Excavation Support Plan: Contractor must be properly licensed for trench excavation work in Massachusetts. Submit a written statement of the methods that will be used to prevent any trench failure that may jeopardize the existing concrete decking or structures adjacent to the work.

C. Within one week of making field adjustments, resubmit revised working drawings necessary to reflect changes required by field conditions.

1.4 QUALITY ASSURANCE

A. Testing and Inspections: The suitability of the material will be determined by the testing standards identified in Paragraph 3 above. Sampling, testing and approval of materials shall be by an independent geotechnical testing firm as described below. Allow a minimum of two weeks for notification and approval of material source.

B. Tolerances:
   a. Construct finish surfaces to tolerances required Massachusetts Specifications for Highways and Bridges, latest edition.
   b. Maintain moisture content of fill material as it is being placed within plus or minus 2% of the optimum moisture content of the material as determined by the laboratory tests specified.

C. LAYOUT AND GRADES
1. Maintain and/or re-establish benchmarks and survey monuments for construction control.
2. Contractor shall be responsible for establishing and maintaining all lines and grades as required constructing the work properly, and certifying the accuracy of the "as built" Record Drawings.
3. Establish finish grades by uniform slope between elevations shown on drawings. Spot elevations shall govern over proposed contours. Uniformly grade between proposed contours and existing grades unless otherwise noted.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery
1. The project is located in a school zone. The contractor shall obtain the approval of the Lowell Department of Public Works and School Department for hauling routes and construction related parking.

B. Storage
1. Stockpile areas must be approved by the owner prior to placement.
2. Stockpiles shall be ringed with hay bales to prevent siltation.
3. Stockpiled soils shall be stabilized by hydro seeding or other applicable methods to prevent erosion, siltation and dust.

C. Handling
1. If questionable soils are encountered, the Contractor shall notify the Engineer immediately. The handling of hazardous soils may only be done by trained construction workers who can present their credentials for such work.

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

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 exposed 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.

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 to persons 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
¾"	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 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 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

A. All equipment operators 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. 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 AND SEEDING

A. Spread minimum of 4 inches of screened loam in areas designated on the drawings.

B. Hydroseed all new loam areas with approved submittal seed mix.

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 TRAFFIC PAVEMENT MARKINGS (Not Used)

END OF SECTION

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

City of Lowell

PROGRESS
NOT FOR CONSTRUCTION

SPLASH PARK
MULLIGAN PARK
LOWELL, MA

PREPARED FOR:
CITY OF LOWELL

MARK	DATE	DESCRIPTION

PROJECT NO: 15006-00
FILE NAME: C-700.dwg
DRAWN BY: RBB
CHK'D BY: GPF

SHEET TITLE
SPECIFICATIONS

C-702
SHEET 10 OF 10

Plot Date: 4/22/2015 9:00:01 AM File Path: J:\01 Projects\15XXX\15006.00 Mulligan Splash Park Pw\11.0 Working Files\11.1 Drawings\11.1.1 Sheet Files\C-700.dwg

SECTION 32 13 13
RIGID PAVING

PART 1 - GENERAL

1.1 SUMMARY SCOPE

A. Concrete slab.

1.2 REFERENCES

A. American Concrete Institute (ACI)

1.3 SUBMITTALS

A. Redimix Concrete product data.

B. Welded Steel Wire Fabric manufacturer's data sheets conforming with MHD M8.01.2.

C. Reinforcing bar manufacturer's data sheets conforming with MHD M8.01.0.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with the American Concrete Institute (ACI) by reference.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete Materials: Redimix Concrete 4,000 PSI

B. Joint Filler: In accordance with MHD M9.14.0 and AASHTO-M153

C. 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.

PART 3 - EXECUTION

3.1 INSTALLATION

A. 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.

B. 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.

C. FINISHING
1. Concrete Slab: Light broom, radiused, and trowel joint edges.
2. Protect surface while curing.
3. Apply approved sealer per manufacturer's directions.

3.2 INTERFACE WITH OTHER WORK

A. Protect building, curbing, pavement, above ground utilities, retainin walls metal railings, sign posts, equipment, landscaping and other miscellaneous site features from concrete splashes or spills.

B. Confirm the accurate placement of sleeves, conduit and anchor bolts prior to the placement of concrete. Coordinate with other trades.

3.3 SEQUENCE OF OPERATIONS

A. Coordinate and schedule the mixing, transporting and placement of concrete to meet the design specifications when poured.

3.4 SITE TOLERANCES

A. Confirm that weather conditions and temperatures meet the required tolerances for the placement of concrete according to the MHD specifications.

3.5 PROTECTION

A. Finished surfaces shall be protected from pedestrian traffic until adequately cured.

END OF SECTION

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.

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 Mirafi 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 manufacurer's instructions and rcommendations.

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

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

City of Lowell

PROGRESS
NOT FOR CONSTRUCTION

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

MARK	DATE	DESCRIPTION

PROJECT NO: 15006-00
FILE NAME: C-700.dwg
DRAWN BY: RBB
CHK'D BY: GPF

SHEET TITLE
SPECIFICATIONS

C-703
SHEET 11 OF 10