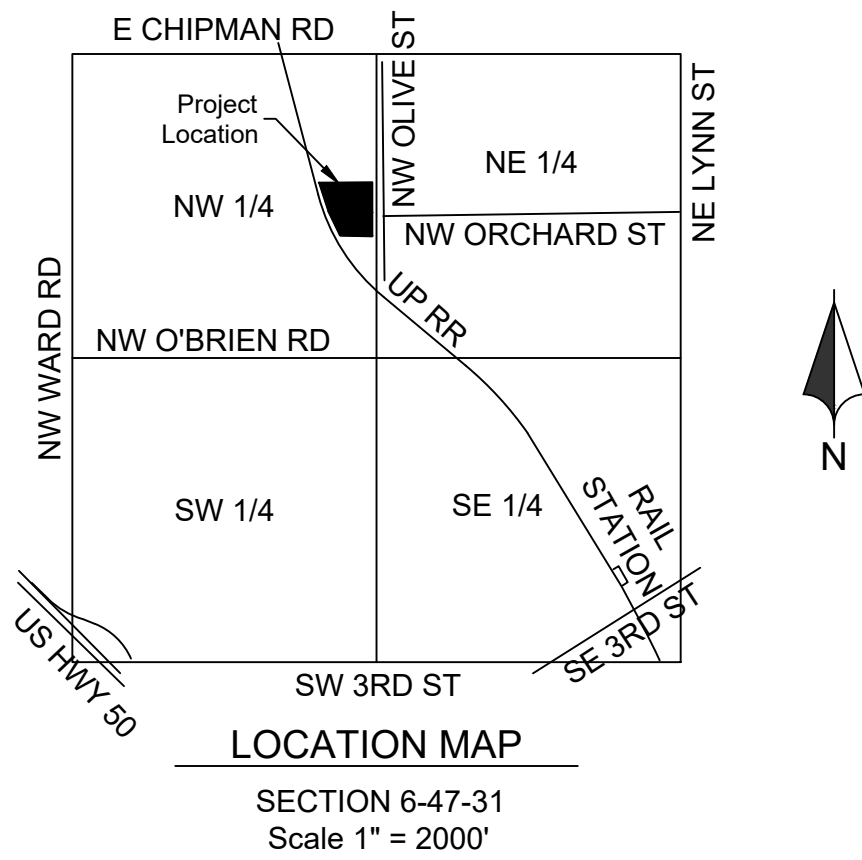


Public Street and Storm For  
Sequoia Residential  
Lee's Summit, Jackson County, Missouri  
Total Project Area: 3.78 Acres (164,565.80 SF)



LEGAL DESCRIPTION

Lot 1, 2, and 3, EXCEPT the North 140 feet of the East 150 feet of Lot 3, HEARNE'S ADDITION, (aka/ HEARNES FIRST ADDITION) and the North Half of vacated Orchard Street lying South and adjacent, a subdivision in Lee's Summit, Jackson County, Missouri.

Lot 22, and 23, HEARNE'S ADDITION, a subdivision in Lee's Summit, Jackson County, Missouri, EXCEPT the South 8 feet of the West 50 feet of Lot 22 and also EXCEPT, the South 8 feet of Lot 23, and ALSO EXCEPT the South 88 feet of the East 150 feet of Lot 22, together with the South 1/2 of vacated Orchard Street lying North of and Adjacent to the said premises in question.

BENCHMARK:

- BM-A: 1.0 mi NW along the Missouri Pacific Railroad from the station at Lee's Summit, at the crossing of Sheer Road, 86 ft southeast of the center line of Sheer Road, 36 ft northeast of the northwest rail, 28.4 ft southeast of a telephone pole, 697 ft southwest of a fence, 1.8 ft west of a witness post, set in the top of a concrete post which projects 0.3 ft above the ground. Elev: 994.87
- BM-B: 1.3 mi N along the Missouri Pacific Railroad from the station at Lee's Summit, Jackson County, at semaphore 2611, on the top of the concrete base, and 10 ft east of the track. A chiseled square. Elev: 971.80

Oil / Gas Well Note:

There is no visible evident, this date, of abandoned oil or gas wells located within the property boundary, as identified in "Environmental Impact Study of Abandoned Oil and Gas Wells in Lee's Summit, Missouri." (Figure B-4, pg. 91)

Flood Plain Note

We have reviewed the F.E.M.A. Flood Insurance Rate Map Number 29095C0417G, revised January 20, 2017, this tract graphically lies in OTHER AREAS, ZONE X, defined as areas determined to be outside the 0.2% annual chance floodplain.

UTILITIES

**WATER & SANITARY SEWER**  
City of Lee's Summit Water Utilities  
220 SE Green St  
Lee's Summit, MO  
Phone: 816.969.1900

**ELECTRICITY**  
Kansas City Power and Light  
PO Box 219255  
Kansas City, Missouri 64141  
Phone: 816.471.5275

**GAS**  
Missouri Gas Energy  
PO Box 219255  
Kansas City, Missouri 64141  
Phone: 816.756.5252

**TELEPHONE**  
AT&T  
Phone: 800.288.2020

Time Warner Cable  
Phone: 816.222.5952

**CABLE TV**  
Comcast  
Phone: 816.795.1100

Time Warner Cable  
Phone: 816.358.8833



LEGEND

---	Existing Section Line	---	Proposed Right-of-Way
---	Existing Right-of-Way Line	---	Proposed Property Line
---	Existing Lot Line	---	Proposed Lot Line
---	Existing Easement Line	---	Proposed Easement
---	Existing Curb & Gutter	---	Proposed Curb & Gutter
---	Existing Sidewalk	---	Proposed Sidewalk
---	Existing Storm Sewer	---	Proposed Storm Sewer
□	Existing Storm Structure	□	Proposed Storm Structure
W/L	Existing Waterline	A	Proposed Fire Hydrant
GAS	Existing Gas Main	WATER	Proposed Waterline
---	Existing Sanitary Sewer	SS	Proposed Sanitary Sewer
⊙	Existing Sanitary Manhole	⊙	Proposed Sanitary Manhole
---	Existing Contour Major	---	Proposed Contour Major
---	Existing Contour Minor	---	Proposed Contour Minor
---	Proposed Asphaltic Pavement	-----	Future Curb & Gutter

**APPLICATION/OWNER:**  
Dick Burton  
Cherokee Flight LLC  
8 SW AA Highway  
Kingsville, MO 64061  
daburton@mail.com

**CIVIL ENGINEER:**  
Mick Slutter, P.E.  
1815 McGee St, #200  
Kansas City, MO 64116  
mslutter@ric-consult.com

**LANDSCAPE ARCHITECT:**  
Andy Gabbert, PLA  
5015 NW Canal St, #100  
Riverside, MO 64150  
agabbert@ric-consult.com

Sheet List Table

Sheet Number	Sheet Title
01	Title Sheet
02	General Notes & Quantities
03	Roadway Typical Section
04	General Layout
05	Grading Plan
06	Utility Plan
07	Signing Plan
08	Drainage Plan
09	Street Plan & Profile
10	Storm Plan & Profile
11	Sanitary Plan
12	Sanitary Plan & Profile
13	Waterline Plan & Profile
14	Erosion Control Phase I
15	Erosion Control Phase II
16	Erosion Control Phase III
17	Standard Details
18	Standard Details
19	Standard Details
20	Standard Details
21	Street Frontage Plan
22	Planting Specifications
23	Irrigation Specifications

GENERAL NOTES

- All construction shall follow the City of Lee's Summit Design and Construction Manual as adopted by Ordinance 5813. Where discrepancies exist between the Construction Document and the Design and Construction Manual, the Design and Construction Manual shall govern.
- The contractor will be responsible for securing all bonds, and insurance required by the contract documents, City of Lee's Summit, Mo., and all other governing agencies (including local, county, state, and federal authorities) having jurisdiction over the work proposed by these construction documents. The cost for all bonds, and insurance shall be the contractor's responsibility and shall be included in the bid for the work.
- All existing utilities indicated on the drawings are according to the best information available to the engineer; however, all utilities actually existing may not be shown. The contractor shall be responsible for contacting all utility companies for an exact field location of each utility prior to any construction. All utilities, shown and un-shown, damaged through the negligence of the contractor shall be repaired or replaced by the contractor at his/her expense.
- The contractor will be responsible for all damages to existing utilities, pavement, fences, structures, and other features not designated for removal. The contractor shall repair all damages at his/her expense.
- The demolition of existing pavement, curbs, structures, and all other features necessary to construct the proposed improvements, shall be performed by the contractor. All waste material removed during construction shall be disposed off the project site. The contractor shall be responsible for all permits for hauling and disposing of waste material. The disposal of waste material shall be in accordance with all local, state, and federal regulations.
- By use of these construction documents the contractor hereby agrees that he shall be solely responsible for the safety of the construction workers and the public. The contractor agrees to hold the engineer and owner harmless for any and all injuries, claims, losses, or damages related to the project.
- The contractor will be responsible for providing all signage, barricades, lighting, etc., as required for temporary traffic control during the construction of this project. Maintenance of the temporary traffic control devices will be the contractor's responsibility. All traffic control in conduction with construction in the right-of-way shall be in conformance with the City Traffic Control Requirements.
- Contractor shall furnish evidence that his/her insurance meets the requirements of the City of Lee's Summit, Missouri Municipal Code.
- Prior to installing, constructing, or performing any work on the public storm sewer line (including connecting private drainage systems to the storm sewer), contact Lee Summit Inspections.
- Connections to the public storm sewers between structures will not be permitted.
- Contractor shall verify and accept existing topography shown herein. Contractor shall notify Engineer if any discrepancies are found prior to any earthwork activities.
- Planning and Codes Administration will require a retaining wall design by a registered engineer in the State of Missouri.
- Geogrid, footings, or other elements of the retaining wall(s) cannot encroach into the right of way or public easements.
- A Knox Box shall be provided for Each Building.
- All building and life safety issues shall comply with the 2012 International Fire Code and local amendments as adopted by the City of Lee's Summit.



## SITE UTILITY NOTES

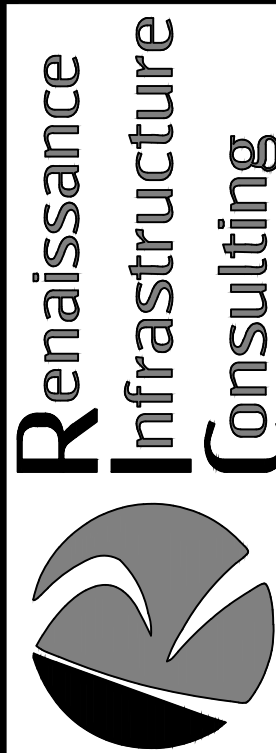
1. All Accessible route construction shall conform to the latest version of the ADA Standards for Accessible Design published by the Department of Justice and the Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way published by the United States Access Board.
2. Other than ramps and ramp runs, walking surfaces must have running slopes not steeper than 1:20.
3. The cross slope of walking surfaces shall not be steeper than 2%.
4. The minimum width for a linear segment of accessible route shall be 36 inches.
5. Where the accessible route makes a 180 degree turn around an element which is less than 48 inches wide, clear width shall be 42 inches minimum approaching the turn, 48 inches minimum at the turn and 42 inches leaving the turn.
6. An accessible route with a clear width less than 60 inches shall provide passing spaces at intervals of 200 feet maximum. Passing spaces shall be 60 inch by 60 inch minimum.
7. Ramp runs shall have a running slope not steeper than 1:12.
8. Ramp runs with a rise greater than 6 inches shall have handrails.
9. Ramp landings with a maximum slope of 1:48 shall be provided before and after ramp runs.
10. The maximum rise of a ramp run shall be 30 inches.
11. The maximum counter slope between the pavement and the curb at a curb ramp shall be 1:20.
12. Curb ramp landings with a maximum slope of 1:48 shall be provided at the top of curb ramps with a clear width of 60 inches.
13. Detectable warning surfaces complying with the latest ADA Standards shall be provided at pedestrian street crossings and refuge islands.
14. Passenger loading zones shall be provided adjacent to any ADA Accessible stall and have a 2% maximum slope in all directions.
15. Contractor to field verify existing site conditions and contact the engineer if field conditions do not match plan prior to construction.

- as Shown on these plans is based on records of the various utility Companies, and where possible, measurements taken in the field. The information is not to be relied on as being exact or complete. The contractor must call the appropriate utility companies at least 48 hours before any excavation to request exact field location of utilities. It shall be the responsibility of the contractor to coordinate with and relocate and/or remove all existing utilities which conflict with the proposed improvements shown on the plans.
2. The construction of storm sewers on this project shall conform to the requirements of Jackson County, Lee's Summit Technical Specifications and Design Criteria.
3. The contractor shall field verify the exact location and elevation of the existing storm sewer locations and the existing elevations at locations where the proposed storm sewer collects or releases to existing ground. If discrepancies are encountered from the information shown on the plans. The contractor shall contact the design engineer. No pipes shall be laid until direction is received from the design engineer.
4. It will be the contractors responsibility to field adjust the top of all manholes and boxes as necessary to match the grade of the adjacent area. Tops of existing manholes shall be raised as necessary to be flush with proposed pavement elevations, and to be 6-inches above finished ground elevations in non-paved areas. No separate or additional compensation will be made to the contractor for making final adjustments to the manholes and boxes.
5. Inlet locations, horizontal pipe information and vertical pipe information is shown to the center of the structure. Deflection angles shown for storm sewer pipes are measured from the center of the curb inlets and manholes. The contractor shall adjust the horizontal location of the pipes to go to the face of the boxes. All roof drains shall be connected to storm sewer structures. Provide cleanouts on roof drain lines at 100' max. spacing and at all bend points. Do not connect roof drains directly to storm sewer pipes.
6. The contractor shall be responsible for furnishing and installing all fire and domestic water lines, meters, back flow devices, pits, valves and all other incidentals required for a complete operable fire protection and domestic water system, if not furnished or installed by the Board of Public Utilities. Coordinate with the Board of Public Utilities. All costs associated with the complete water system for the building shall be the responsibility of the contractor. All work shall conform to the requirements of Jackson County, Lee's Summit.
7. The contractor shall be responsible for furnishing and installing all sanitary sewer service lines from the building to the public line. The contractor shall refer to the architectural plans for specific locations and elevations of the service lines of the building connection. All work shall conform to the requirements of Lee's Summit.
8. The contractor is responsible for securing all permits, bonds and insurance required by the contract documents, Lee's Summit, and all other governing agencies (including local, county, state and federal authorities) having jurisdiction over the work proposed by the construction documents. The cost for all permit bonds and insurance shall be the contractors responsibility and shall be included in the bid for the work.
9. By the use of these construction documents the contractor hereby agrees that he/she shall be solely responsible for the safety of the construction workers and the public. The contractor agrees to hold the engineer and owner harmless for any and all injuries, claims, losses or damages related to the project.
10. The contractor shall be responsible for furnishing all materials, tools and equipment and installation of electrical power, telephone and gas service from a point of connection from the public utility lines to the building structure. This will include all conduits, service lines, meters, concrete pads and all other incidentals required for a complete and operational system as required by the owner and the public utilities. Refer to building plans for exact tie-in locations of all utilities. Contractor shall verify connection points prior to installation of utility line.
11. All fill material is to be in place, compacted, and consolidated before installation of proposed utilities. On-site geotechnical engineer shall provide written confirmation that this requirement has been met and that utilities may proceed in the fill areas. All utilities are to be placed in trench conditions.
12. Contractor shall notify the utility authorities inspectors 49 hours before connecting to any existing line.
13. Storm sewer roof drains(st) shall be as follows (unless otherwise shown on plans).
  - PVC SDR 35 per ASTM D3034, for pipes less than 12' deep.
  - PVC SDR 26 per ASTM D3034, for pipes 12' to 20' deep.
14. Waterlines shall be as follows (unless otherwise shown on plans):
  - for 8" and larger: ductile iron pipe per AWWA C150
  - between 2" and 6": copper tube Type "K" per ANSI 816.22 or ductile iron pipe per AWWA C150
  - For smaller than 2": copper tube Type "K" per ANSI 816.22
15. Minimum trench width shall be 2 feet.
16. Contractor shall maintain a minimum of 42" of cover on all waterlines. All water line joints are to be mechanical joints with thrust blocking as called out in specifications and construction plans. Water mains and service lines shall be constructed in accordance to the Board of Public Utilities specifications for commercial services.
17. All waterlines shall be kept ten feet (10') apart (parallel) from sanitary sewer lines or manholes. Or when crossing, an 18" vertical clearance (outside edge of pipe to outside edge of pipe) of the waterline above the sewer line is required.
18. Trench Drain shall be ACO S200K or approved equal.
19. Trench Drain shall be installed in accordance with the manufacturer's installation instructions and recommendations.
20. In the event of a vertical conflict between waterlines, sanitary lines, storm lines and gas lines (existing and proposed), the sanitary line shall be ductile iron pipe with mechanical joints at least 10 feet on both sides of the crossing (or encased in concrete the same distance), the waterline shall have mechanical joints with appropriate thrust blocking as required to provide a minimum of 18" clearance. Meeting requirements ANSI A21.10 or ANSI 21.11 (AWWA C151)(Class 50).
21. All underground storm, sanitary, water and other utility lines shall be installed, inspected and approved before backfilling. Failure to have inspection approval prior to backfill will constitute rejection of work.
22. All necessary inspections and/or certifications required by codes and/or utility service companies shall be performed prior to announced building possession and the final connection of service. Contractor shall coordinate with all utility companies for installation requirements and specifications.
23. refer to building plans for site lighting electrical plan, irrigation, parking lot security system and associated conduit requirements. Coordinate with Owner that all required conduits are in place and tested prior to paving.
24. When a building utility Connection from site utilities leading up to the building cannot be made immediately, temporarily mark all such utility terminations.

1. **CONTOURS AND ELEVATIONS:** Existing and proposed contours are shown on plans at one foot (1') contour intervals, unless otherwise noted. Proposed contours and elevations shown represent approximate finish grade.
2. **CLEARING AND GRUBBING:** Prior to the start of grading and earthwork, the areas to be graded shall be stripped of all vegetation, organic matter, and topsoil, to a minimum depth of four inches (4") or as otherwise directed by the Geotechnical Engineer. Stripping materials shall not be incorporated into structural fills. Topsoil materials shall not be used in building and pavement areas.
3. **TOPSOIL:** Prior to the start of grading, the contractor shall strip all topsoil from areas to be graded and stockpile at a location on or adjacent to the site as directed by the owner. At completion of grading operations and related construction, the contractor will be responsible for redistribution of topsoil over all areas disturbed by the construction activities. Topsoil shall be placed to a minimum depth of six inches (6") and in accordance with specifications for landscaping.
4. **SUBGRADE PREPARATION:** Prior to placement of new fill material, the existing subgrade shall be proofrolled and approved under the direction of the Geotechnical Engineer or his representative.
5. **PROOFROLLING:** Prior to the placement of new fill material, the existing subgrade shall be proofrolled and approved under the direction of the Geotechnical Engineer. Unsuitable areas identified by the proofrolling areas shall be undercut and replaced with controlled structural fill or treated with flyash per the Geotechnical report.
6. **EARTHWORK:**
  - A. **GEOTECHNICAL:** All earthwork shall conform to the recommendations of the Geotechnical report.
  - B. **SURFACE WATER:** Surface water shall be intercepted and diverted during the placement of fill.
  - C. **FILLS:** All fills shall be considered controlled or structural fill and shall be free of vegetation, organic matter, topsoil, and debris. All fill required for project shall be provided by the Contractor. Material Shall be pre-approved by the Engineer prior to placement.
  - D. **EXISTING SLOPES:** Where fill material is to be placed on existing slopes greater than 5:1 (horizontal to vertical), existing slope shall be benched providing a minimum vertical face of twelve inches (12"). Fill material shall be placed and compacted in horizontal lifts not exceeding nine inches (9") (loose fit measurement), unless otherwise approved by the Geotechnical Engineer.
  - E. **COMPACTION REQUIREMENTS:** Earth fill material shall be placed and compacted to a minimum density of ninety five percent (95%) of the material's maximum dry density as determined by ASTM D698 (standard proctor compaction). The moisture content at the time of placement and compaction shall be within a range of -2% to 3% above the optimum moisture content as defined by the standard proctor compaction procedure. The moisture contents shall be maintained within this range until completion of the work. Where compaction of earth fill by a large roller is impractical or undesirable, the earth fill shall be hand compacted with small vibrating rollers or mechanical tampers.
7. **TESTING AND INSPECTION:** Testing and inspection services required to make tests required by the specifications and to observe the placement of fills and other work performed on this project shall be provided by a commercial testing laboratory (Geotechnical Engineer) selected by the owner. The cost of testing will be the owner's responsibility.
8. **SEEDING:** All areas disturbed by earthwork operations in the right-of-way shall be seeded.

Summary of Quantities			
Item	Description	Qty.	Unit
1	Clearing and Grubbing	1	LS
2	Demolition	1	LS
3	2" Asphaltic Concrete Surface	152	TONS
4	4" Asphaltic Concrete Base	305	TONS
5	6" MODOT Type 5 Base	226	CY
6	6" Chemical Subgrade Stabilization	226	CY
7	Curb and Gutter	755	LF
8	Sidewalk	2163	SF
9	ADA Ramp	2	EA
10	R8-3a NO PARKING SIGN (24" x 30")	10	LS
11	R1-1 STOP SIGN (30" x 30")	1	LS
12	4" Data Line Conduit	1,926	LF
13	4" Underground Power Conduit	1,920	LF
14	4' x 3' Curb Inlet	2	EA
15	15" RCP	35	LF
16	18" HDPE	122	LF
17	End Section	1	EA
18	4' Dia. Sanitary Manhole	4	EA
19	8" (SDR-26) PVC	496	LF
20	Connection to Existing Manhole	1	LS
21	AWWA C900 PVC	510	LF
22	6" Tee	1	LF
23	6" x 11.25° Horizontal Bend	4	EA
24	6" x 22.5° Horizontal Bend	2	EA
25	6" x 45° Horizontal Bend	5	EA
26	Relocate Existing Fire Hydrant	1	LS
27	Fire Hydrant Assembly	1	EA
28	Erosion Control	1	LS

Note:  
Quantities are for Information only

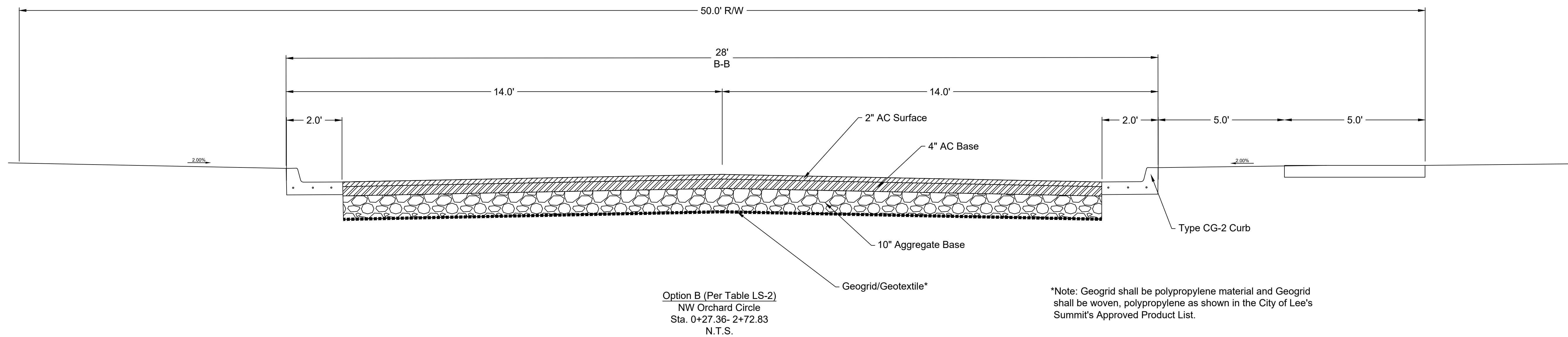
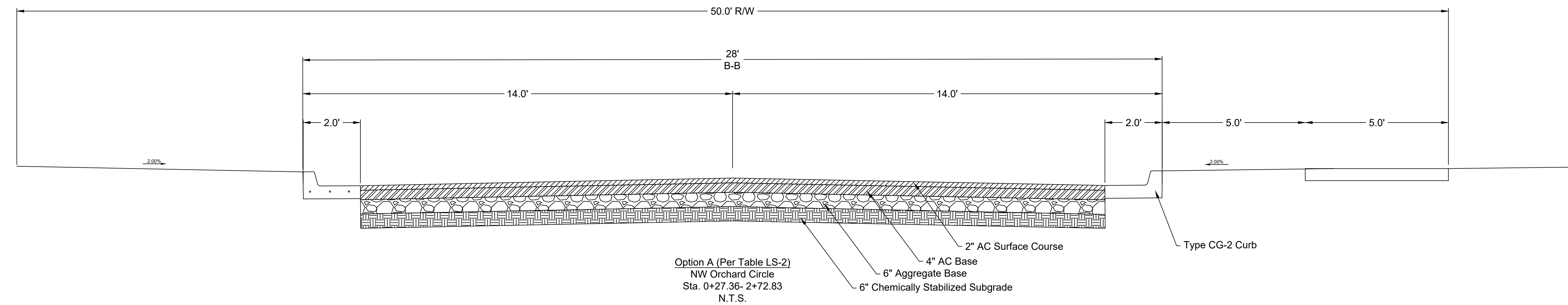
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KANSAS CITY, MISSOURI 64108  
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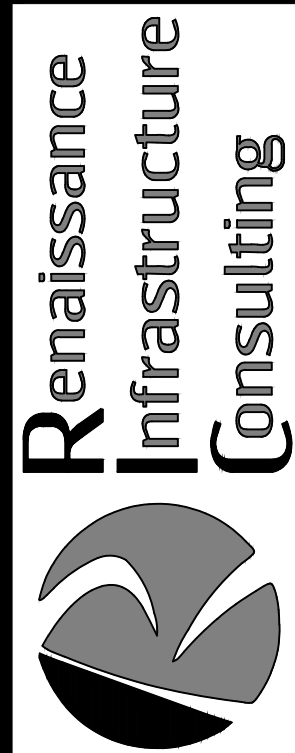
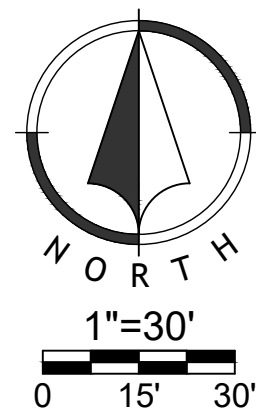
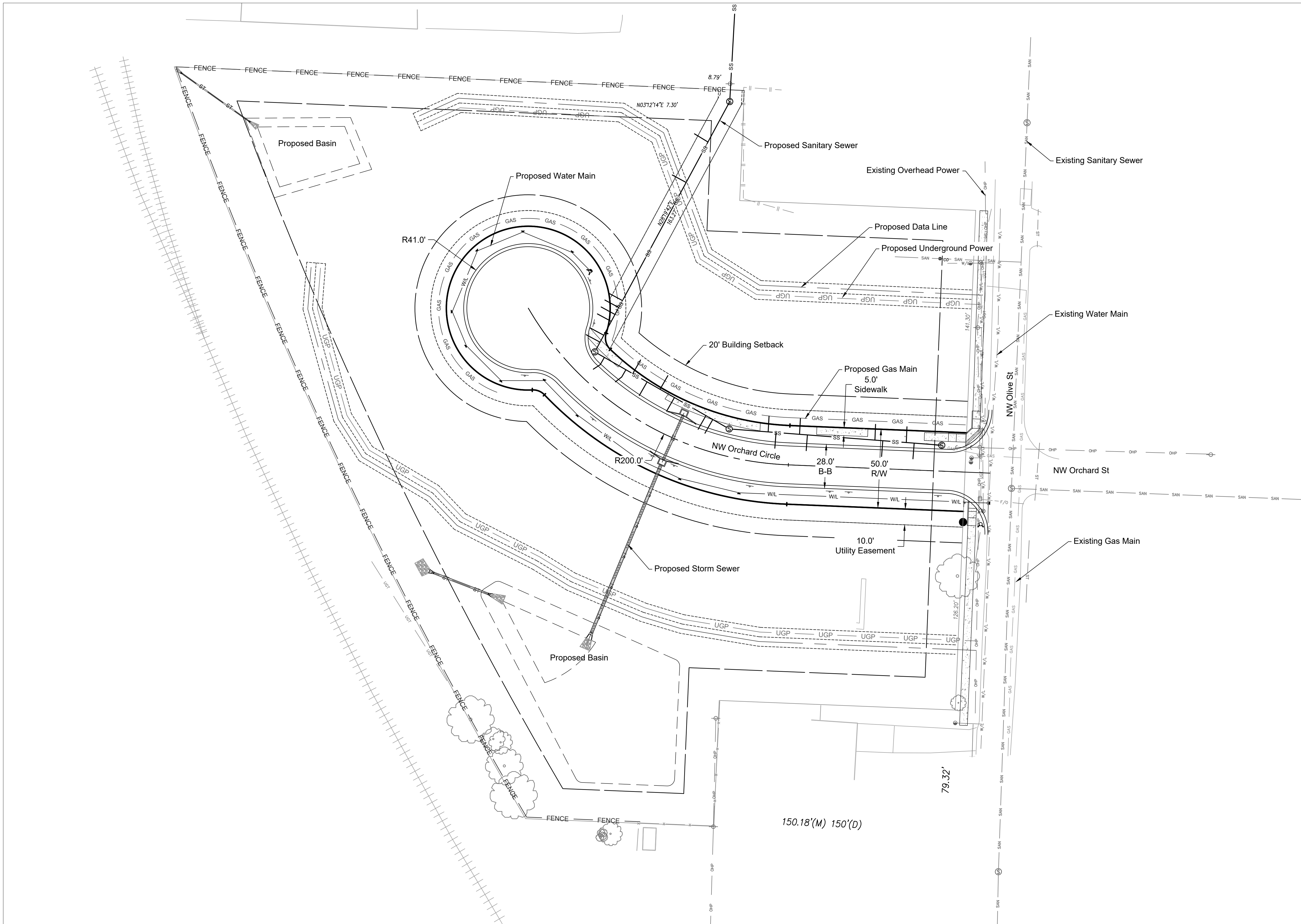








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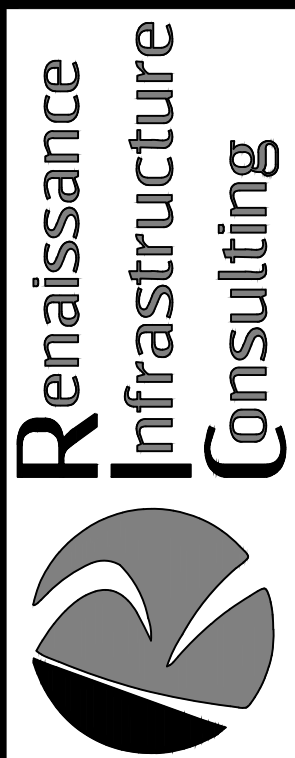
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WWW.RIC-CONSULT.COM



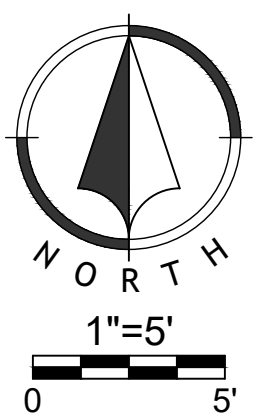
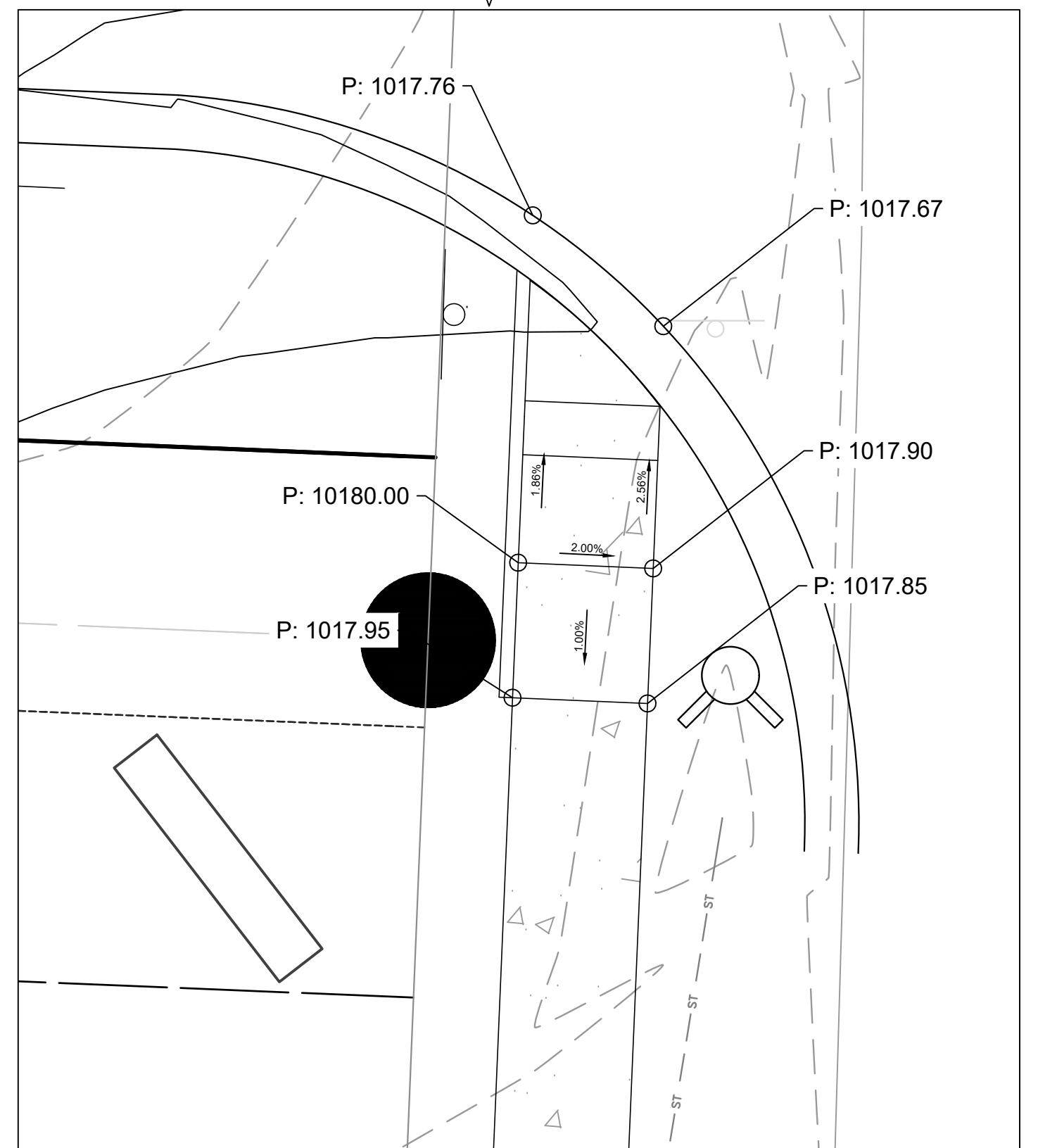
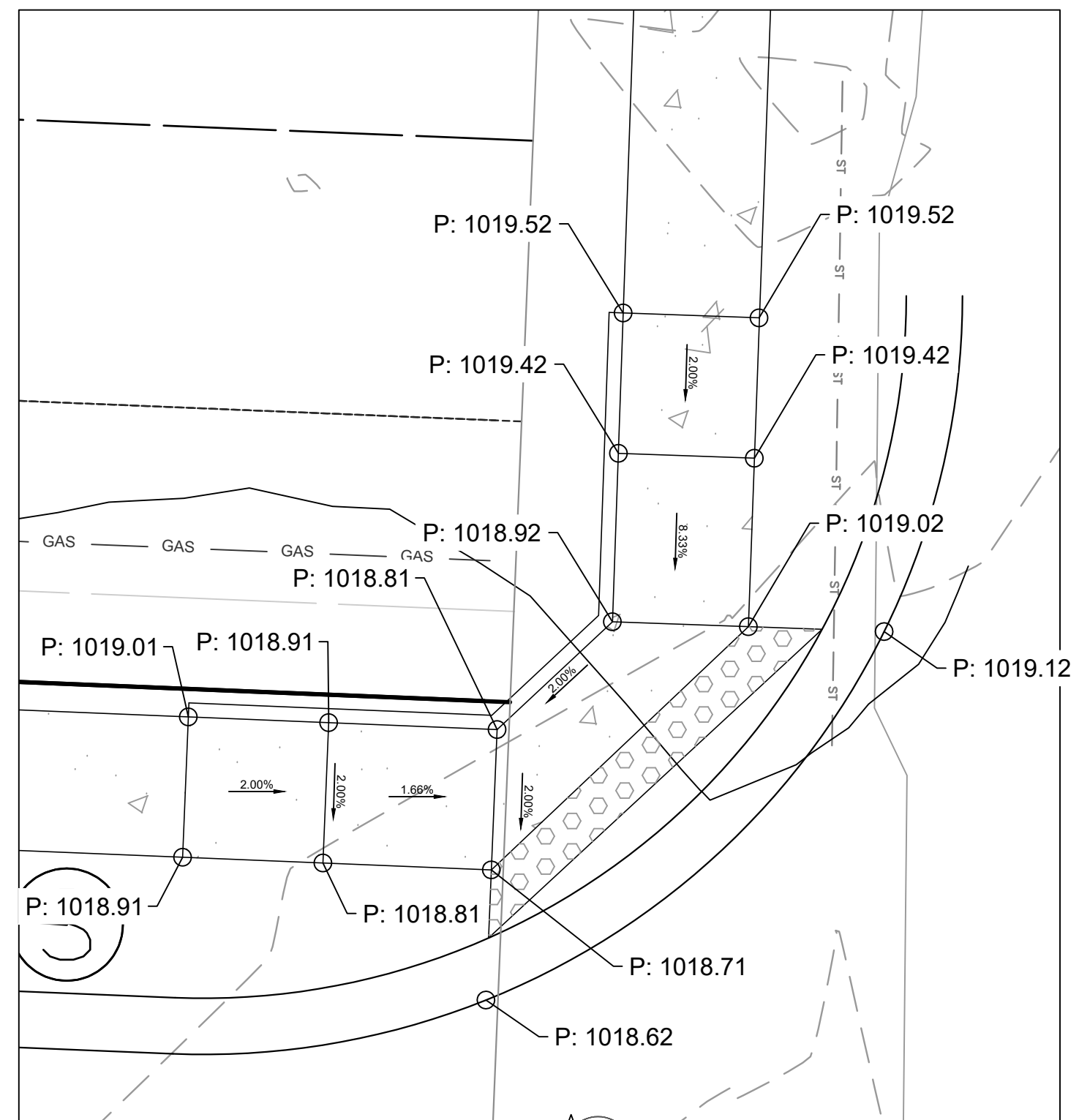
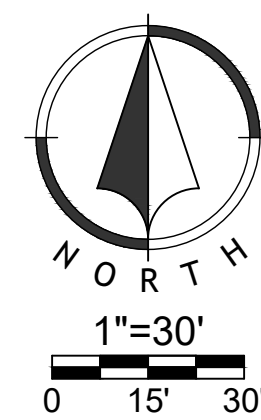
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General Layout

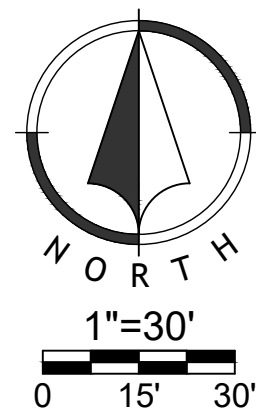
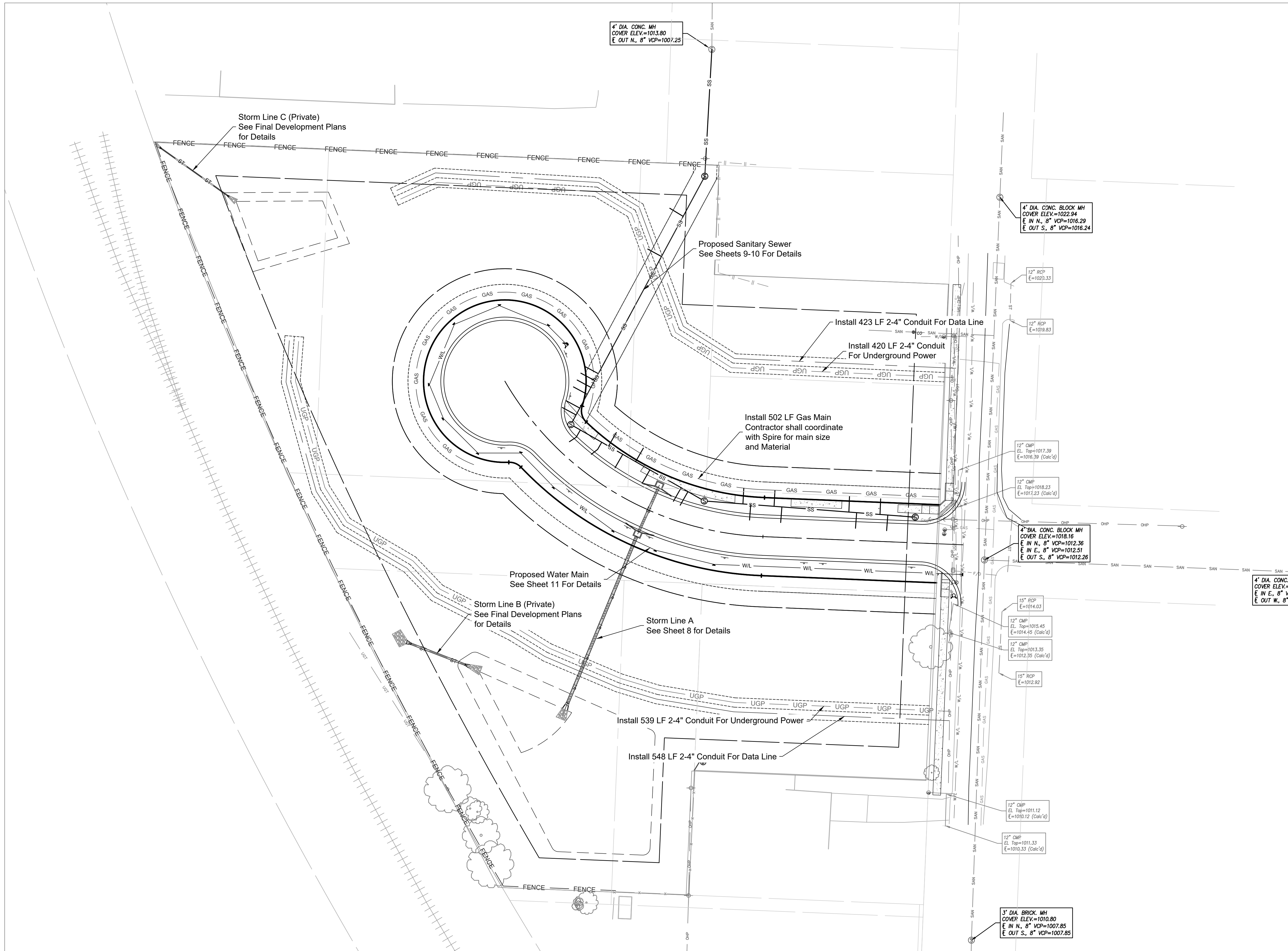


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Sheet  
06 of 23

Public Street And Storm Plans  
18-0251  
Sequoia Residential  
Lee's Summit, Jackson County, MO

Utility Plan

NO.	BY	DATE	REVISION
1.	JDG	MES 05/08/2020	ORIGINAL SUBMISSION

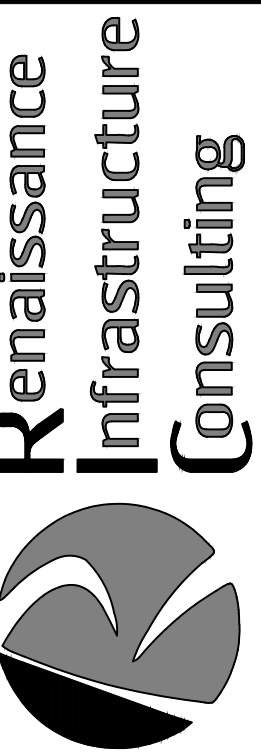
**Renaissance**  
Infrastructure  
Consulting

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KANSAS CITY, MISSOURI 64108  
816.800.0950  
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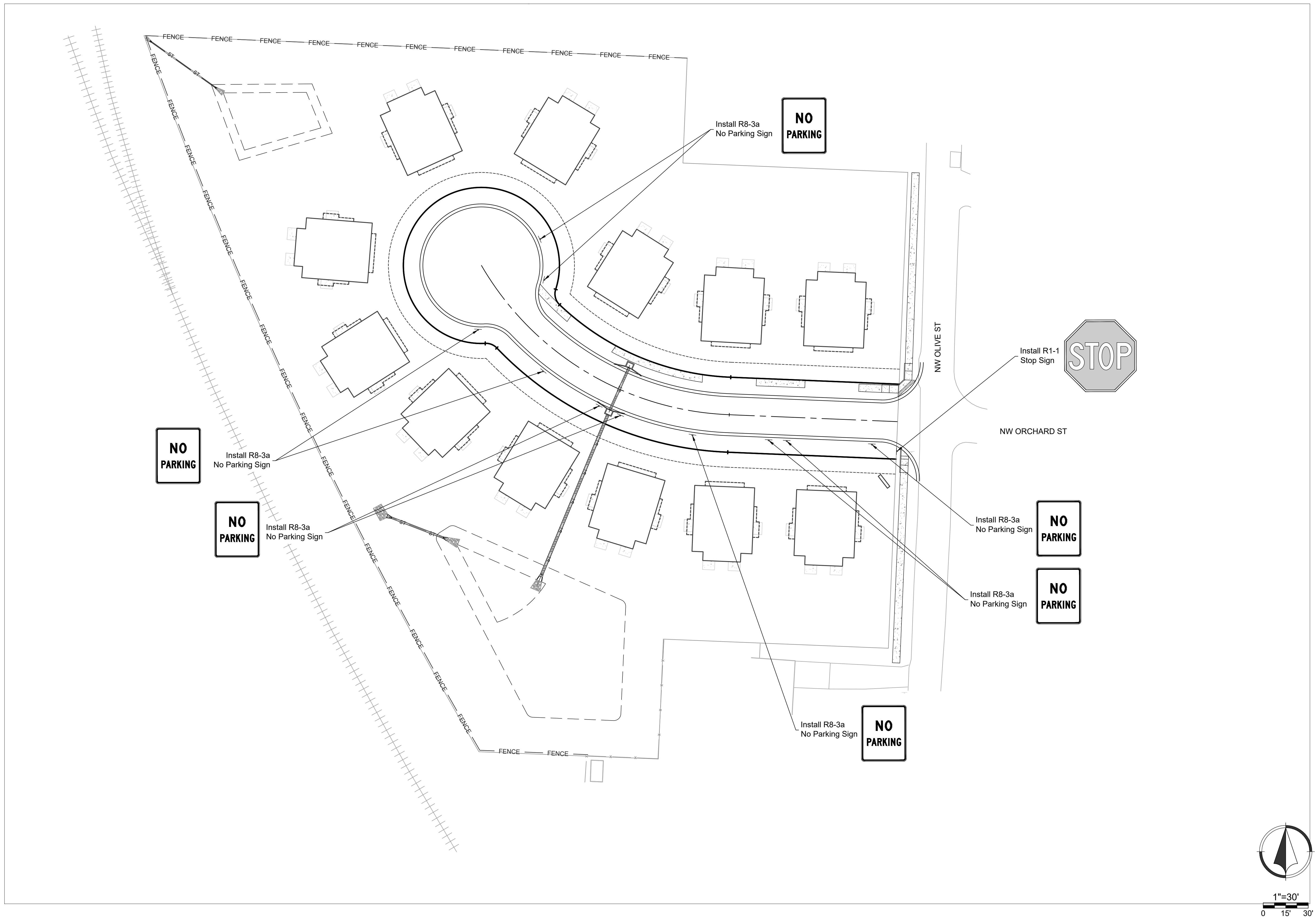
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MITCHELL E. SLUTTER  
PE-2002003418  
04/2020



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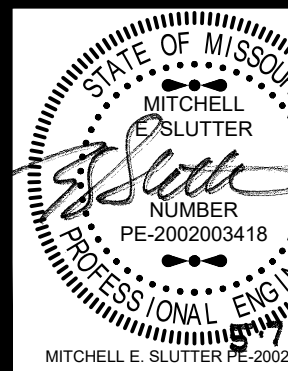

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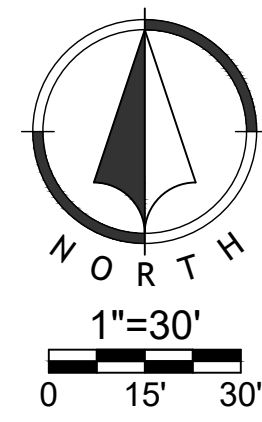


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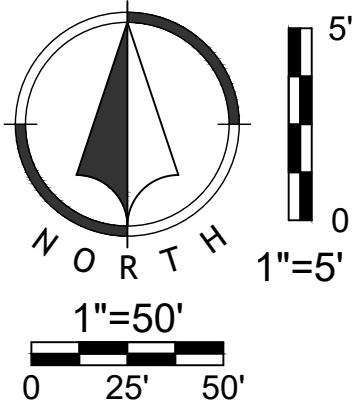
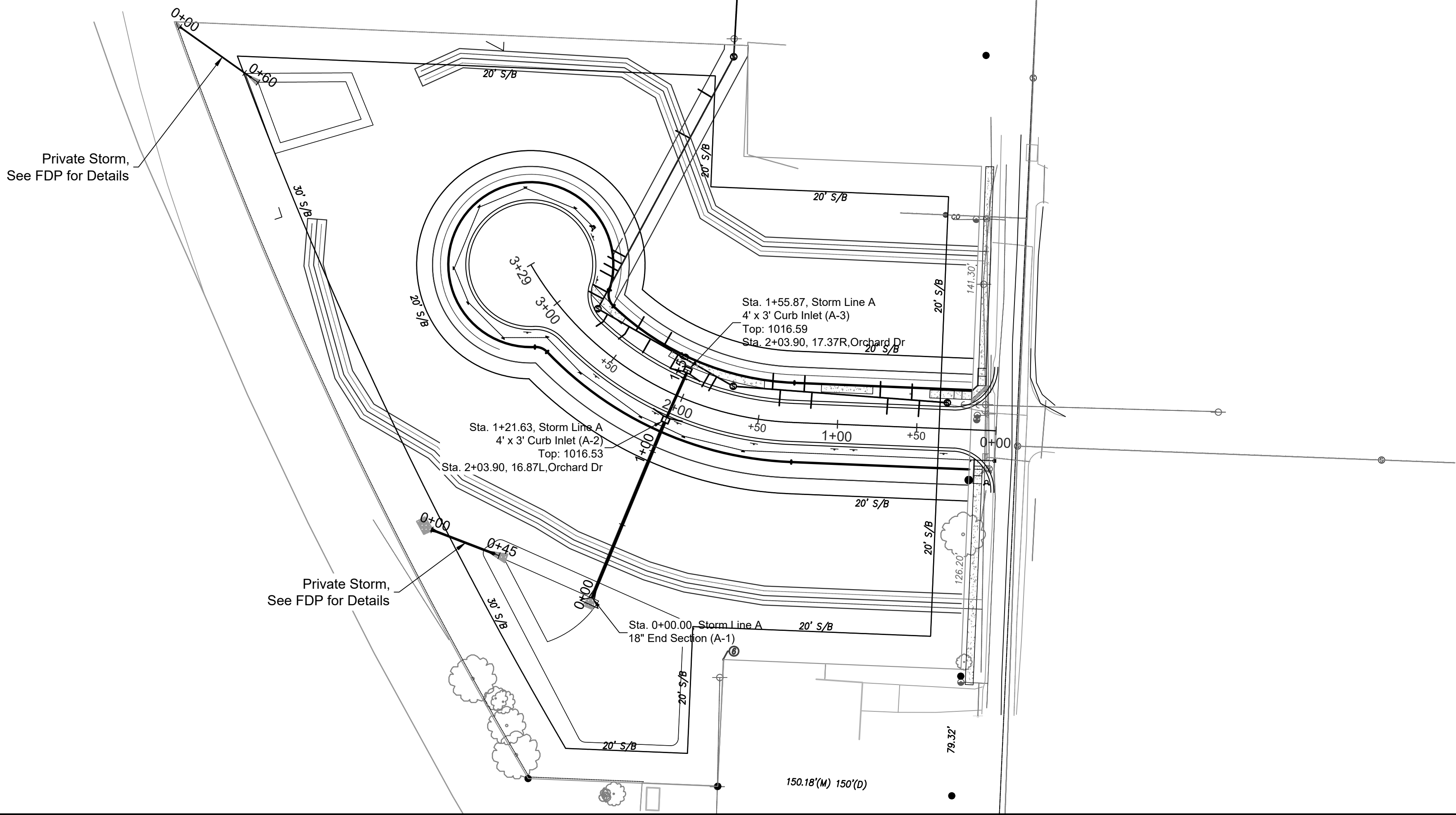
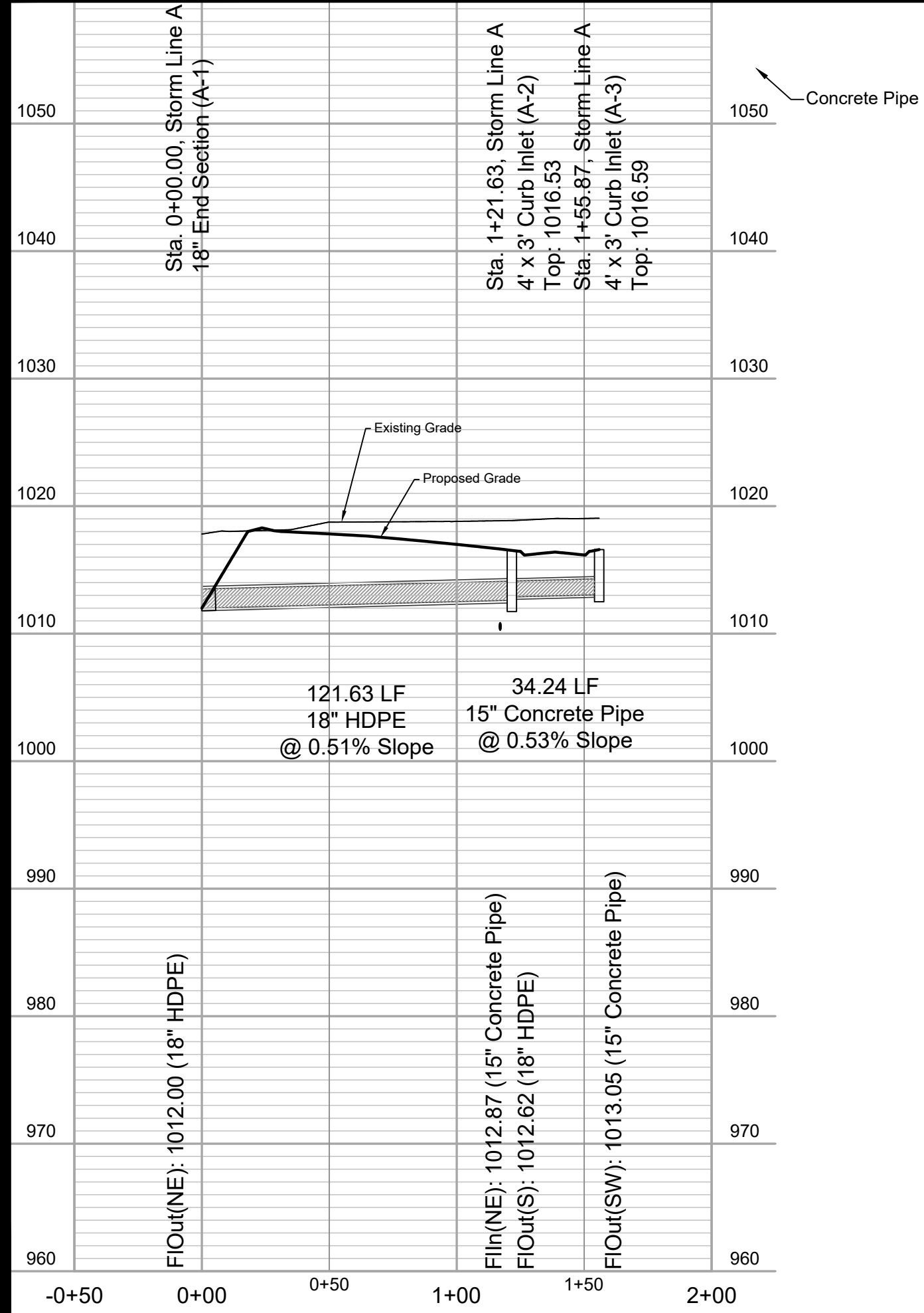
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**Renaissance Infrastructure Consulting**

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NO.	BY	DATE	REVISION
1	JDG	MES 05/09/2020	ORIGINAL SUBMISSION

Storm Plan & Profile

Public Street And Storm Plans  
18-0251  
Sequoia Residential  
Lee's Summit, Jackson County, MO

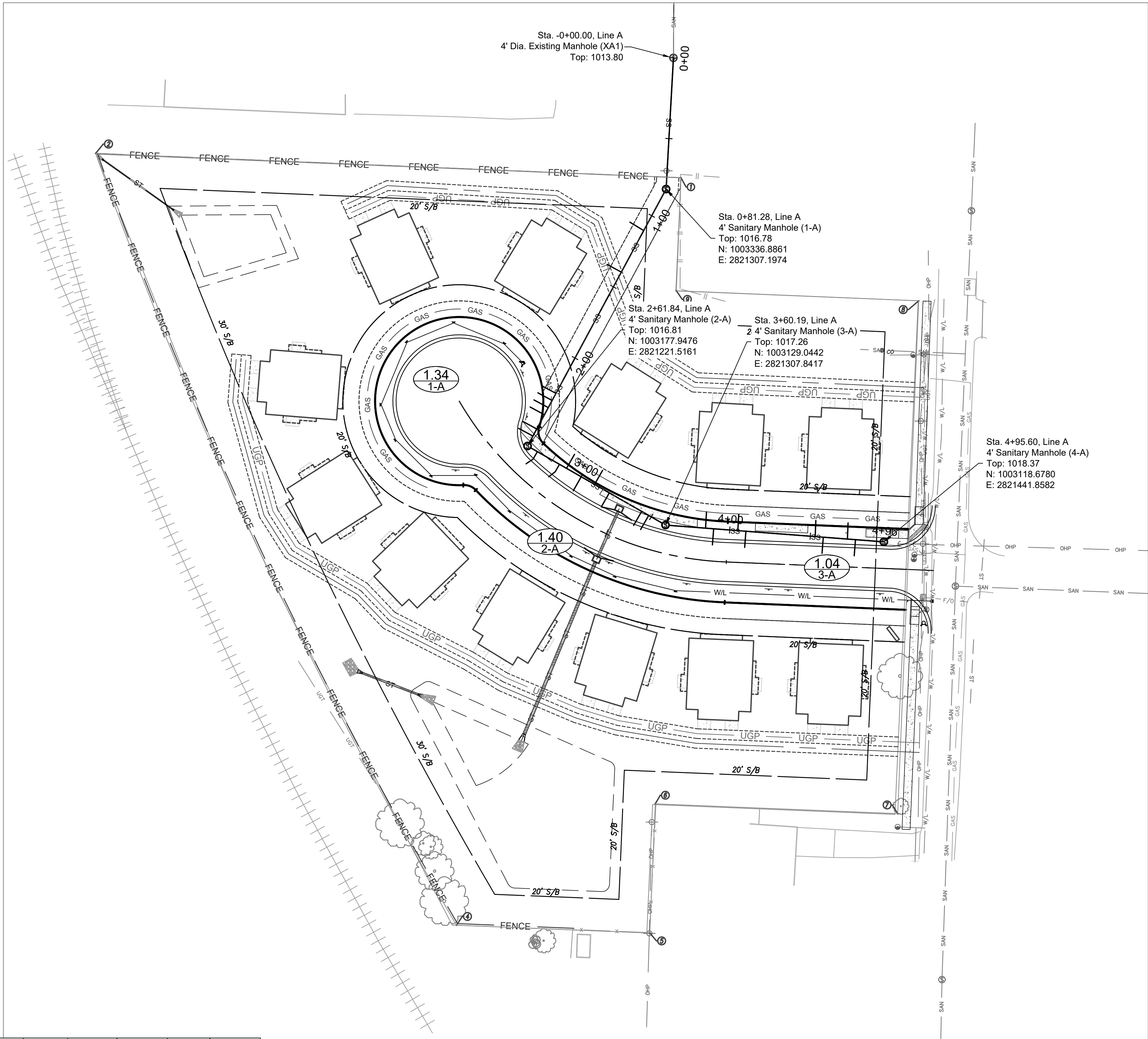


GENERAL NOTES

- All construction materials and procedures on this project shall conform to the following requirements:
  - City of Lee's Summit, Missouri Standard Specifications: Section 3500 - Sanitary Sewers
- The contractor will be responsible for securing all bonds, and insurance required by the Final Development Plans, City of Lee's Summit, and all other governing agencies (including local, county, state, and federal authorities) having jurisdiction over the work proposed by these construction documents. The cost for all bonds, and insurance shall be the contractor's responsibility and shall be included in the bid for the work.
- All existing utilities indicated on the drawings are according to the best information available to the engineer; however, all utilities actually existing may not be shown. The contractor shall be responsible for contacting all utility companies for an exact field location of each utility prior to any construction. All utilities, shown and un-shown, damaged through the negligence of the contractor shall be repaired or replaced by the contractor at his expense.
- The contractor will be responsible for all damages to existing utilities, pavement, fences, structures, and other features not designated for removal. The contractor shall repair all damages at his expense.
- The demolition of existing pavement, curbs, structures, and all other features necessary to construct the proposed improvements, shall be performed by the contractor. All waste material removed during construction shall be disposed off the project site. The contractor shall be responsible for all permits for hauling and disposing of waste material. The disposal of waste material shall be in accordance with all local, state, and federal regulations.
- By use of these Final Development Plans the contractor hereby agrees that he shall be solely responsible for the safety of the construction workers and the public. The contractor agrees to hold the engineer and owner harmless for any and all injuries, claims, losses, or damages related to the project.
- The contractor will be responsible for providing all signage, barricades, lighting, etc., as required for temporary traffic control during the construction of this project. Maintenance of the temporary traffic control devices will be the contractor's responsibility. All traffic control in conduction with construction in the right-of-way shall be in conformance with the City Traffic Control Requirements.
- Contractor shall furnish evidence that his/her insurance meets the requirements of the City of Lee's Summit Municipal Code.
- Prior to installing, constructing, or performing any work on the public storm sewer line (including connecting private drainage systems to the storm sewer), contact Inspections.
- The Developer (not the contractor) to pick up all permits.

Summary of Quantities			
Item	Description	Qty.	Unit
1	8" (SDR-26)PVC	496	LF
2	4" Dia. Concrete Manhole	4	EA
3	8" x 4" PVC Wye	12	EA
4	Erosion Control	1	LS

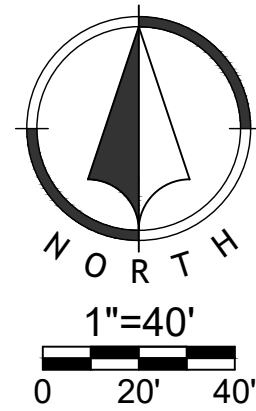
Segment		Peak Base Flow (Residential)			Peak Infiltration			Peak Inflow				Design Peak	Pipe Full	Pipe Dia.	Pipe	Pipe	Vel Full	Design
U/S MH	D/S MH	Area, acres	PDWF, gpd/ac	Flow, cfs	Area, acres	Infiltration Rate, gpd/ac	Flow, cfs	Tributary Area, acres	Rainfall Intensity, iph	Inflow Factor	Flow, cfs	Flow, cfs	Capacity, cfs	Inches	Length, ft	Slope, %	fps	Vel, fps
4-A	3-A	0.000	1500	0.000	0.000	500.000	0.000	0.000	5.490	0.006	0.000	0.000	0.941	8.000	135.410	0.700	2.697	0.000
3-A	2-A	1.040	1500	0.002	1.040	500.000	0.001	1.040	5.490	0.006	0.034	0.037	0.941	8.000	98.350	0.700	2.697	1.276
2-A	1-A	1.400	1500	0.003	1.400	500.000	0.001	2.440	5.490	0.006	0.080	0.119	0.941	8.000	180.560	0.700	2.697	1.846
1-A	Existing	1.300	1500	0.003	1.340	500.000	0.001	3.780	5.490	0.006	0.125	0.209	0.941	8.000	81.280	0.700	2.697	2.168
Existing	Existing	0.000	1500	0.000	0.000	500.000	0.000	3.780	5.490	0.006	0.125	0.249	0.900	8.000	323.770	0.470	2.578	2.173



NO.	BY	DATE	REVISION
1.	JDG	MES 05/08/2020	ORIGINAL SUBMISSION

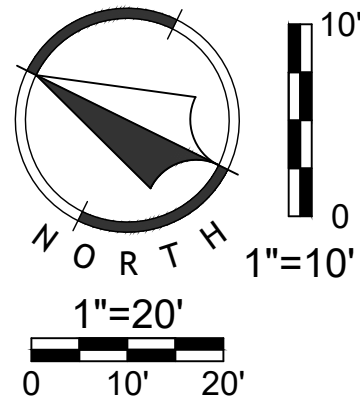
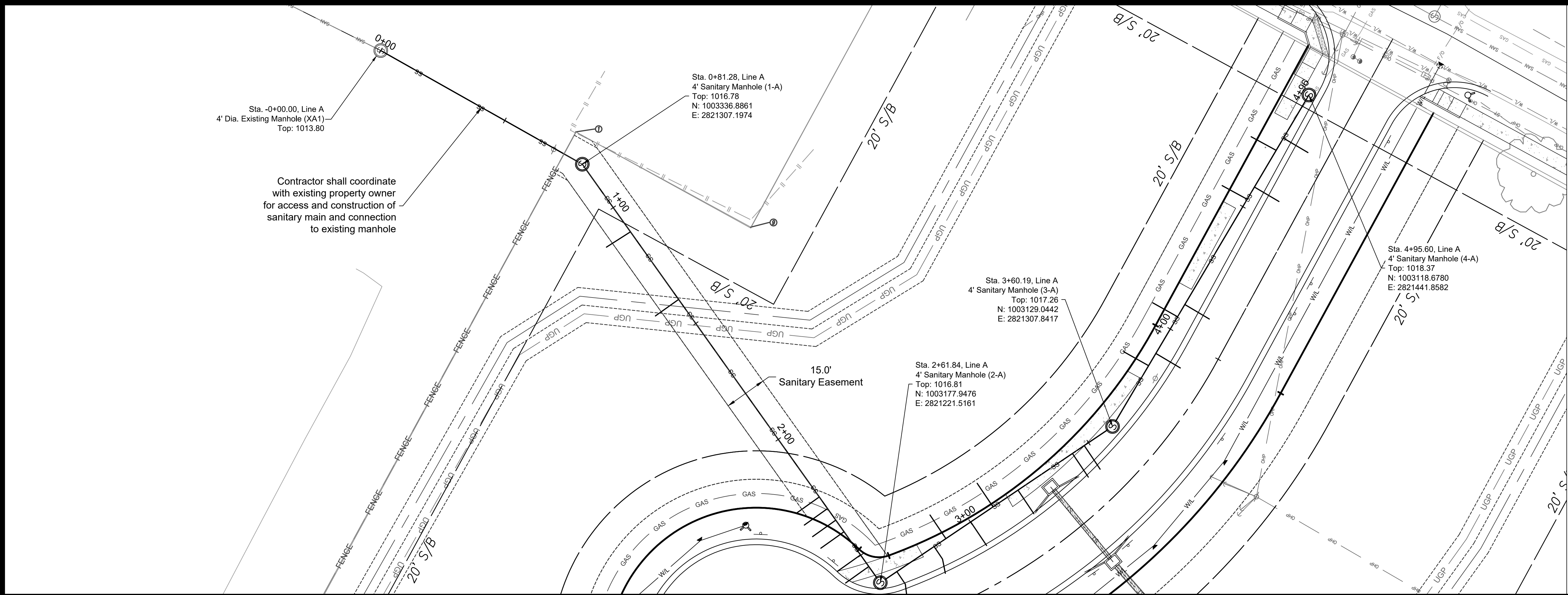
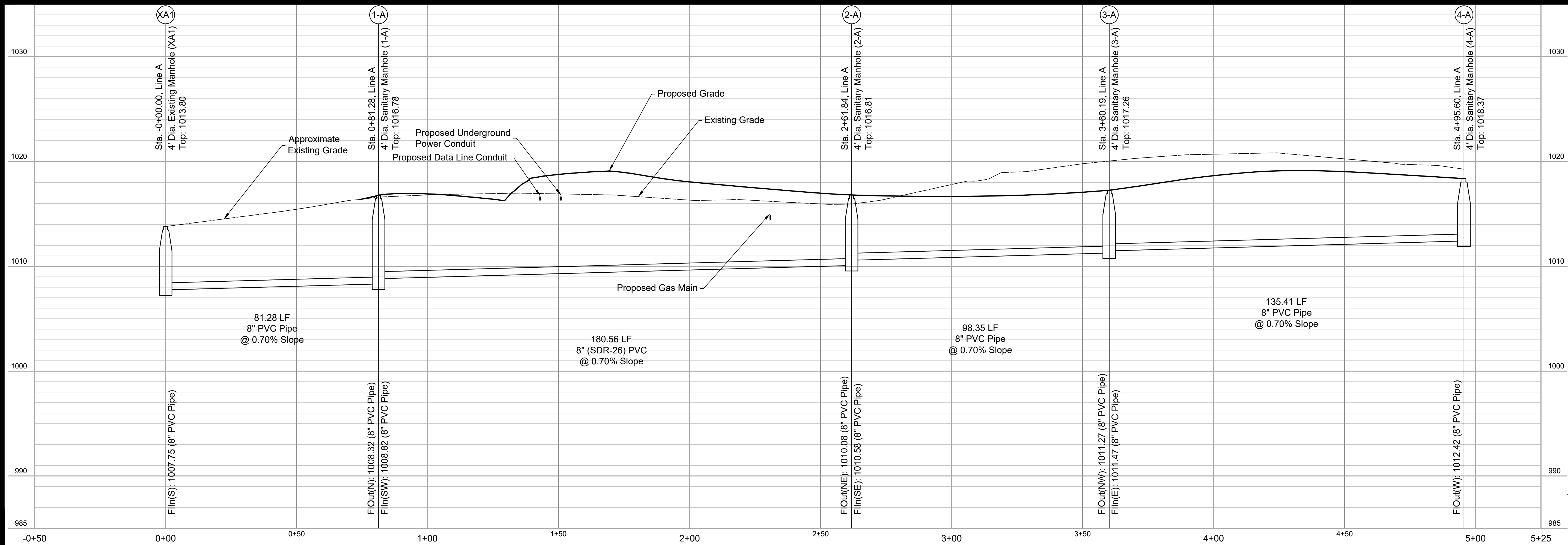
**Renaissance Infrastructure Consulting**  
816.800.0950  
1815 MCGEE STREET, SUITE 200  
KANSAS CITY, MISSOURI 64108  
WWW.RIC-CONSULT.COM

Professional Engineer  
Mitchell E. Slutter  
PE-2002003418  
STATE OF MISSOURI  
JUL 9 2020





May 08, 2020 11:57am  
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Sheet  
12 of 23

Public Street And Storm Plans  
18-0251  
Sequoia Residential  
Lee's Summit, Jackson County, MO

Sanitary Plan & Profile

NO.	BY	CD	DATE	REVISION
1	JDG	MES	05/08/2020	ORIGINAL SUBMISSION

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KANSAS CITY, MISSOURI 64108  
WWW.RIC-CONSULT.COM

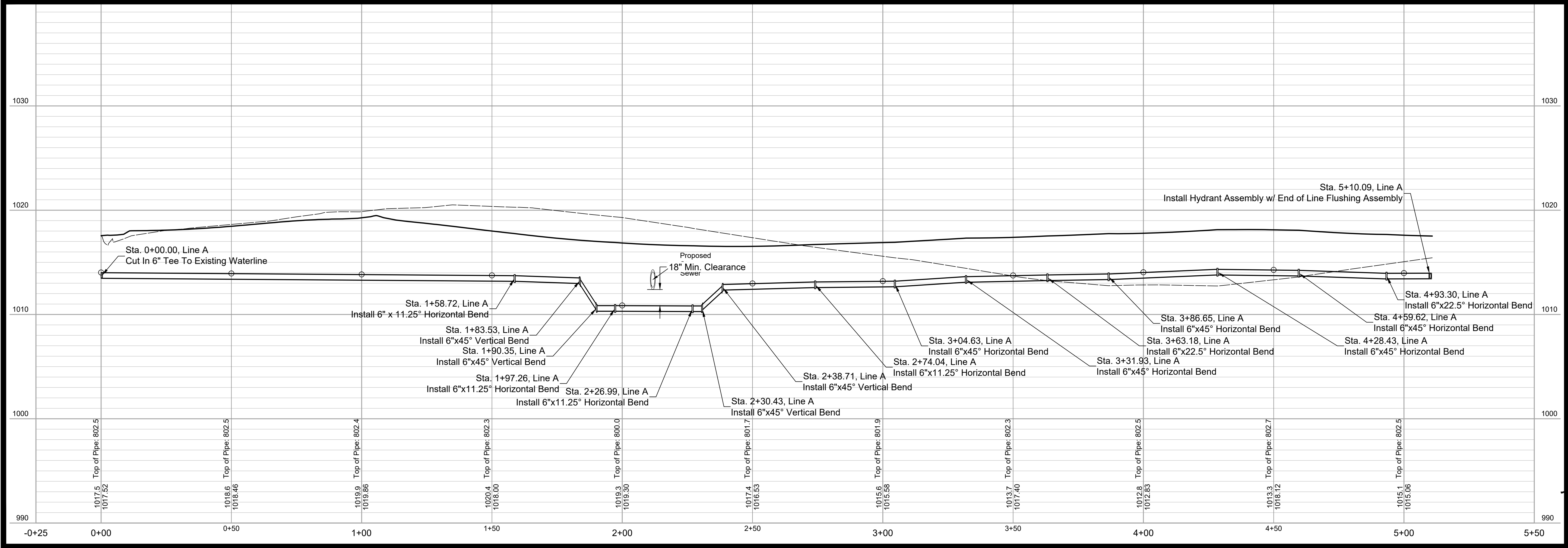
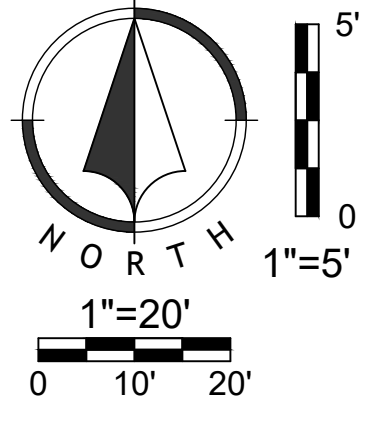
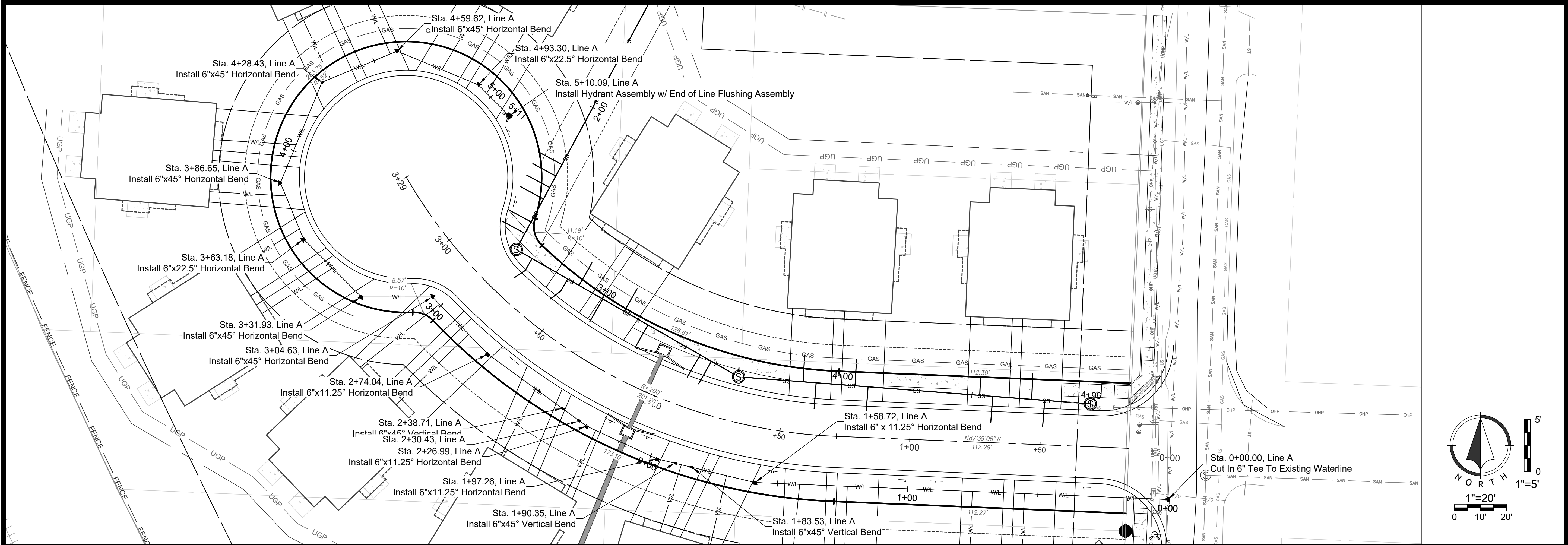
MO Certificate of Authority: E-2010033830

STATE OF MISSOURI  
MITCHELL E. SLUTTER  
ENGINEER  
NUMBER  
PE-2002003418  
EXPIRATION DATE  
05-01-2025

May 08, 2020



May 08, 2020 11:59am  
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Sheet  
13 of 23

Public Street And Storm Plans  
18-0251  
Sequoia Residential  
Lee's Summit, Jackson County, MO

Waterline Plan & Profile

NO.	BY	CD	DATE	REVISION
1.	JDG	MES	05/08/2020	ORIGINAL SUBMISSION

Renaissance  
Infrastructure  
Consulting

STATE OF MISSOURI  
SEAL  
MITCHELL E. SLUTTER  
ENGINEER  
NUMBER  
PE-2002003418  
EXPIRATION  
05-31-2025

1815 MCGEE STREET, SUITE 200  
KANSAS CITY, MISSOURI 64108  
816.800.0950  
WWW.RIC-CONSULT.COM

MO Certificate of Authority: E-201003630



## Phase I

[illegible]

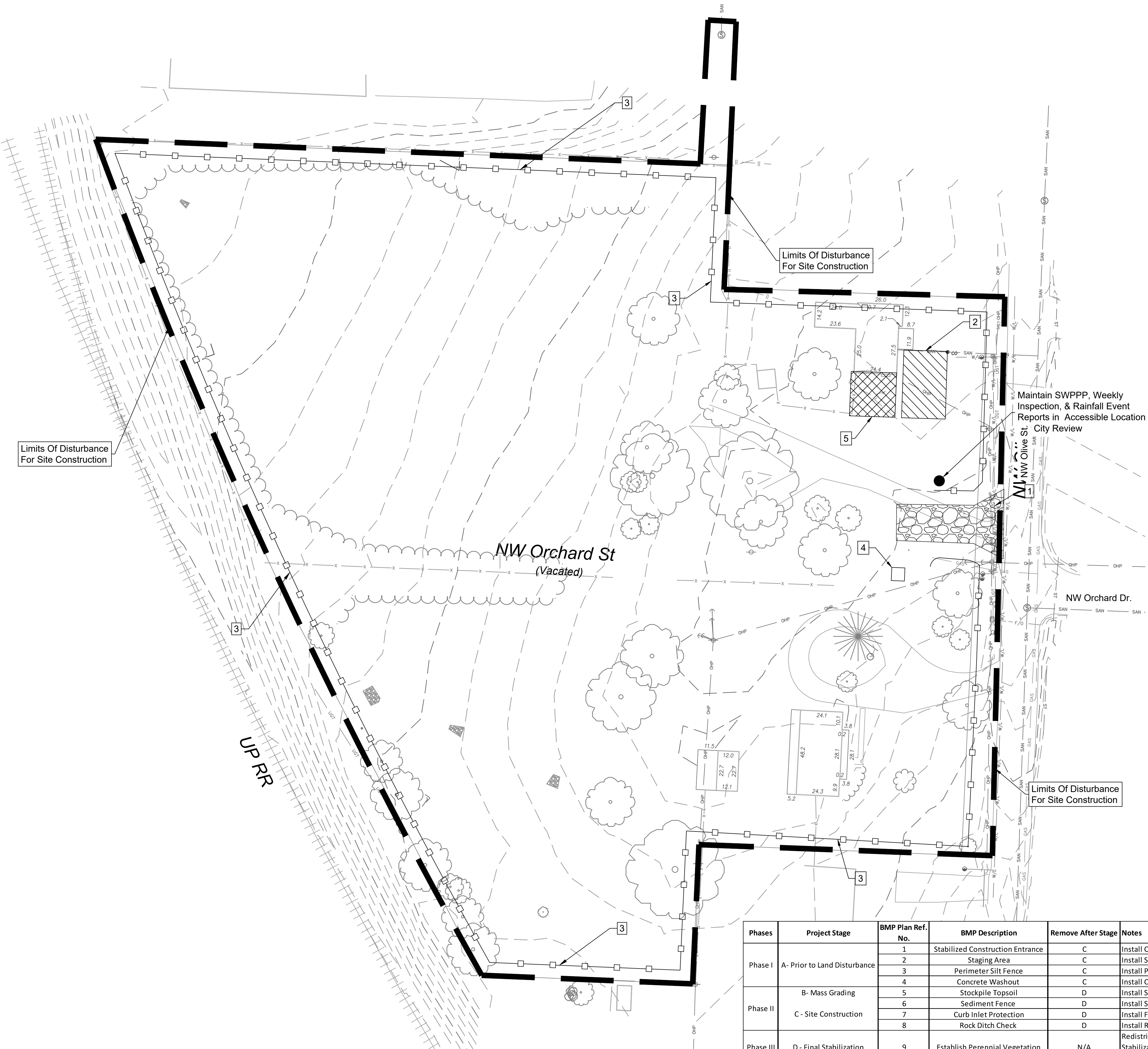
**Renaissance  
Infrastructure  
Consulting**

UITE, 200  
64108

816.800.0950  
WWW.RIC-CONSULT.COM

1815 MCGEE STREET,  
KANSAS CITY, MISSOURI

STATE OF MISSOURI  
MITCHELL E. SLUTTER  
*M. E. Slutter*  
NUMBER  
PE-2002003418  
PROFESSIONAL ENGINEER  
JAN 1, 2020  
MITCHELL E. SLUTTER PE-2002003418



Phases	Project Stage	BMP Plan Ref. No.	BMP Description	Remove After Stage	Notes
Phase I	A- Prior to Land Disturbance	1	Stabilized Construction Entrance	C	Install Construction Entrance, as shown on Plans.
		2	Staging Area	C	Install Staging Area
		3	Perimeter Silt Fence	C	Install Perimeter Silt Fence, as Shown on Plans.
		4	Concrete Washout	C	Install Concrete Washout as shown on plans prior to pouring any concrete
Phase II	B- Mass Grading	5	Stockpile Topsoil	D	Install Sediment Fence a Minimum of 5' Beyond Toe of Slope
		6	Sediment Fence	D	Install Sediment Fence, as Shown on Plans
	C - Site Construction	7	Curb Inlet Protection	D	Install Filter Bags around Proposed Curb Inlets
		8	Rock Ditch Check	D	Install Rock Ditch Check, as Shown on Plans
Phase III	D - Final Stabilization	9	Establish Perennial Vegetation	N/A	Redistribute topsoil and seed and mulch all disturbed areas. Sod right-of-way. Stabilization complete when 100% disturbed area is established with perennial vegetation with a density of 70%.

1. **Implement Pre-Clearing Plan:**  
All temporary structural BMP's shown on the pre-clearing plan must be in place before the general clearing operations. Clearing necessary to place temporary structural BMP's is the minimum required for installation.  
Coordinate clearing necessary to place temporary structural BMP's with local weather forecast so that clearing and placement may be completed within a forecast dry period. Stabilize all erosion control measures after installation. Temporary Barrier Fence shall be in Place, around areas not to be disturbed, prior to any construction activities. This area includes Stream Corridor.
2. **Clear and Stabilize Work Areas:**  
Grade contractor areas and place all-weather surface on contractor areas.
3. **Clearing and Grubbing:**  
After Phase I BMP's are installed, contractor may clear, grub, and demo required areas as necessary.

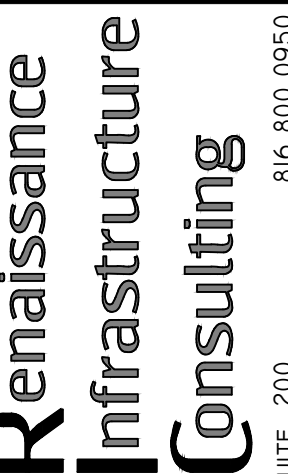
### EROSION CONTROL NOTES

1. Erosion control plan modifications shall be required if the plan fails to substantially control erosion and offsite sedimentation.
2. The retention of access controls and sediment controls shall be required for areas where seed has not established 70% cover.
3. The contractor shall temporarily seed and mulch all disturbed areas if there has been no construction activity on them for a period of fourteen (14) calendar days.
4. Install "J" Hooks on silt fence every 100 LF

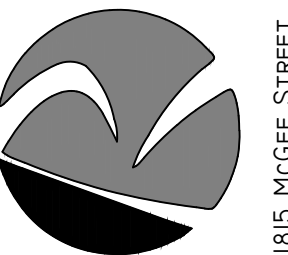


## Phase II

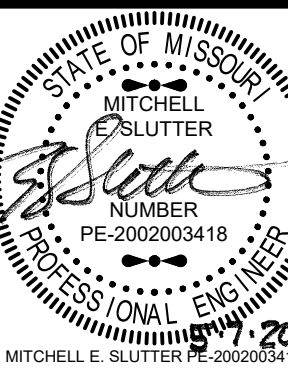
NO	BY	CD	DATE	REVISION
1.	JDG	MES	06/09/2020	ORIGINAL SUBMISSION



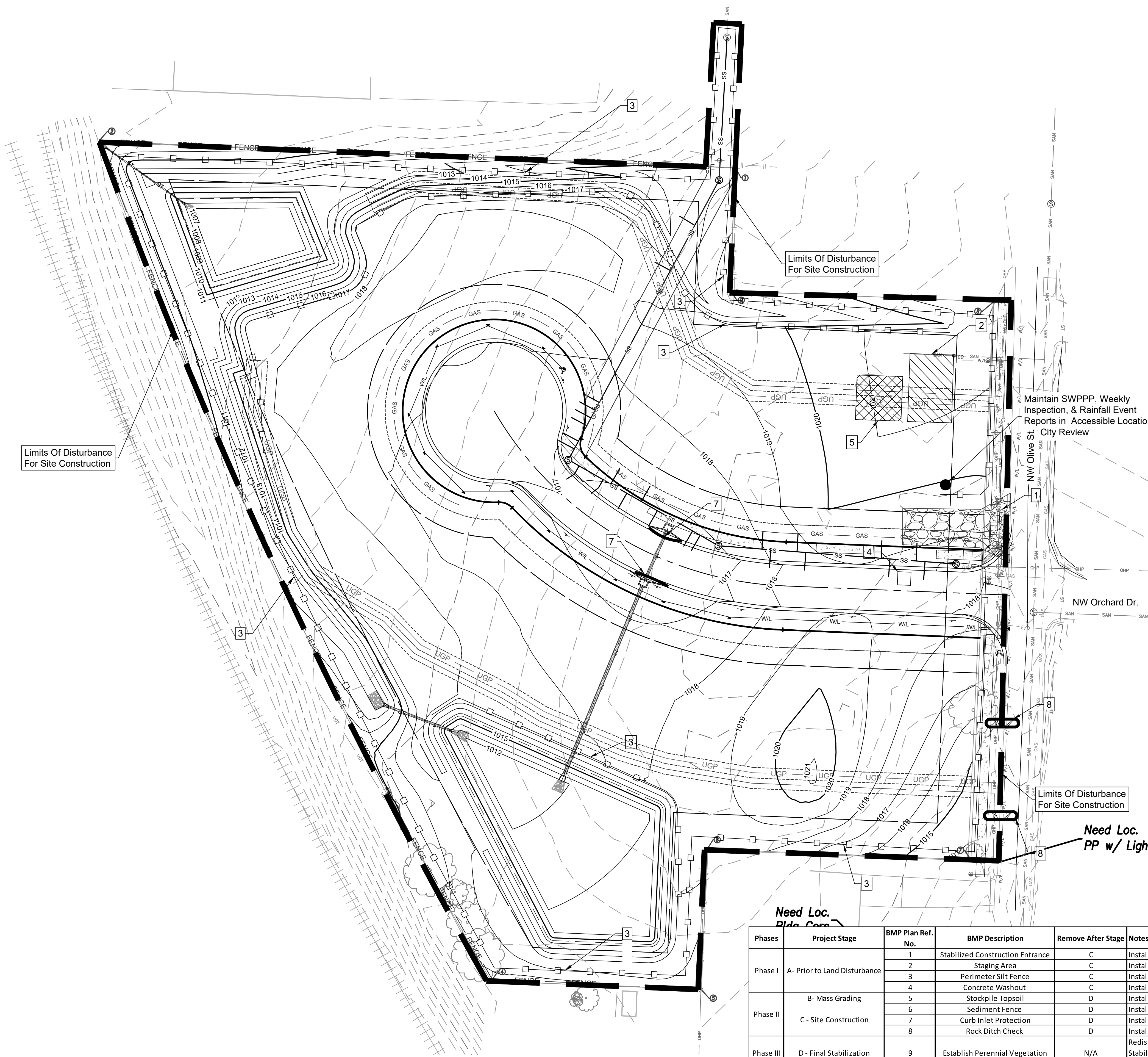
FILE: 200  
64108  
WWW.RIC-CONSULT.COM  
010-000-0300



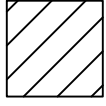
KANSAS CITY, MISSOURI 64110



KANSAS CITY, MISSOURI 64110



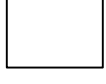
## Stabilized Construction Entrance



## Staging Area



### Stockpile Area



## Concrete Washout



### Limits of Disturbance

## Perimeter Silt Fence



### Rock Ditch Check

## WRITTEN SEQUENCING

1. **Implement Pre-Clearing Plan:**  
All temporary structural BMP's shown on the pre-clearing plan must be in place before the general clearing operations. Clearing necessary to place temporary structural BMP's is the minimum required for installation. Coordinate clearing necessary to place temporary structural BMP's with local weather forecast so that clearing and placement may be completed within a forecast dry period. Stabilize all erosion control measures after installation. Temporary Barrier Fence shall be in Place, around areas not to be disturbed, prior to any construction activities. This area includes Stream Corridor.
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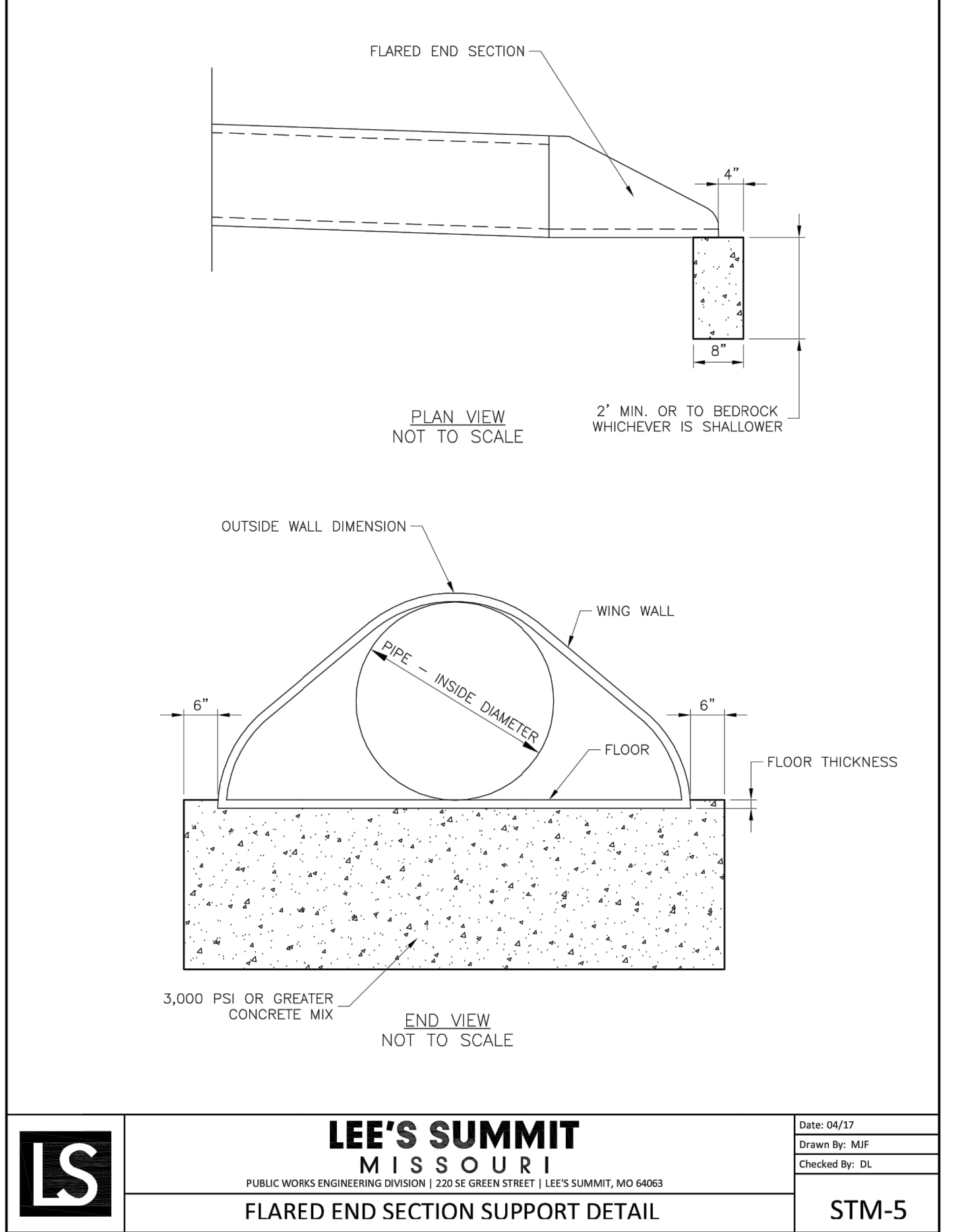
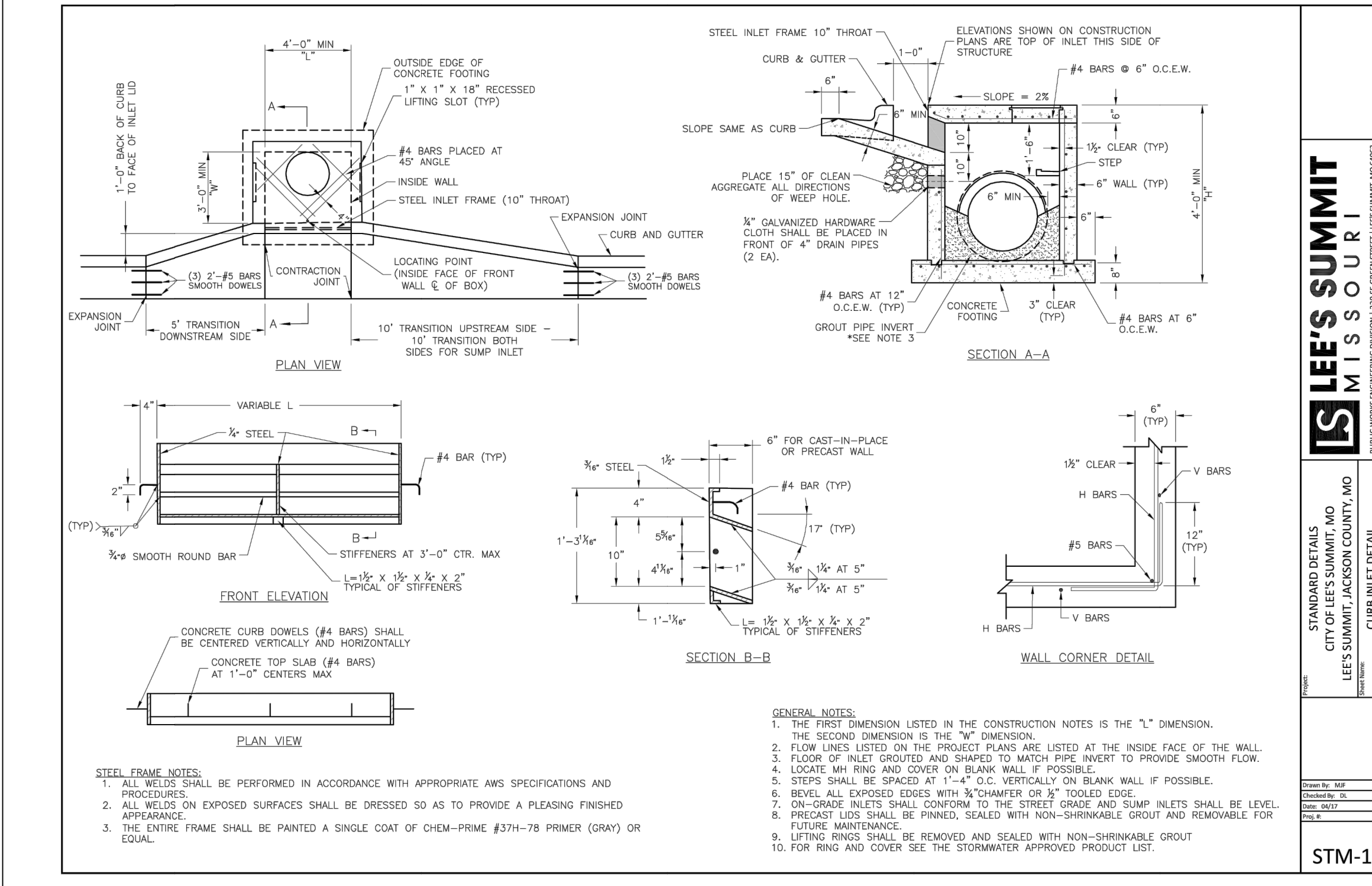
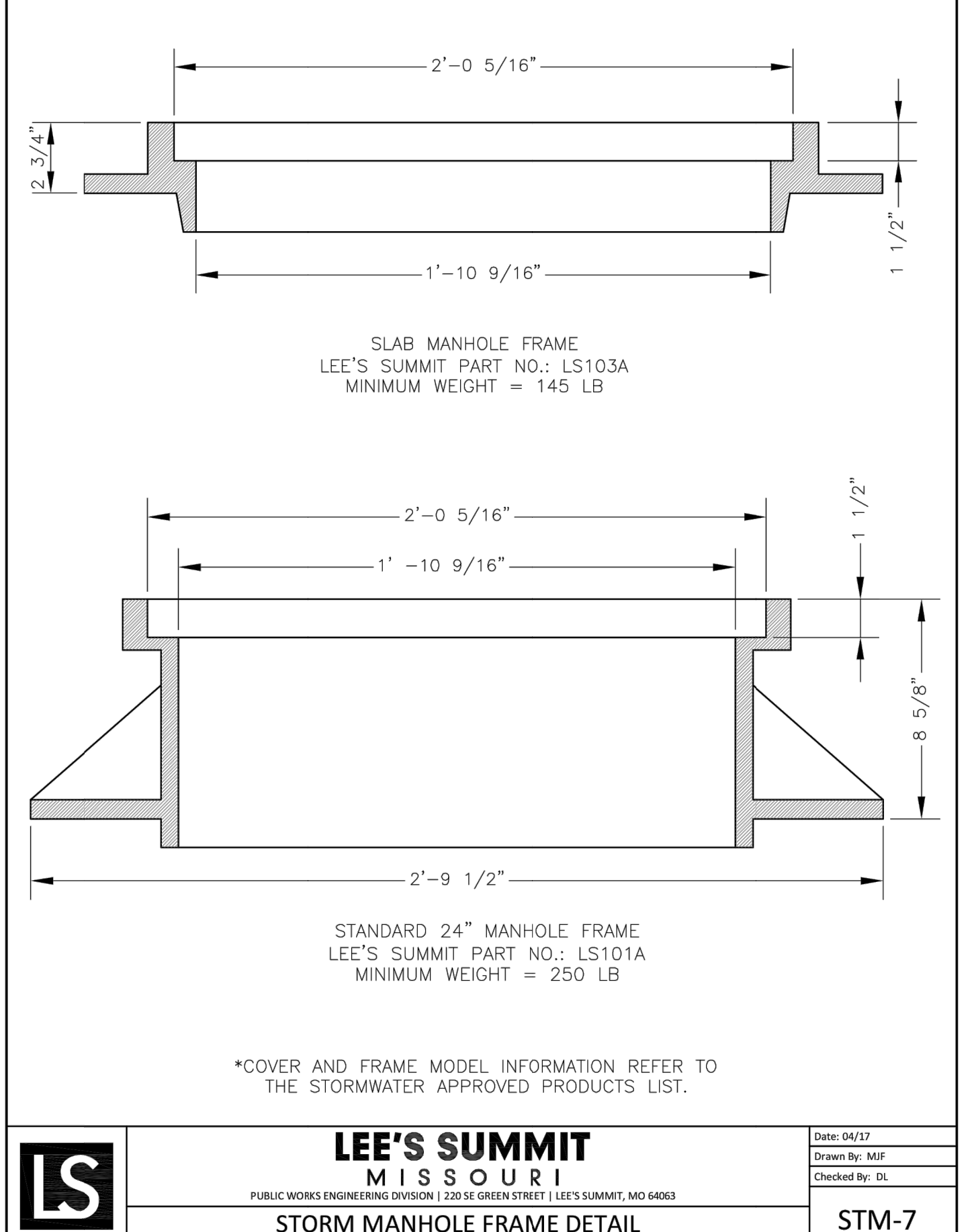
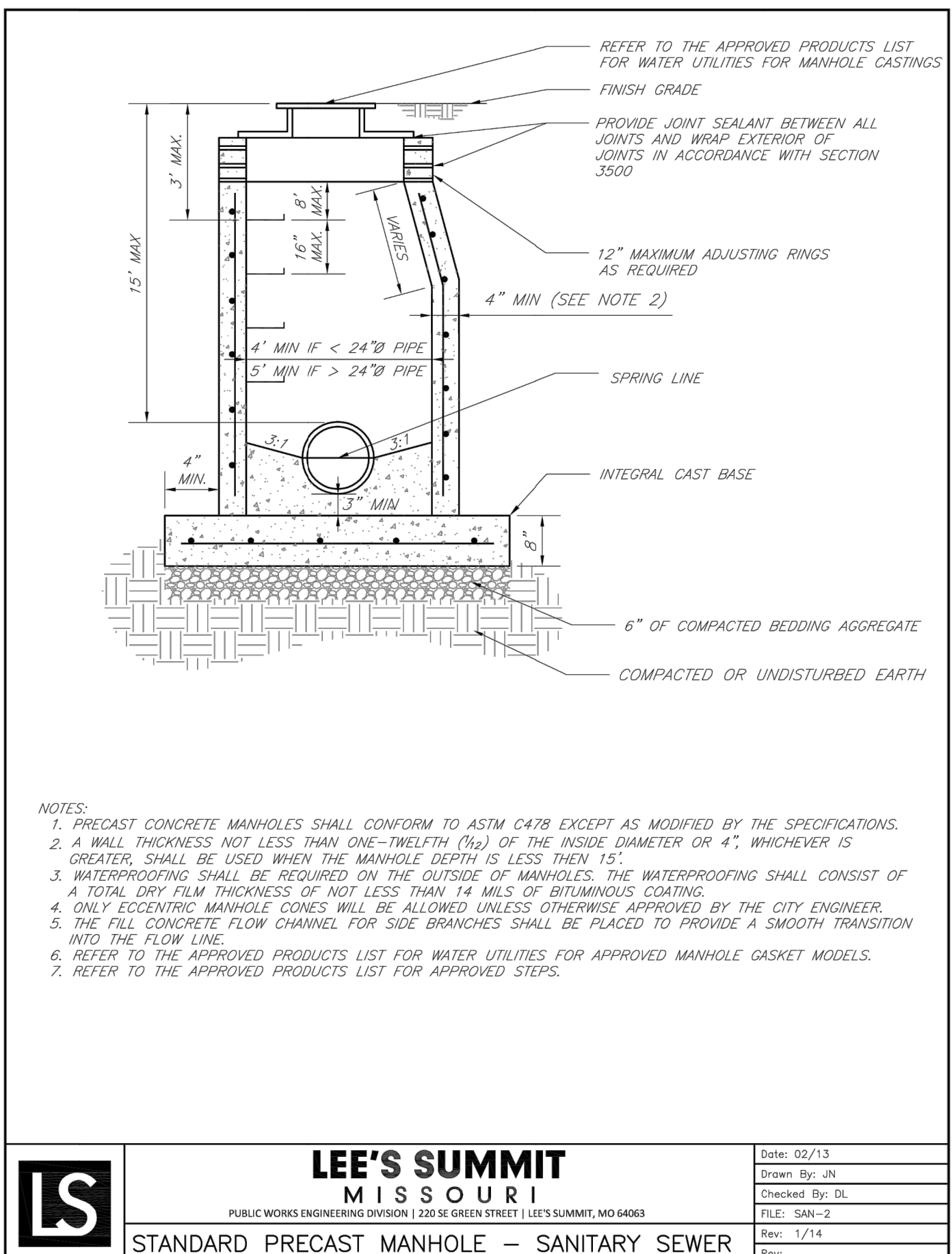
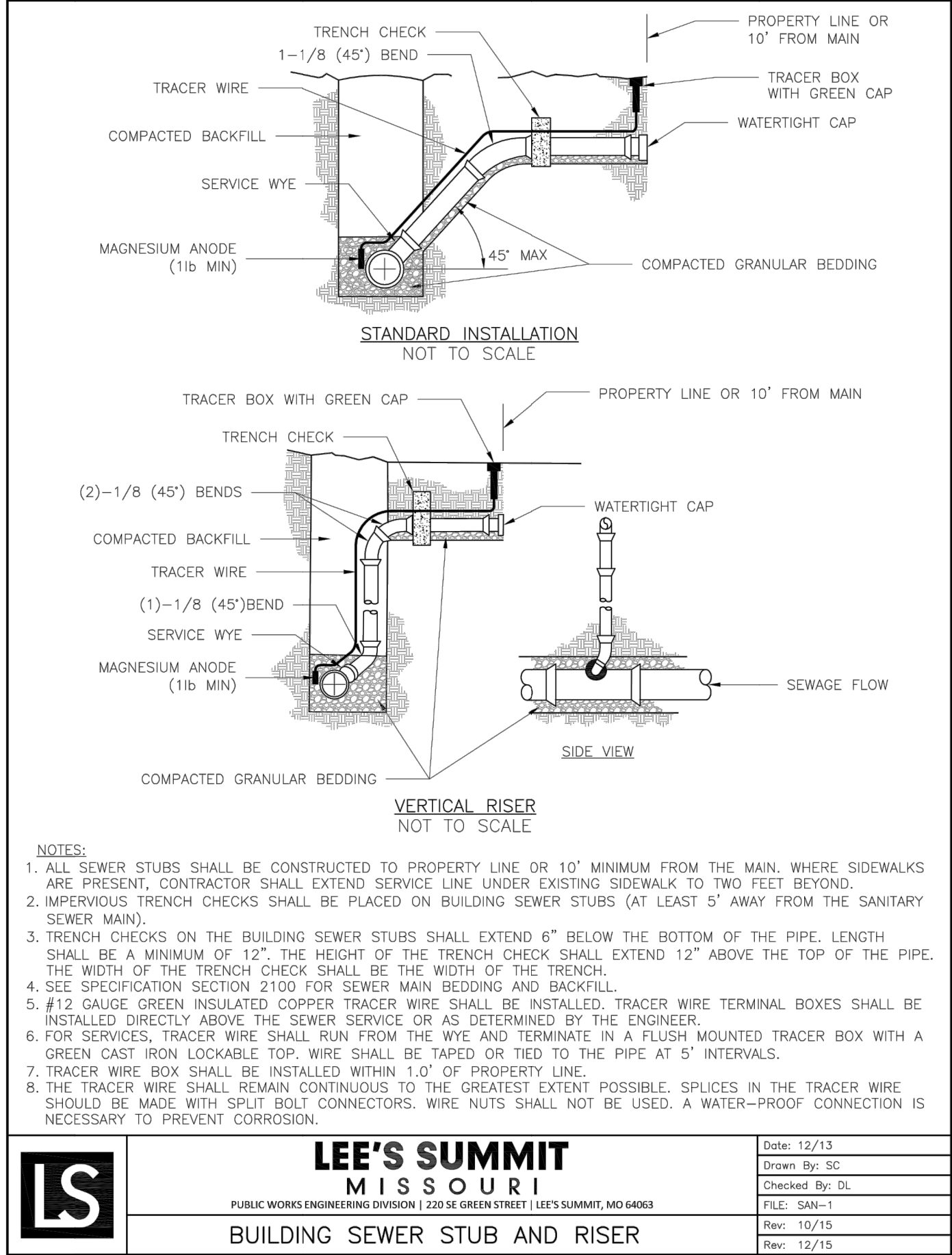






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NO.	BY	DATE	REVISION
1.	JDG	MES 05/09/2020	ORIGINAL SUBMISSION

**Renaissance Infrastructure Consulting**

816.800.0950  
WWW.RIC-CONSULT.COM

1815 MCGEE STREET, SUITE 200  
KANSAS CITY, MISSOURI 64108

MO Certificate of Authority: E-201 0033630

**STATE OF MISSOURI**

**MITCHELL E. SLUTTER**

**Professional Engineer**

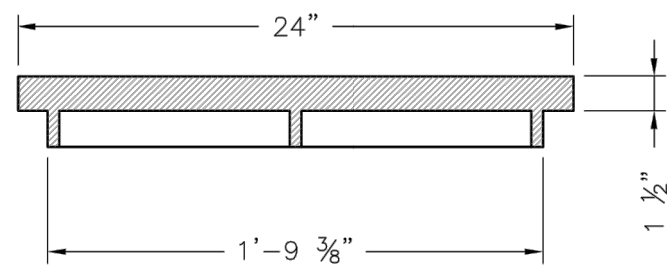
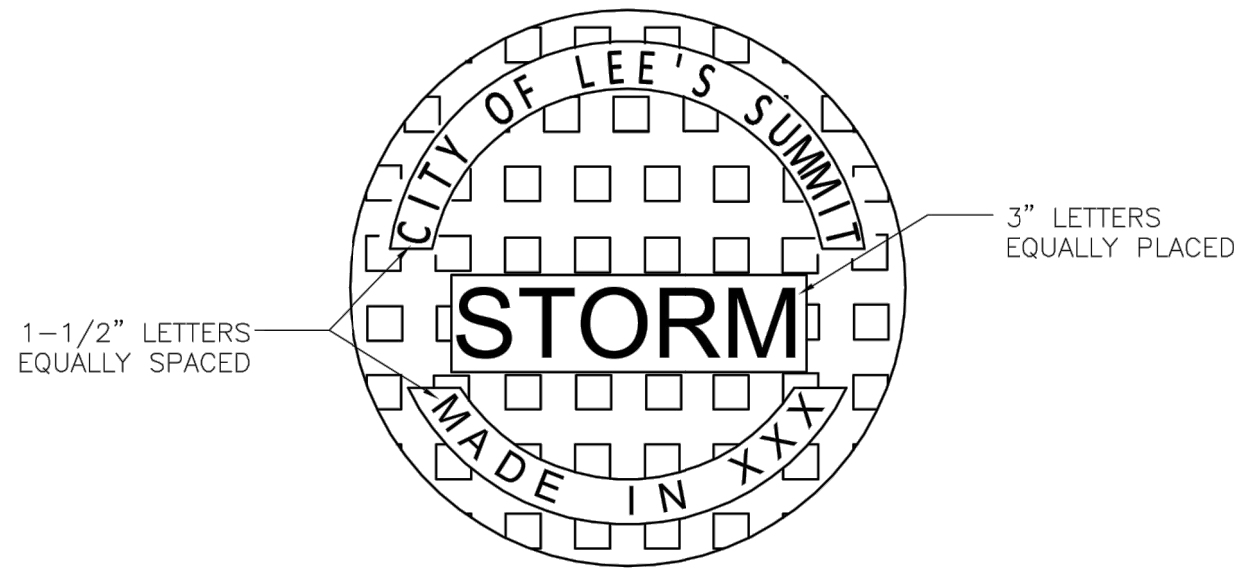
NUMBER  
PE-2002003418

DATE  
04-14-2020

MITCHELL E. SLUTTER PE-2002003418



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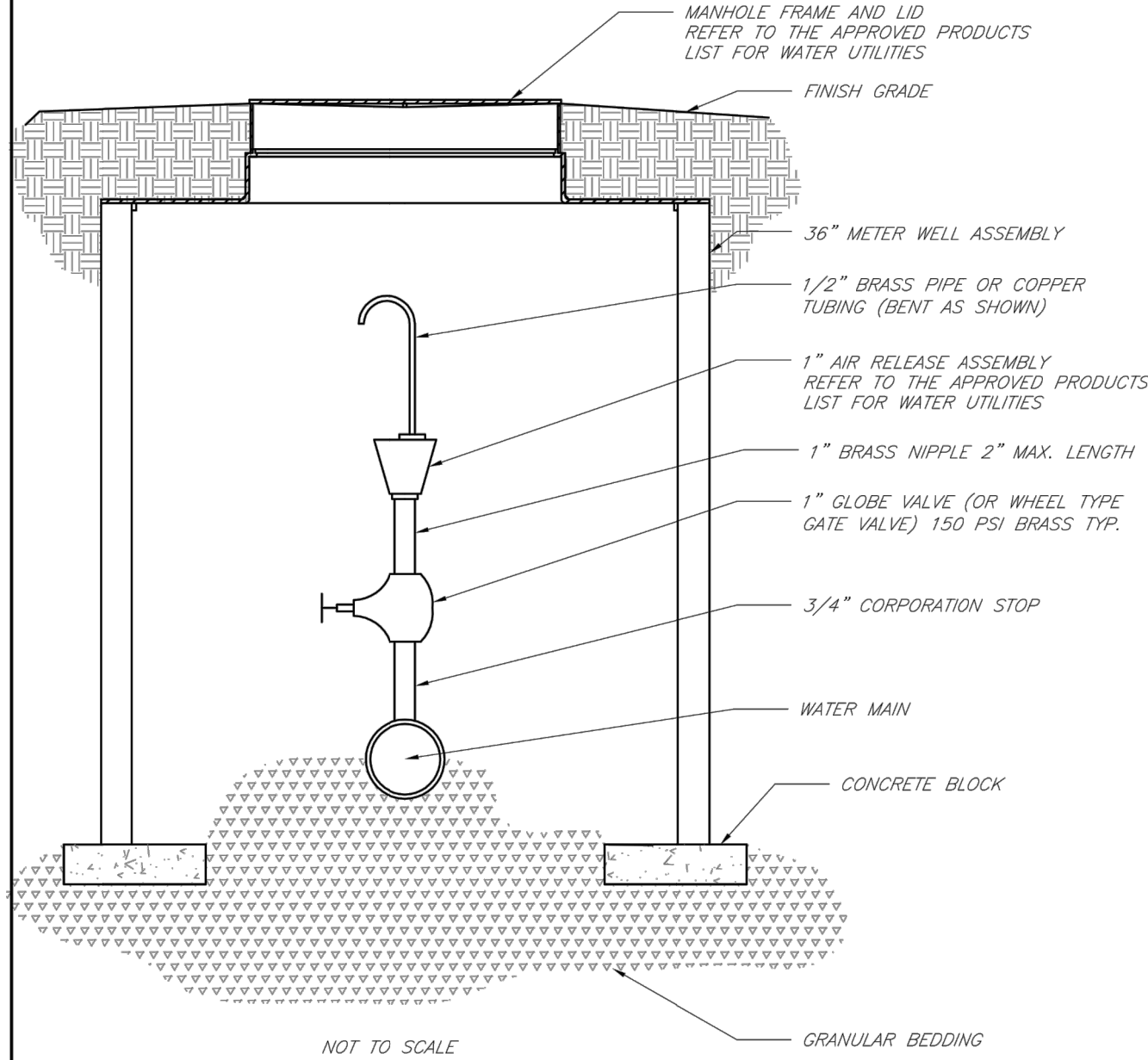
STANDARD 24" MANHOLE COVER  
MINIMUM WEIGHT = 160 LB  
NOTE: PICK HOLES NOT SHOWN

\*COVER AND FRAME MODEL INFORMATION REFER TO  
THE STORMWATER APPROVED PRODUCT LIST.



**LEE'S SUMMIT  
MISSOURI**  
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063  
**STORM MANHOLE COVER DETAIL**

Date: 04/17  
Drawn By: NJF  
Checked By: DL  
**STM-6**

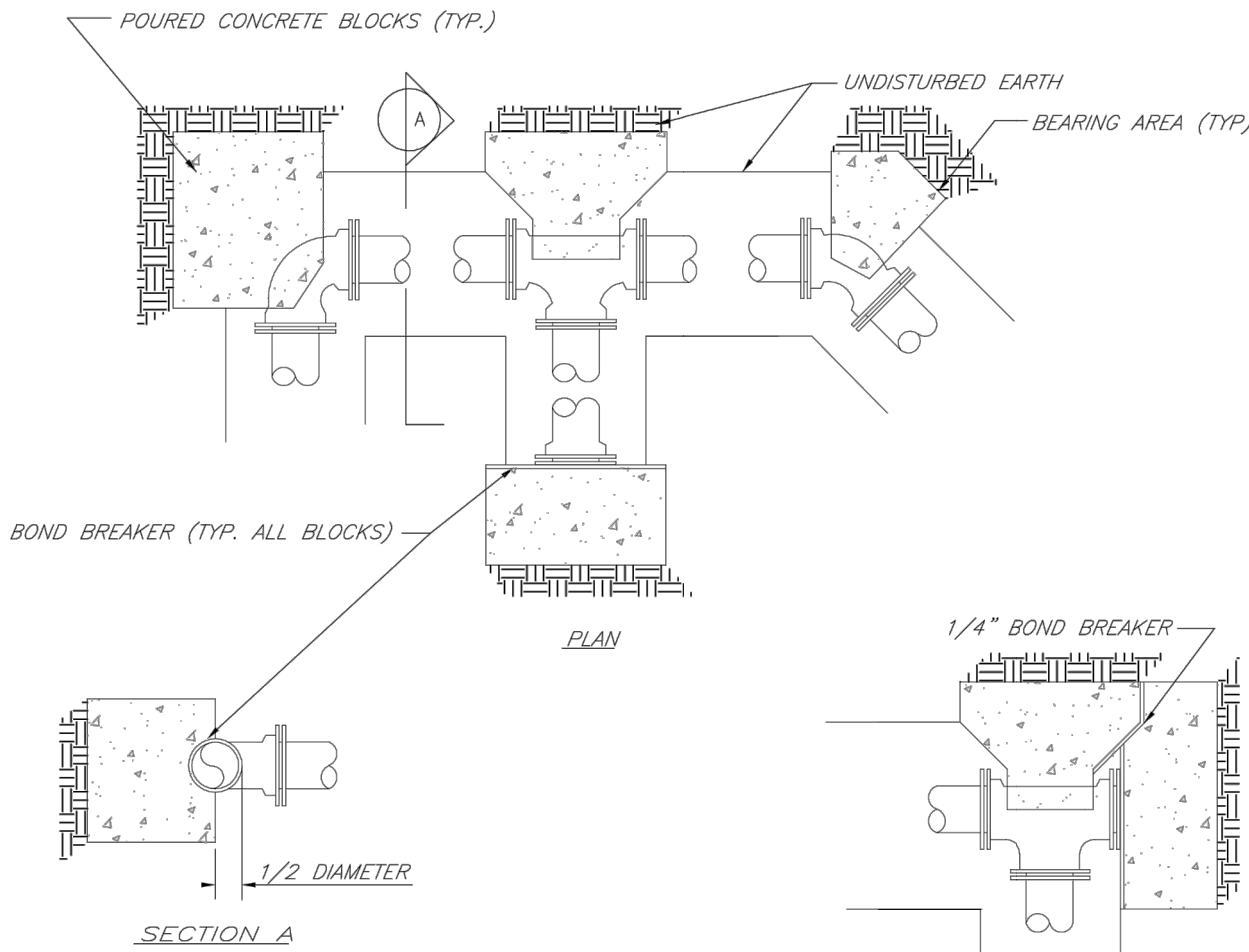


**LEE'S SUMMIT  
MISSOURI**  
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063  
**AIR RELEASE ASSEMBLY**

Date: 02/13  
Drawn By: JN  
Checked By: DL  
FILE: WAT-10  
Rev: 1/14

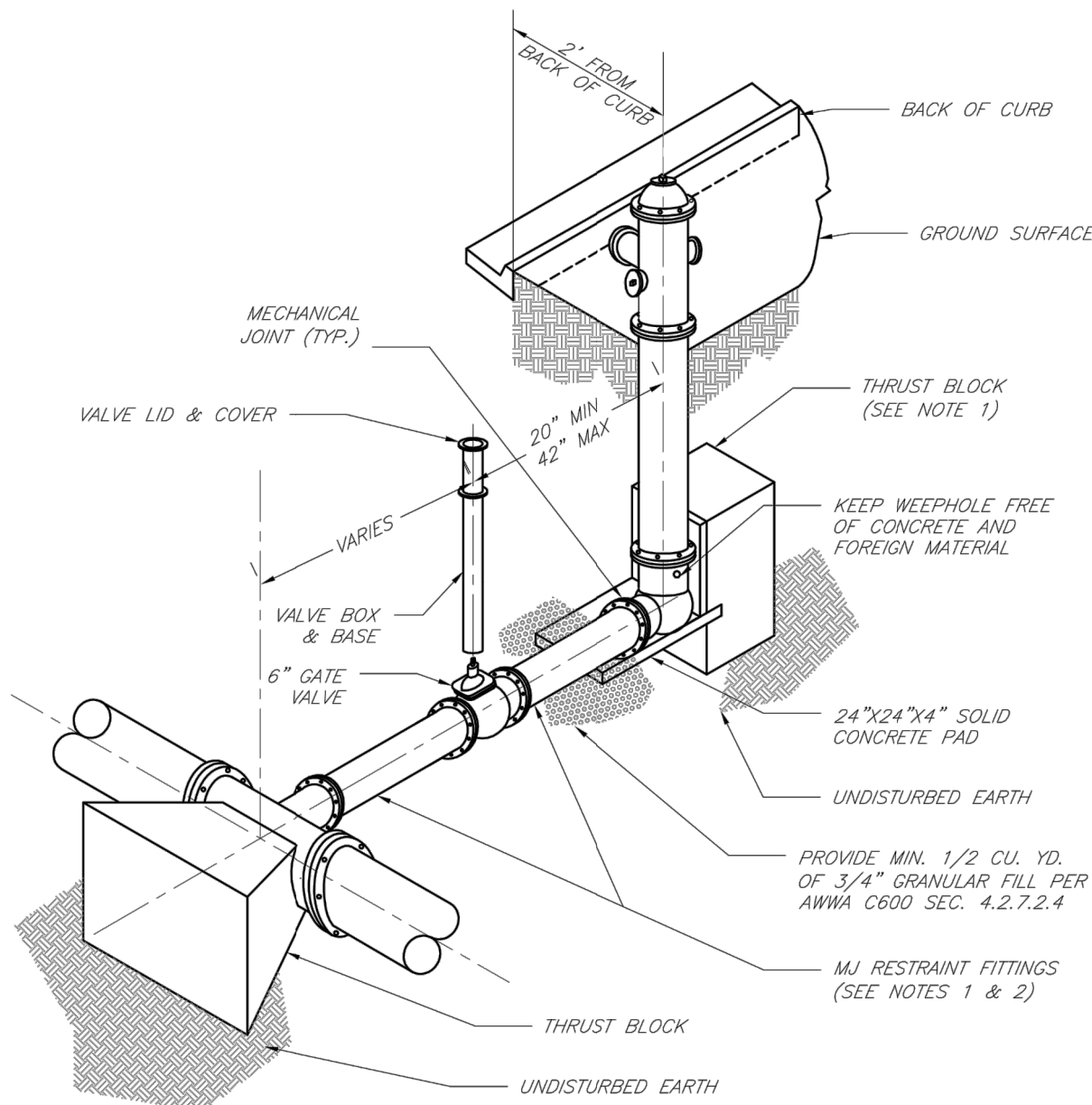
REQUIRED CONCRETE BEARING AREA (SQUARE FEET - SF)					
NOM. DIA. (INCHES)	TEE, PLUG	90 BEND	45 BEND	22.5 BEND	11.25 BEND
6	4.7	6.7	4.0	4.0	4.0
8	8.4	11.8	6.4	4.0	4.0
10	13.1	18.5	10.0	5.1	4.0
12	18.8	26.7	14.4	7.4	4.0
14	25.7	36.3	19.6	10.0	5.0
16	33.5	47.4	25.6	13.1	6.6
18	42.4	REST. JT.	32.5	16.5	8.3
20	REST. JT.	REST. JT.	40.1	20.4	10.3
24	REST. JT.	REST. JT.	REST. JT.	29.4	14.8

NOTES:  
1. ALL BENDS WITHOUT RESTRAINED JOINTS SHALL HAVE CONCRETE THRUST BLOCKS INSTALLED FOR RESTRAINT.  
2. MEGA LUGS MAY BE USED ONLY IN CONJUNCTION WITH CONCRETE THRUST BLOCKING.  
3. BEARING AREA MUST BE AGAINST UNDISTURBED SOIL.  
4. DO NOT COVER JOINTS OR BOLTS (WHERE APPLICABLE) WITH CONCRETE.



**LEE'S SUMMIT  
MISSOURI**  
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063  
**HORIZONTAL THRUST BLOCKS**

Date: 02/13  
Drawn By: JN  
Checked By: DL  
FILE: WAT-1  
Rev: 1/14



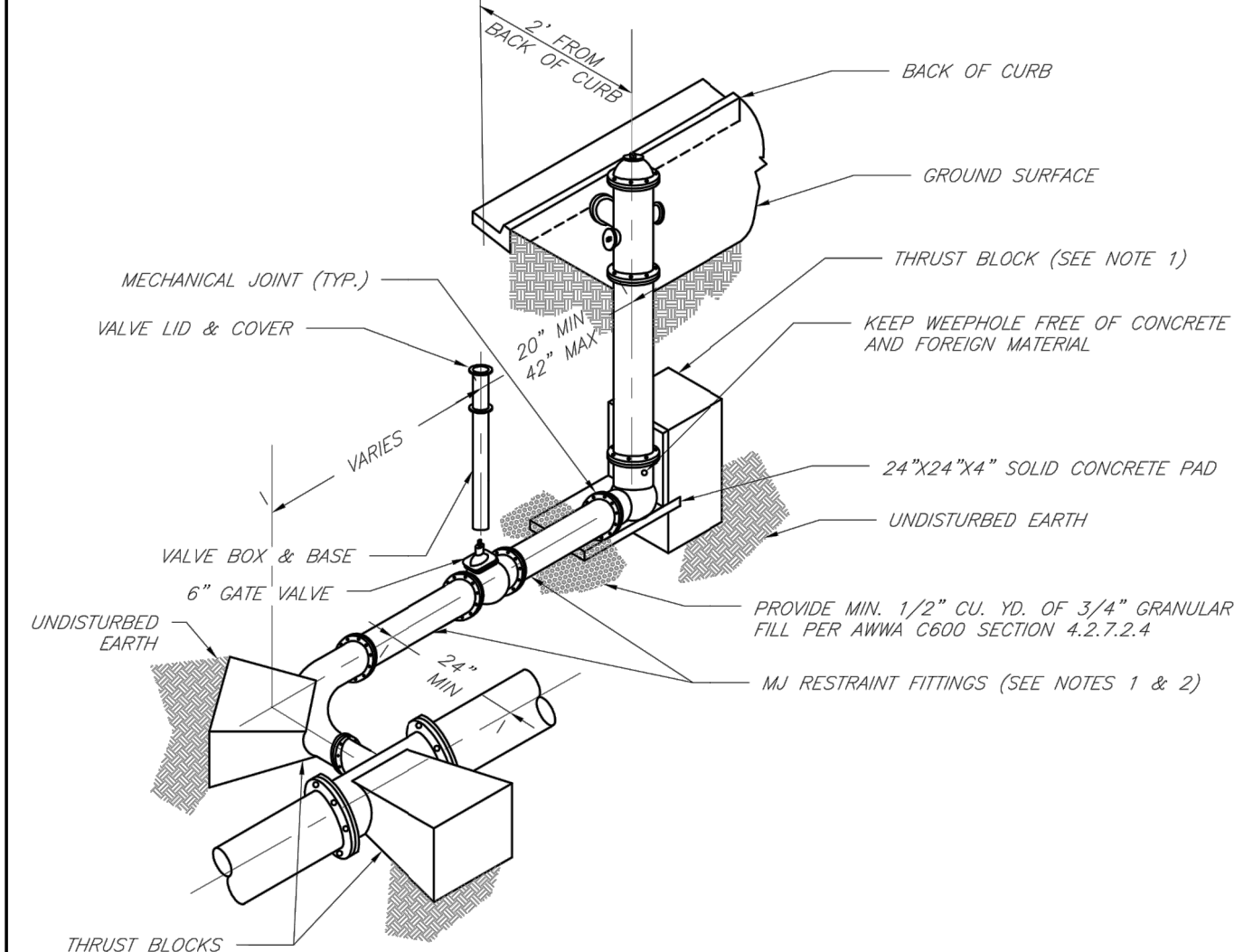
NOTES:

1. WHEN RETAINER GLANDS ARE USED IN LIEU OF MECHANICAL JOINT (MJ) RESTRAINT FITTINGS, HORIZONTAL THRUST BLOCKS ARE REQUIRED.
2. GATE VALVE MAY BE BOLTED DIRECTLY TO MJ RESTRAINT TEE.
3. SEE APPROVED PRODUCTS LIST FOR WATER UTILITIES FOR FIRE HYDRANT, VALVES, VALVE BOX LID, AND COVER.
4. BOTTOM HYDRANT FLANGE SHALL BE 2" TO 6" ABOVE FINISHED GRADE.
5. FOR STREETS WITHOUT CURBS FIRE HYDRANTS SHALL BE PLACED WITHIN 1 FOOT OF THE R/W LINE, BUT NOT MORE THAN 10" FROM EDGE OF PAVEMENT. FIRE HYDRANT SHALL NOT BE PLACED IN BOTTOM OF DITCH.
6. HYDRANT SHALL BE ROTATED AS DIRECTED BY INSPECTOR.



**LEE'S SUMMIT  
MISSOURI**  
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063  
**HYDRANT INSTALLATION - STRAIGHT SET**

Date: 02/13  
Drawn By: JN  
Checked By: DL  
FILE: WAT-7  
Rev: 1/14



NOTES:

1. WHEN RETAINER GLANDS ARE USED IN LIEU OF MECHANICAL JOINT (MJ) RESTRAINT FITTINGS, HORIZONTAL THRUST BLOCKS ARE REQUIRED.
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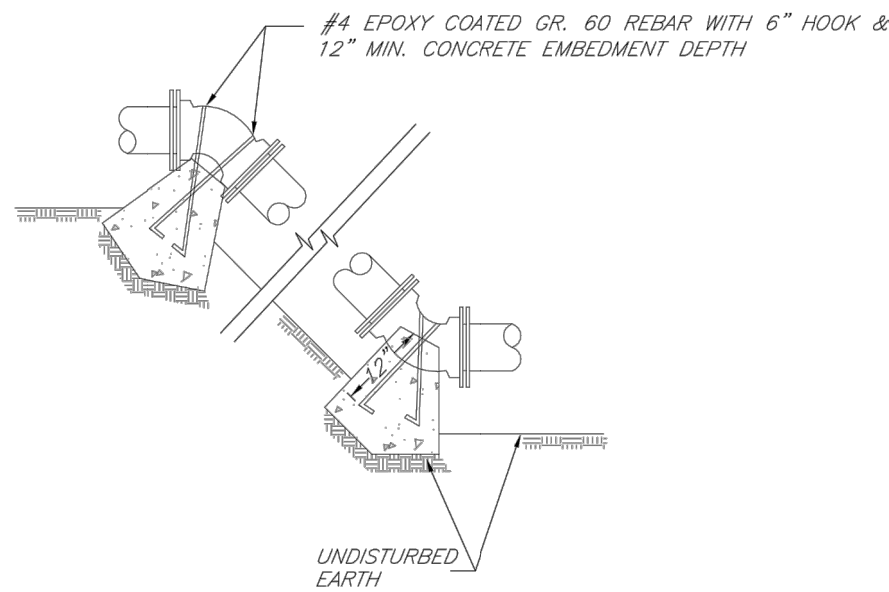


**LEE'S SUMMIT  
MISSOURI**  
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063  
**HYDRANT WITH 90 DEGREE BEND**

Date: 02/13  
Drawn By: JN  
Checked By: DL  
FILE: WAT-8  
Rev: 1/14

REQUIRED CONCRETE VOLUME (CUBIC FEET - CF)					
NOM. DIA. (INCHES)	TEE, PLUG	90 BEND	45 BEND	22.5 BEND	11.25 BEND
6	50.5	71.4	38.6	19.7	9.9
8	89.8	126.9	68.7	35.0	17.6
10	140.2	198.3	107.3	54.7	27.5
12	202.0	REST. JT.	154.6	78.8	39.6
14	REST. JT.	REST. JT.	210.4	107.3	53.9
16	REST. JT.	REST. JT.	REST. JT.	140.1	70.4
18	REST. JT.	REST. JT.	REST. JT.	177.3	89.1
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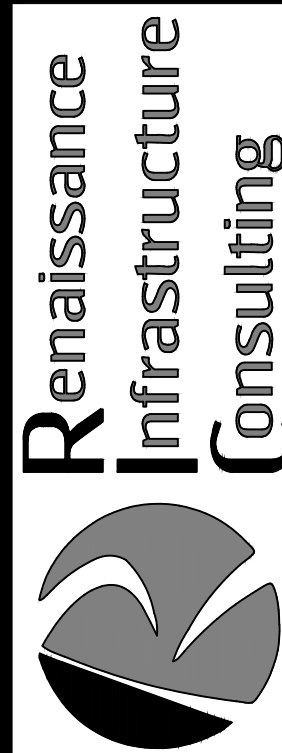
NOTES:  
1. ALL BENDS WITHOUT RESTRAINED JOINTS SHALL HAVE CONCRETE THRUST BLOCKS INSTALLED FOR RESTRAINT.  
2. MEGA LUGS MAY BE USED ONLY IN CONJUNCTION WITH CONCRETE THRUST BLOCKING.  
3. BEARINGS MUST BE AGAINST UNDISTURBED SOIL.  
4. DO NOT COVER JOINTS OR BOLTS (WHERE APPLICABLE) WITH CONCRETE.



**LEE'S SUMMIT  
MISSOURI**  
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063  
**VERTICAL THRUST BLOCKS**

Date: 02/13  
Drawn By: JN  
Checked By: DL  
FILE: WAT-2  
Rev: 1/14

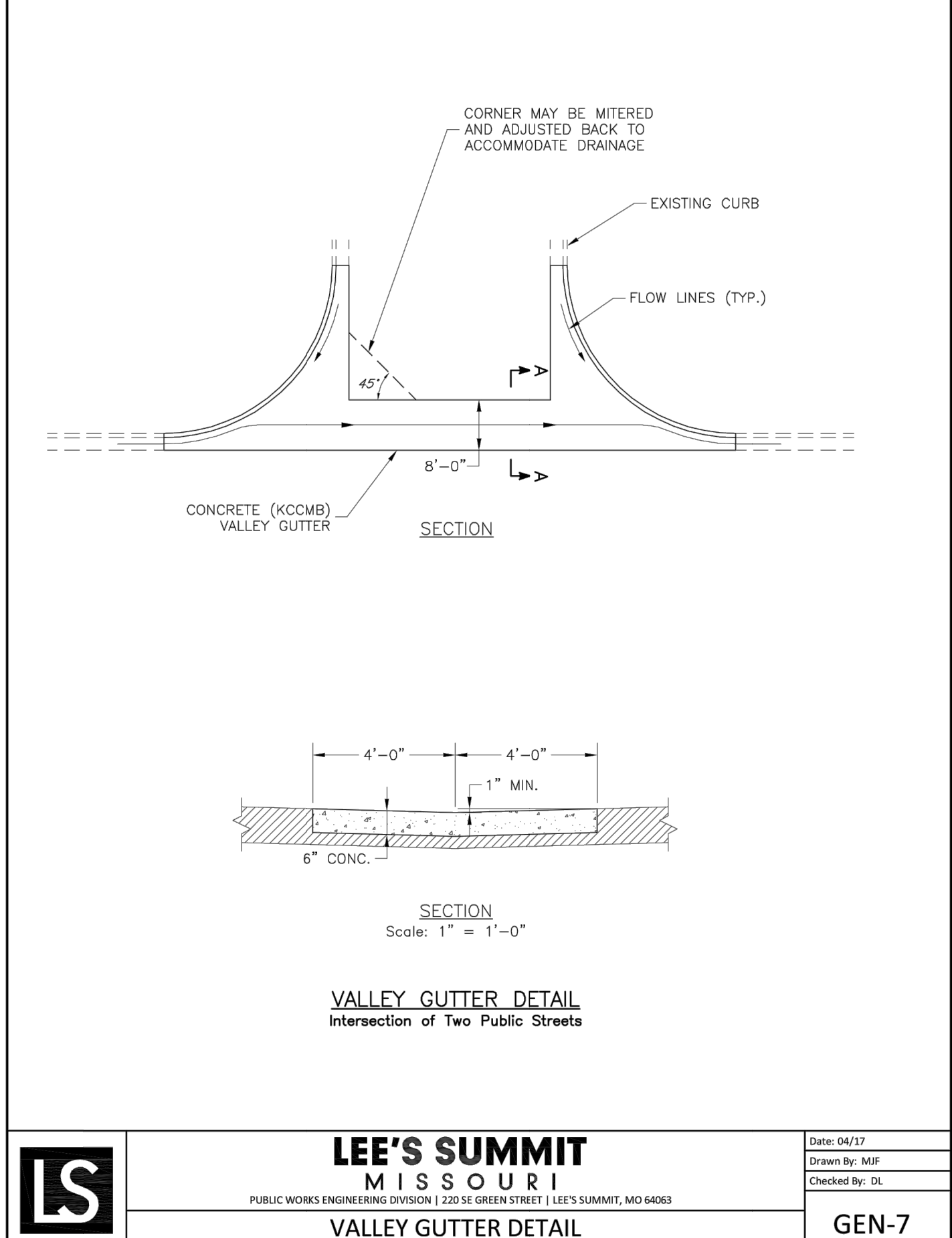
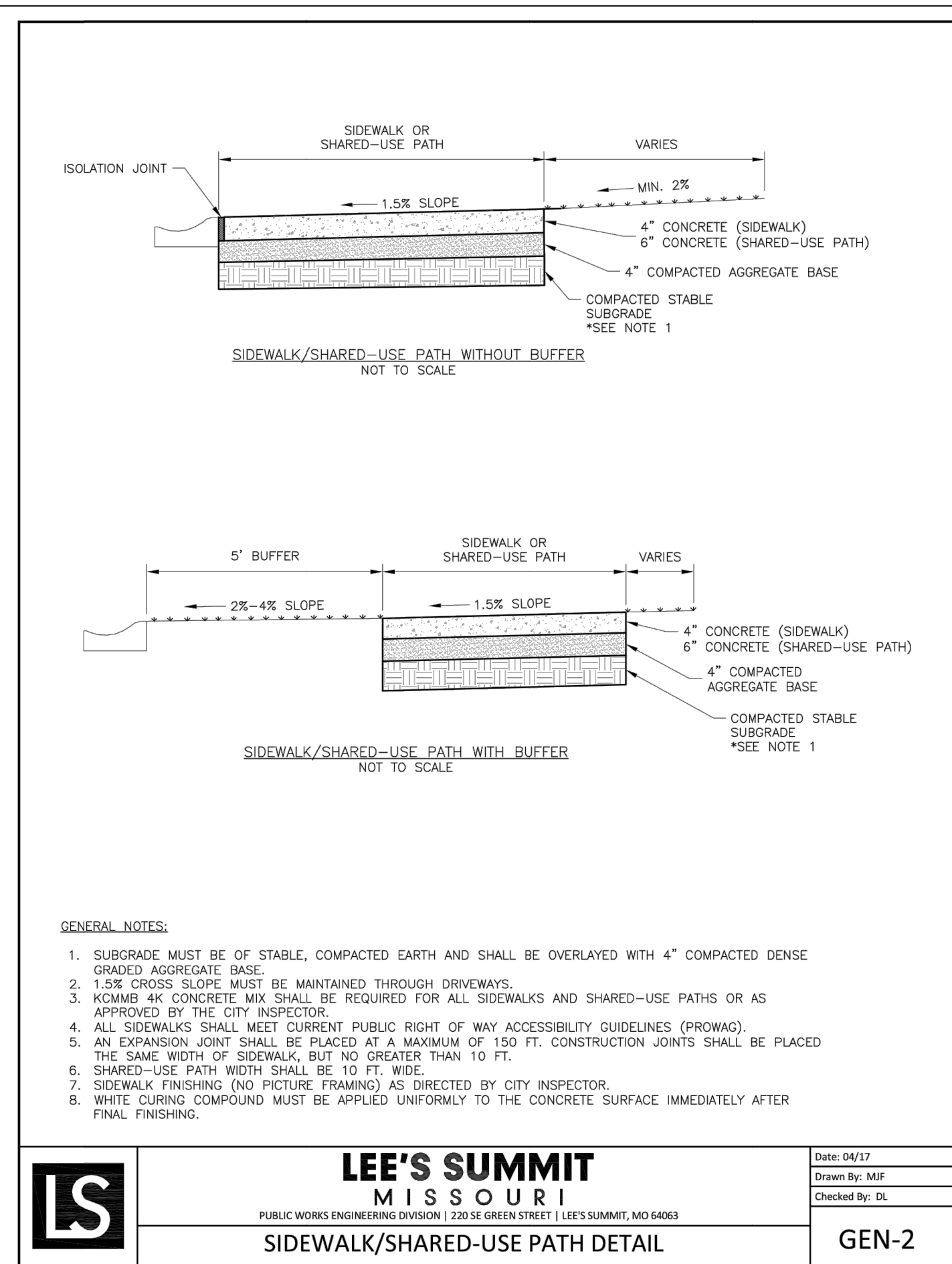
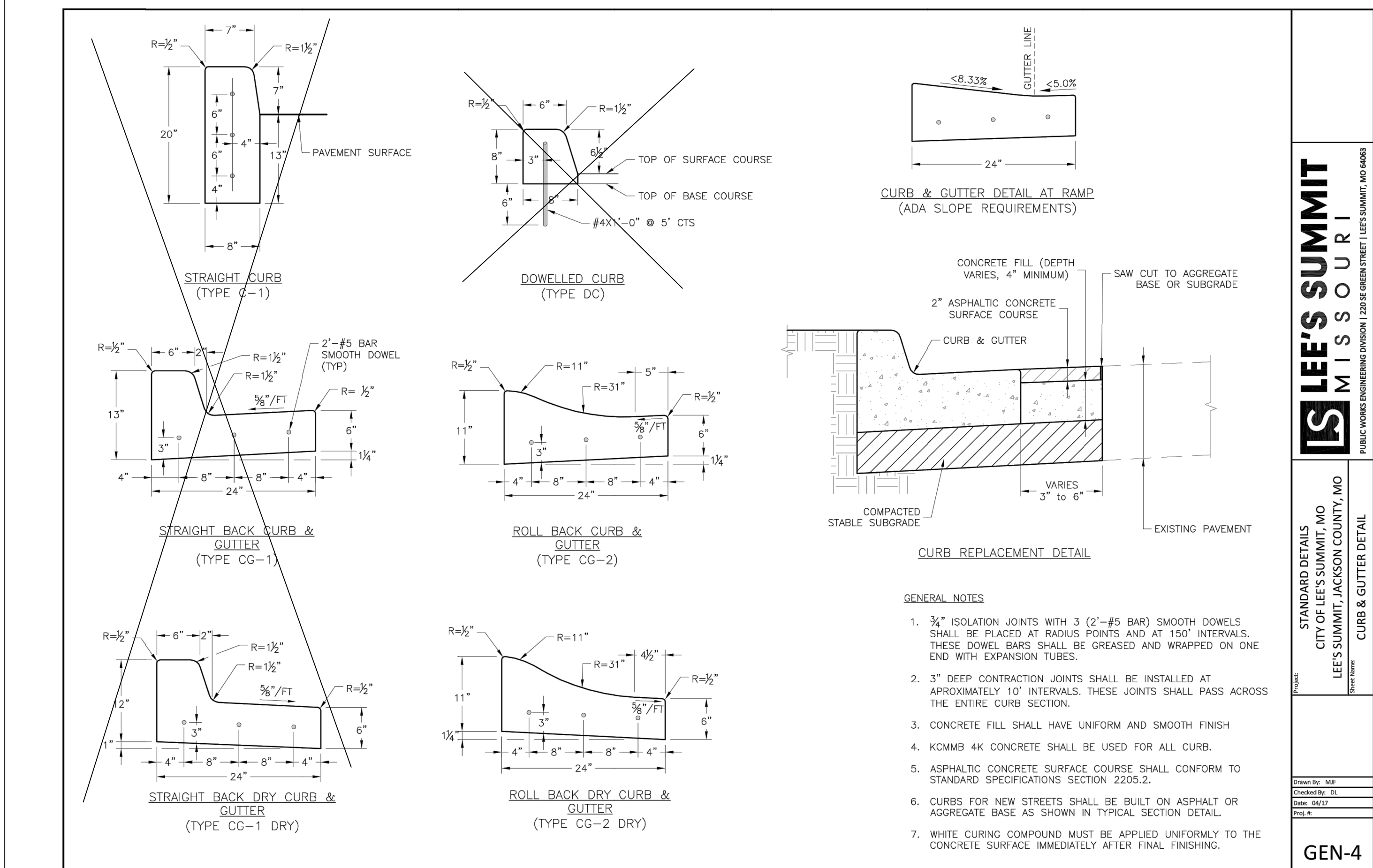
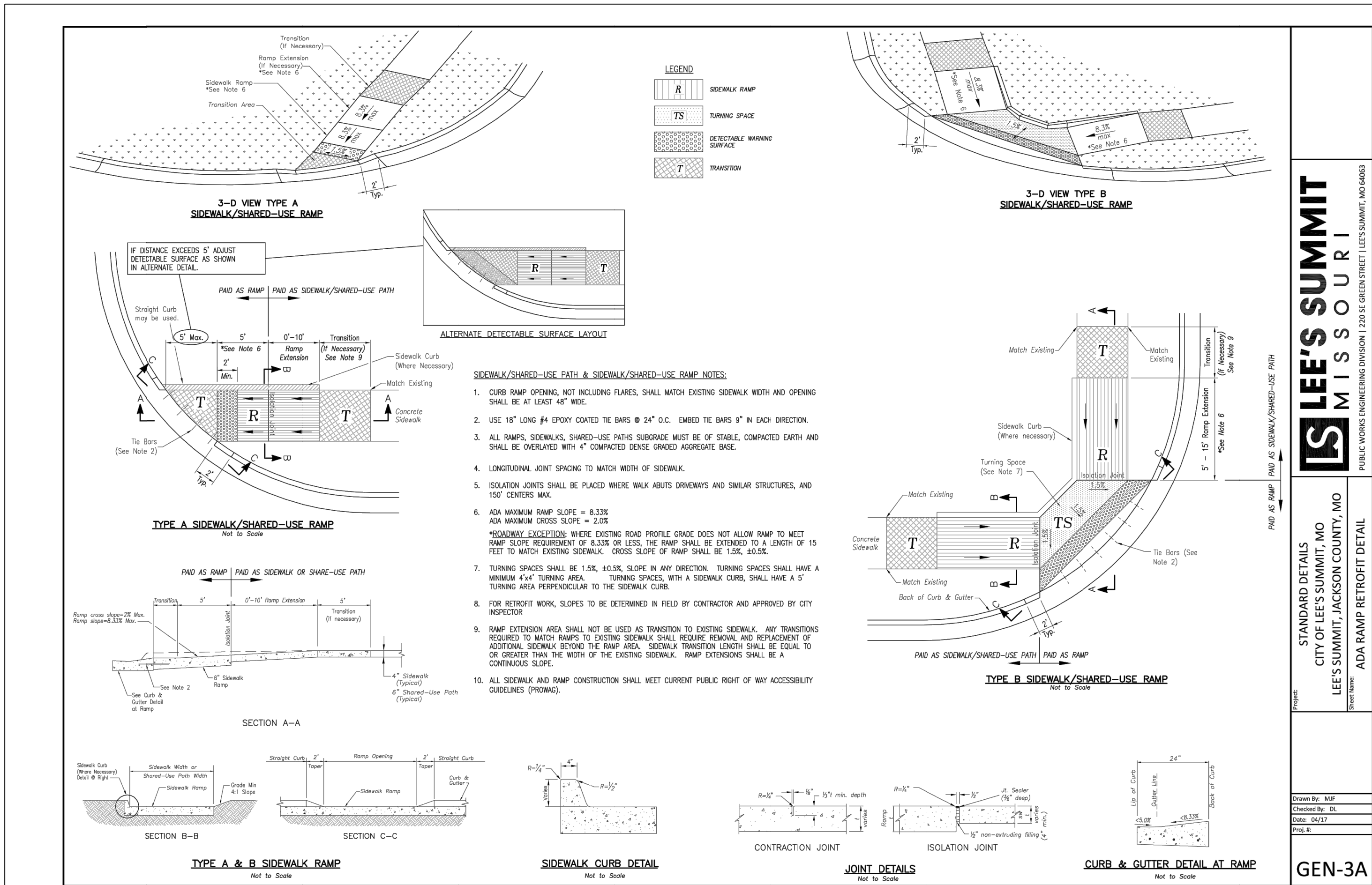
REVISION				ORIGINAL SUBMISSION
NO.	BY	DATE	DESCRIPTION	
1	JDS	05/08/2020		



816-800-0950  
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1815 MCCREE STREET, SUITE 200  
KANSAS CITY, MISSOURI 64108

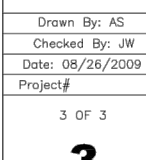
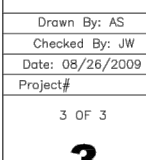






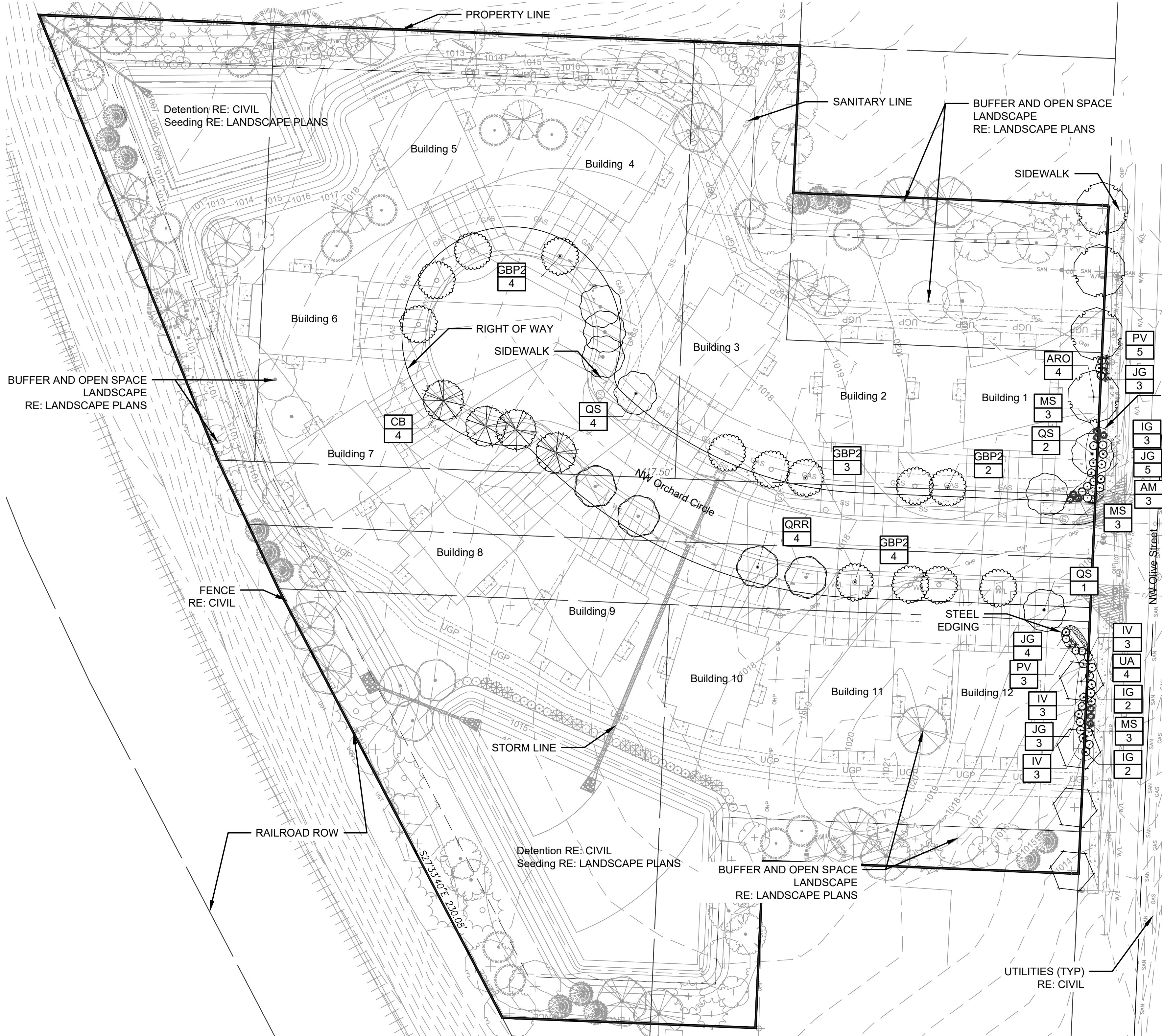
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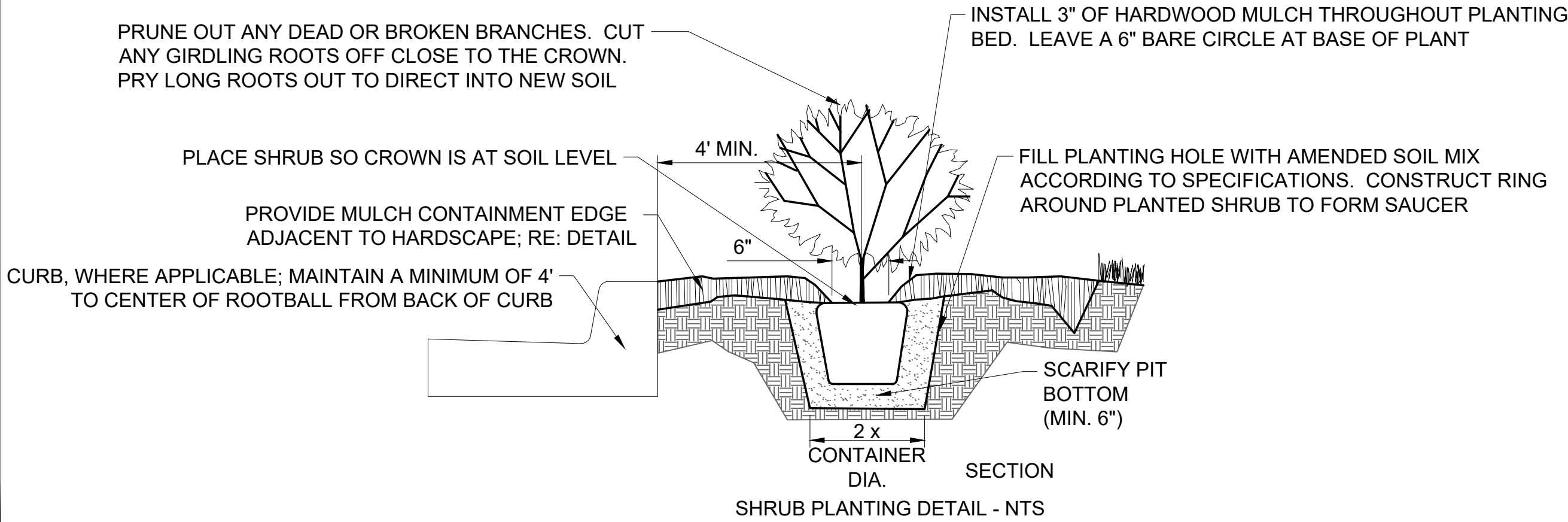


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Z:\R\C Design\2018\18-0251 Burton Townhomes Lees Summit\Draw\Street & Storm Plans\18-0251 LND ST Tree.dwg

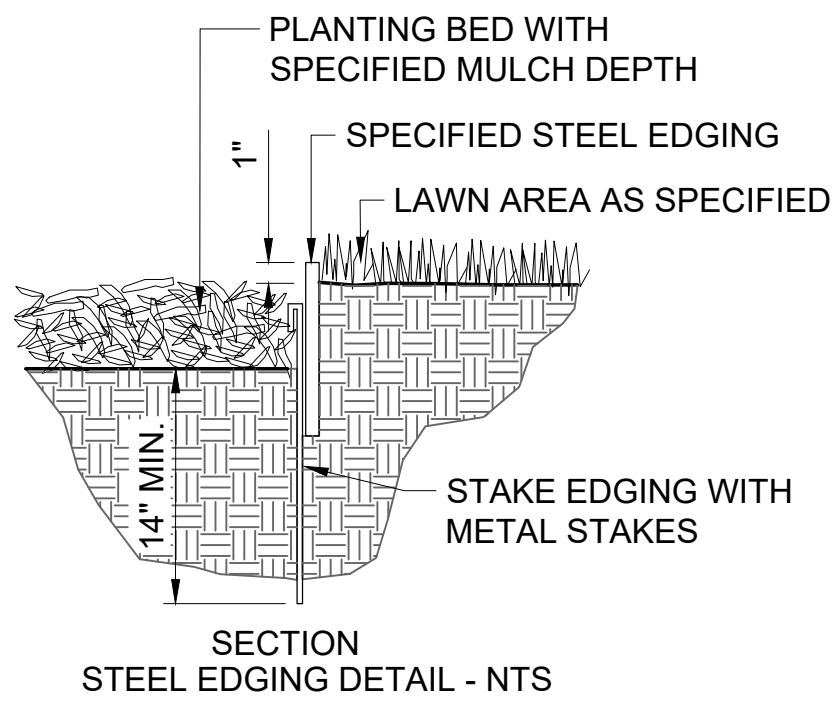


- NOTES:
1. REFER TO SPECIFICATIONS FOR TOPSOIL BACKFILL MIX.
  2. CONTRACTOR TO WATER THOROUGHLY AFTER PLANTING
  3. INSTALLATION TO BE IN ACCORDANCE WITH PLANTING SPECIFICATIONS
  4. WHERE ADJACENT TO CURB, MAINTAIN THE MINIMUM OFFSET SHOWN. FOR SHRUBS LARGER THAN 4' MATURE DIAMETER, PROVIDE A GREATER OFFSET EQUAL TO 1/2 OF THE MATURE DIAMETER MINIMUM.

PRUNE OUT ANY DEAD OR BROKEN BRANCHES. CUT ANY GIRDLING ROOTS OFF CLOSE TO THE CROWN. PRY LONG ROOTS OUT TO DIRECT INTO NEW SOIL



- NOTES:
1. EDGING PER SPECIFICATION L03 2.07 A. SET ALL EDGING 1" ABOVE FINISH GRADE (TURF) SURFACE AS SHOWN.
  2. EDGING SHALL ABOUT ALL CONCRETE CURBS AND WALKS PERPENDICULAR AND FLUSH WITH TOP OF CONCRETE.
  3. ALL JOINTS SHALL BE SECURELY STAKED.
  4. FINISH SHALL BE POWDER COAT; COLOR: GREEN. CONTRACTOR SHALL SUBMIT COLOR SAMPLE TO OWNERS REPRESENTATIVE PRIOR TO PURCHASE.
  5. CONTRACTOR SHALL LOCATE AND MARK ALL PLANT BED LOCATIONS PRIOR TO INSTALLATION OF STEEL FOR FINAL APPROVAL BY OWNER OR LANDSCAPE ARCHITECT.



## PLANT SCHEDULE STREET FRONTAGE

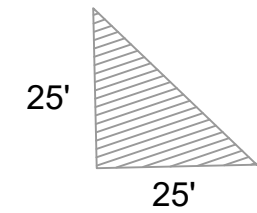
DECIDUOUS TREES	BOTANICAL / COMMON NAME	CONT	CAL	QTY
ARO	Acer rubrum 'October Glory' TM / October Glory Maple	B&B	2.5" Cal.	4
CB	Carpinus betulus 'Fastigiata' / Pyramidal European Hornbeam	B&B	2.5" Cal.	4
GBP2	Ginkgo biloba 'Princeton Sentry' / Princeton Sentry Ginkgo	B&B	2.5" Cal.	13
QRR	Quercus robur 'Regal Prince' / Regal Prince English Oak	B&B	2.5" Cal.	4
QS	Quercus shumardii / Shumard Red Oak	B&B	2.5" Cal.	7
UA	Ulmus americana 'Valley Forge' / American Elm	B&B	2.5" Cal.	4
SHRUBS	BOTANICAL / COMMON NAME	CONT		QTY
AM	Aronia melanocarpa 'Morton' TM / Iroquis Beauty Black Chokeberry	3 Gal.		3
IG	Ilex glabra / Inkberry Holly	6' Ht.		7
IV	Itea virginica 'Henry's Garnet' / Henry's Garnet Sweetspire	5 Gal.		12
JG	Juniperus chinensis 'Gold Lace' / Gold Lace Juniper	5 Gal.		14
MS	Miscanthus sinensis 'Gracillimus' / Maiden Grass	5 Gal.		9
PV	Panicum virgatum 'Haense Herms' / Haense Herms Switch Grass	5 Gal.		8
GROUND COVERS	BOTANICAL / COMMON NAME	CONT	SPACING	QTY
	ANNUAL/SEASONAL Plants Per OWNER	TBD	12" o.c.	63

## LANDSCAPE NOTES

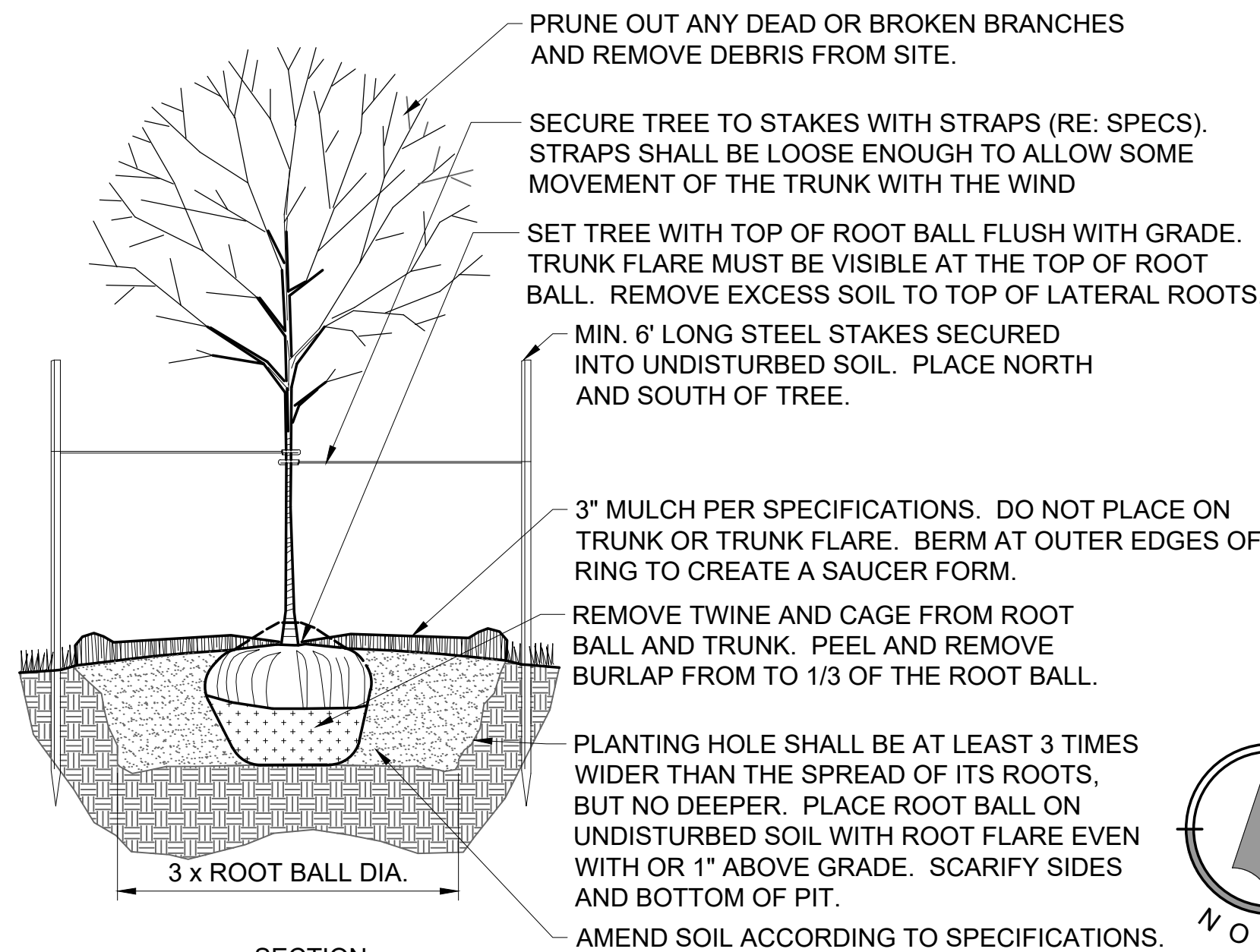
1. LOCATE UTILITIES PRIOR TO COMMENCING LANDSCAPE OPERATIONS. ALL TREES SHALL BE FIELD POSITIONED AS TO AVOID CONFLICTS WITH EXISTING AND PROPOSED UTILITIES. NOTIFY LANDSCAPE ARCHITECT OF ANY CONFLICTS OR OBSTRUCTIONS.
2. CONTRACTOR SHALL STAKE ALL PLANTING AREAS IN THE FIELD PRIOR TO PLANTING FOR APPROVAL OF THE OWNER OR THEIR REPRESENTATIVE.
3. CONTRACTOR SHALL VERIFY ALL PLANT QUANTITIES PRIOR TO PLANTING. ANY DISCREPANCIES WITH THE PLAN SHALL BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT. THE PLAN QUANTITIES SHALL SUPERCEDE SCHEDULED QUANTITIES.
4. ALL PLANT MATERIAL SHALL BE SPECIMEN QUALITY AND SHALL COMPLY WITH RECOMMENDATIONS AND REQUIREMENTS OF ANSI Z60.1 THE 'AMERICAN STANDARD FOR NURSERY STOCK'.
5. ALL PLANTING BEDS & NATIVE GRASS STANDS SHALL BE EDGED AS SHOWN IN PLAN.
6. PREPARE PLANTING BEDS AND INCORPORATE AMENDMENTS ACCORDING TO PLANS.
7. SHREDDED HARDWOOD MULCH, PER SPECIFICATIONS SHALL BE USED AS A THREE INCH (3") TOP DRESSING IN ALL PLANTING BEDS AND AROUND ALL TREES. SINGLE TREES AND SHRUBS SHALL BE MULCHED TO THE OUTSIDE EDGE OF THE SAUCER OR LANDSCAPE ISLAND.
8. ALL TREES SHALL BE STAKED PER DETAIL.
9. ALL PLANT MATERIAL SHALL BE INSTALLED TO ALLOW A ONE FOOT (1') CLEARANCE BETWEEN PLANT AND ADJACENT PAVEMENT.
10. THE LANDSCAPE CONTRACTOR SHALL NOT COMMENCE WORK UNTIL THE SITE IS FREE OF DEBRIS CAUSED BY ON-GOING CONSTRUCTION OPERATIONS. REMOVAL OF DEBRIS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. LANDSCAPE WORK SHALL NOT BEGIN UNTIL THE LANDSCAPE ARCHITECT AND OWNER HAVE GIVEN WRITTEN APPROVAL FOR SUCH. THERE SHALL BE NO DELAYS DUE TO LACK OF COORDINATION FOR THIS ACTIVITY.
11. THE LANDSCAPE ARCHITECT AND OWNER SHALL APPROVE GRADES AND CONDITION OF SITE PRIOR TO SODDING/SEEDING OPERATIONS.
12. ALL AREAS DISTURBED DURING CONSTRUCTION AND NOT DESIGNATED FOR OTHER PLANTINGS OR HARDSCAPE SHALL BE SODDED WITH TURF TYPE FESCUE.
13. LIMITS OF IRRIGATION SHALL BE DETERMINED BY OWNER. TURF AREAS SHALL BE IRRIGATED BY SPRAY OR ROTOR. PLANT BEDS SHALL BE IRRIGATED BY DRIP IRRIGATION. IRRIGATION SYSTEM SHALL INCLUDE AUTOMATIC RAIN-SENSOR DEVICE. IRRIGATION SHOP DRAWINGS SHALL BE PROVIDED BY THE CONTRACTOR FOR APPROVAL PRIOR TO CONSTRUCTION.

## NOTES:

1. TREES THAT DO NOT MEET THE SIZE REQUIREMENT WILL BE REJECTED
2. TREES SHALL BE INSPECTED BY OWNERS REPRESENTATIVE PRIOR TO INSTALLATION.



SIGHT TRIANGLE - NTS



DECIDUOUS TREE PLANTING DETAIL - NTS

NO.	BY	CD	DATE	REVISION
1	JMM	AC	5/8/2020	ORIGINAL SUBMISSION







**PART 1 - GENERAL**

1.01 SUMMARY:

- A. This Section includes piping, valves, sprinklers, specialties, and wiring for automatic-control irrigation systems.
- 1.02 REFERENCE STANDARDS:**
- A. ASTM B32 - Standard Specification for Solder Metal; 2008.
  - B. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2010.
  - C. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2009.
  - D. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings; 2004 (Reapproved 2011).
  - E. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2009.
  - F. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2004 (Reapproved 2009).
  - G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association 2008.
- 1.03 DEFINITIONS:**
- A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.
  - B. Irrigation Main Piping: Downstream from backflow preventer to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.
  - C. Service Line Piping: Downstream from point of connection to backflow preventer.
  - D. The following are industry abbreviations for plastic materials:
    - 1. ABS: Acrylonitrile-butadiene-styrene plastic.
    - 2. FRP: Fiberglass-reinforced plastic.
    - 3. PE: Polyethylene plastic.
    - 4. PP: Polypropylene plastic.
    - 5. PVC: Polyvinyl chloride plastic.
    - 6. HDPE: High Density Polyethylene plastic
- 1.04 SYSTEM REQUIREMENTS:**
- A. Location of Watering System and Specialties: Irrigation Contractor to provide shop drawings showing the minimum coverage per layout. Actual locations may vary per field installation, it shall be the responsibility of the irrigation contractor to provide water coverage of areas indicated on the plans.
  - B. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties, unless otherwise indicated:
    - 1. Irrigation Main Piping: 200 psig.
    - 2. Circuit Piping: 200 psig.
- 1.05 SUBMITTALS:**
- A. Product Data: Include pressure ratings, rated capacities, and settings of selected models for the following:
    - 1. General-duty valves, Specialty valves, Control-valve boxes, Irrigation specialties.
    - 2. Controllers. Include wiring diagrams.
    - 3. Control wiring. Include splice kits.
  - B. Shop Drawings: Irrigation Contractor shall provide design documentation for approval prior to installation. Shop drawings shall include but not be limited to the following information: Indicate piping layout to water source and tap (including coordination & reuse of existing system), coordinate location of sleeves under pavement, electrical routing and wire diagrams, plant and landscaping features, site structures, schedule of fittings, zone and system calculations, drawing scale & north arrow and all component details.
  - C. Field quality-control test reports. Irrigation contractor shall perform flow test to verify available pressure.
  - D. Operation and Maintenance Data: For irrigation systems, to include in emergency shut down, operation, and maintenance manuals. Include data for the following:
    - 1. Automatic-control valves.
    - 2. Controllers (if required).
    - 3. Winterization procedures.
    - 4. System start-up, shut-down, winterization, operation and maintenance.
    - 5. Final Valve Schedule List.
  - E. As-Built Drawings: Irrigation Contractor shall submit as-built drawing showing valves, quick coupler & main line routing with coordinate locations & depth.
  - F. Extra Materials: Provide the following for Owner's use in maintenance of project.
    - 1. Extra Spray/Rotary Heads: Two each type & size.
    - 2. Extra Drip Line: Furnish an extra 100 LF dripline tubing to match type installed on Project.
    - 3. Extra Valve Keys for Manual Valves: Two.
    - 4. Extra Valve Box Keys: Two.
    - 5. Extra Valve Marker Keys: Two
    - 6. Wrenches: One for each type head core and for removing and installing each type head.
    - 7. Valves: Furnish two extra valves of each type and size installed on the project.

## 1.06 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
1. Approved Manufacturer: Rainbird, Toro, Hunter, Netafim, and as listed in this specification.
  2. Contractors shall submit documentation for Manufacturers not listed above
  3. All like products shall be from a single supplier as listed, for example, if netafim dripline is used, all dripline in project shall be netafim.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.
- 1.07 **DELIVERY, STORAGE, AND HANDLING:**
- A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
  - B. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.
- 1.08 **PROJECT CONDITIONS:**
- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arrangements to provide temporary water service according to requirements indicated:
    1. Notify Owner and/or General Contractor no fewer than two days in advance of proposed interruption of water service.
    2. Disruption of services shall be by owner's written permission only.
  - B. If Existing irrigation system is present. Contractor shall be responsible for tapping into existing system, capping off existing system where needed and verifying condition of existing system.
- 1.09 **COORDINATION:**
- A. Coordinate timing of installation, location and installation of all sleeves under sidewalks or drives. Owner shall not be responsible for boring due to lack of coordination of this requirement.
  - B. Coordinate power requirements and connection of controller as required.
  - C. Coordinate existing water supply requirements.
  - D. Coordinate with landscape installation
  - E. Irrigation Contractor to attend on-site meeting at both project kick-off and prior to installation after approved shop drawings.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified. All

products of type shall be from a single manufacturer as listed.

## 2.02 PIPES, TUBES, AND FITTINGS

- A. Refer to Part 3 "Piping Applications" Article for installation of pipe, fitting, and joining materials.
- B. PVC, Pressure-Rated Pipe:
1. ASTM D2241, CL 200 SDR-21.
- C. Pipe Risers at Valves: 160 psi PVC pipe.
- D. PVC Socket fittings, CL 200, ASTM D2467.
- E. Sleeve Material: PVC - Schedule 80, Minimum size shall be 2 times the irrigation pipe diameter with a minimum size 2.5" diameter
- 2.03 JOINING MATERIALS:
- A. Solvent Cement (PVC Piping):
1. Primer and solvent conforming to ASTM D2564-02.
- 2.04 OUTLETS
- A. Rotary Type Sprinkler Head: Pop-up type with screens; fully adjustable for flow and pressure; size as indicated; with letter or symbol designating degree of arc and arrow indicating center of spray pattern. Provide Head to Head coverage
- B. Spray Type Sprinkler head: Pop-up type with in-stem pressure regulator system. Pop-up height shall vary with location.
- Provide nozzle with spray pattern as required to minimize waste. Adjustable patterned nozzles shall be set by the contractor for optimum throw. Provide Head to Head coverage
- C. Drip Specialties
1. Drip Zone Control Kit:
    - a. Factory assembled kit for controlling low-flow irrigation zones comprised of the following components:
      - 1) Medium-flow remote control valve with 'double knife' diaphragm (1/2-inch diameter seat), double-filtered pilot flow, external bleed and internal bleed for manual operation.
      - 2) Pressure regulator with plastic body capable of maintaining outlet pressure of 30 psi.
      - 3) Filtration provided by either:
        - 2)a. Inline Wye Filter of heavy-duty glass-fitted nylon material with 150-mesh filter screen (factory-installed).
        - 2)b. Inline Basket filter with threaded top section containing an indicator changing from green to red to indicate when the filter is full. Provide with factory-installed 150 mesh filter minimum.
    2. Manufacturers
      - a. Rainbird, Toro, Hunter, Netafim, Approved Equal
  3. Landscape Dripline
    - a. Flexible PE tubing with pre-installed pressure-compensating emitters with dual outlet ports, 16 mm (0.630 inch) outside diameter. Flow rate shall be 0.6 gallons-per-hour.
    - b. Manufacturers: As listed above
    - c. Warranty: 5 years free from original defects in materials and workmanship and 7 years for environmental stress cracking.
  4. Compression Fittings:
    - a. UV-resistant ABS fittings with Buna rubber seal capable of accepting 1/2-inch poly tubing from 16 to 18 mm outside diameter.
    - b. Manufacturers: As listed above
  5. Air Vacuum Relief Valve:
    - a. Plastic housing with rustproof materials designed for use with dripline tubing.
    - b. Manufacturers: As listed above
  6. Flush Valve:
    - a. Plastic ball valve featuring PVC body and ball construction, EPDM Seat Seals and O ring, rated to 150 psi at 73°F.
    - b. Manufacturers: As listed Above
- 2.05 SHUTOFF & GENERAL-DUTY VALVES:
- A. Cast Brass Gate Valves: Resilient-seated, nonrising-stem, cast brass body and bonnet (ASTM B584) gate valve; with brass stem and stem nut.
1. Maximum Working Pressure: 200 psig.
  2. End Connections: Threaded ends.
  3. Handle: Brass cross.
  4. Manufacturers:
    - a. Matco-Norca 514.
    - b. Approved Equal.
5. Operating Wrenches: Furnish total of two (2) steel, tee-handle operating wrench(es) with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.
- B. Plastic Automatic Control Valves: The electric remote control valve shall be a normally closed 24 VAC 50/60 Hz (cycles/second) solenoid actuated globe/angle. The valve pressure rating shall not be less than 150 PSI. The valve body and bonnet shall be constructed of high impact, weather resistant PVC with stainless steel screws. The valve shall have manual open/close control (internal bleed) for manually opening and closing the valve without electrically energizing the solenoid. The valve's internal bleed shall prevent flooding of the valve box. The valve shall house a fully-encapsulated, one-piece solenoid. The solenoid shall have a captured plunger with a removable retainer for easy servicing, and a leverage handle for easy turning. This 24 VAC 50/60 Hz solenoid shall open with 19.6 VAC minimum at 150 psi. At 24 VAC, average inrush current shall not exceed 0.41 amps. Average holding current shall not exceed 0.28 amps. The valve shall have a flow control stem for accurate manual regulation and/or shut off of outlet flow. The valve must open or close in less than 1 minute at 150 PSI, and less than 30 seconds at 20 PSI. The valve must match the demand required by the proposed zone.
- C. Valve Box and Cover: Box and cover, with open bottom and openings for piping; designed for installing flush with grade. Include size as required for valves and service.
1. General Duty Valves
    - a. Shape: Round
    - b. Sidewall: PE, ABS, or FRP
    - c. Cover Material: PE, ABS, FRP, Green in color
  2. Remote Control Valves
    - a. Shape: Rectangular
    - b. Sidewall: PE, ABS or FRP
    - c. Cover Material: PE, ABS or FRP, Green in color
  3. Specialty Valve Boxes
    - a. Shape: Box and cover, with open bottom and openings for piping; designed for installing flush with grade. Include size as required for valves and service
    - b. Sidewall: PE, ABS or FRP
    - c. Cover Material: PE, ABS or FRP, Green in color
  4. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3/4"-inch minimum to 1 inch maximum.
- 2.06 SPECIALTY VALVES:
- A. Quick-Couplers: Factory-fabricated, brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, locking rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.
1. Locking-Top Option: Vandal-resistant, single-lug locking feature. Include two matching keys.
  2. Manufacturers:
    - a. 33DLRC by Rain Bird Sprinkler Mfg. Corp.
    - b. 075-SLVC by The Toro Company
    - c. Approved equal.

1. Shall include a base unit with expansions slots to accommodate future expansion
2. Shall be capable of operating two 24 VAC solenoid valued actuators
3. Shall operate on 120VAC +/- 10% at 60Hz
4. Shall be capable of providing watering cycles by day of week
5. Shall have a display capable of displaying each zones scheduled watering schedule
6. Shall have 12-hour AM/PM or 24 hour clock with a midnight alarm
7. Shall have 365 day calendar backed up against power interruption and time for 10 years. Shall provide notification of lost power
8. Shall be capable of communicating with the existing on-site controller
9. Controller shall have programmable rain shut off threshold
10. Shall be capable in running off time based program or ET program
11. The controller shall be EPA WaterSense labeled
12. Shall offer manual watering of all zones
13. Controller shall be capable of being located in the same location as the existing controller
14. Manufacturer's
  - a. Rainbird
  - b. Approved Equal

2.08 **CONTROL WIRE (REMOTE VALVE TO CONTROLLER)**

## 2.08 CONTROL WIRE (REMOTE VALVE TO CONTROLLER)

- A. General: UL 493, Type UF, single conductor, with solid-copper conductor and PE insulation; suitable for direct burial
1. Low-Voltage, Branch-Circuit Cables: No. 14 AWG minimum, between controllers and automatic control valves; color coded per the following
    - a. Common Wire - White
    - b. Control Wire - Red
    - c. Spare Common Wire - Green
    - d. Spare Control Wire - Blue
  2. Splicing Materials: Manufacturer's packaged kit consisting of insulating, spring-type connector or crimped joint and epoxy resin moisture seal; suitable for direct burial
  3. Each wire path shall be grounded using a Rain Bird MSP-1 surge protector, or approved equal
  4. All connectors shall be 3M DBR connectors only
- 2.09 RAIN/TEMPERATURE SENSOR
- A. Automatic rain shutoff sensor shall be capable of sensing precipitation/temperature and interrupting irrigation during rain and low temperature events.
  - B. All sensors shall be capable of interfacing with approved controller.
  - C. Contractor shall field locate for optimum performance. Location shall be approved prior to installation.
- 2.10 MISCELLANEOUS SPRINKLER EQUIPMENT:
- A. Valve Identification Tags: Pre-printed plastic tags with minimum text height of 1 inch, capable of being attached to valve stem or valve wire within valve box.
  - B. Gravel: Clean washed gravel 3/4" nominal diameter.
- 2.11 POINT OF CONNECTION
- A. Irrigation Contractor shall be responsible for providing all point of connection taps, back flow devices, valves, vaults & covers.
  - B. Irrigation Contractor shall show in the provided shop drawings the point of connection for approval.
  - C. Irrigation Contractor shall provide a Master Valve for the proposed irrigation system.

PART 3 - EXECUTION

3.01 GENERAL:

1. Install piping sleeves by boring or jacking under existing paving if possible. No open cutting of pavement shall be allowed.
  2. Irrigation Contractor shall coordinate sleeve locations under new construction during early construction stages to avoid boring where possible; Refer to Sheet LS200 for sleeve locations.
- B. Provide minimum cover over top of underground piping according to the following:
1. Irrigation Main Piping: Minimum depth of 18 inches below finished grade to top of pipe.
  2. Circuit (Lateral) Piping: Minimum depth of 12 inches below finished grade to top of pipe.
  3. Sleeves: 18 inches Minimum.
- 3.02 **PREPARATION:**
- A. Set stakes to identify locations proposed irrigation system. Obtain owners approval before excavation. Locate all utilities prior to excavation.
- B. Route piping to avoid conflicts with other work
- C. Unless otherwise installed, bore for sleeves under existing pavement as indicated on plans. Employ equipment and methods designed for horizontal boring.
1. Sleeves shall be installed prior to pavement installation. All additional costs for boring sleeves shown in the plan shall be the responsibility of the contractor.
- 3.03 **TRENCHING**
- A. Trench and backfill with subsoil excavated on-site. Fill material shall be free of lumps larger than 3-inches, rocks larger than 2-inches and debris. Topsoil shall be placed as noted on the plans.
- B. Trench shall accommodate grade changes
- C. Maintain trenches free of debris, material or obstructions that may damage pipe.
- 3.04 **PIPING APPLICATIONS:**
- A. Install components having pressure rating equal to or greater than system operating pressure.
- 3.05 **PIPING INSTALLATION:**
- A. Location and Arrangement: To be determined by shop drawing approval. Drawings shall indicate irrigation type to be installed.
- B. Install piping free of sags and bends.
- C. Install groups of pipes parallel to each other spaced to permit valve servicing.
- D. Install fittings for changes in direction and branch connections.
- E. Install dielectric fittings to connect piping of dissimilar metals.
- F. Install underground thermoplastic piping according to ASTM D2774.
- G. Lay piping on solid subbase, uniformly sloped without humps or depressions.
- H. Install PVC piping in dry weather when temperature is above 40°F (5°C). Allow joints to cure at least 24 hours at temperatures above 40°F (5°C) before testing unless otherwise recommended by manufacturer.

### 3.06 JOINT CONSTRUCTION

- A. Construct solvent-weld joints per ASTM D2855 and Butt Heat Fusion (HDPE Piping) per ASTM D3261 & ASTM D2657
  - B. Construct mechanical joints per manufacturer's recommendations:
    - 1. Provide adequate joint restraint at all mechanical joints through thrust blocking or mechanical restraints.
- 3.07 VALVE INSTALLATION:**
- A. Underground Gate Valves: Install in round valve box with top flush with grade.
  - B. Control Valves/Master Valves: Install in rectangular control-valve box.
  - C. Quick Couple Valves: Install in round valve box.
- 3.08 OUTLET INSTALLATION:**
- A. Drip line Installation: Install drip lines per manufacturer's recommendations in areas shown on the plans and the approved shop drawings. Flush all lines prior to installation of drip lines.
  - B. Rotary/Spray Head Installation: Install rotary/spray heads per manufacturer's recommendations in areas shown on the plans and approved shop drawings. Heads shall be installed flush with finish grade. Flush all lines prior to installation of irrigation heads.
- 3.09 AUTOMATIC-CONTROL SYSTEM INSTALLATION:**
- A. Install control wire in same trench as irrigation piping as approved with shop drawings. Provide conductors of size not

smaller than recommended by controller manufacturer. Install wire in separate sleeve under paved areas if irrigation piping is installed in sleeve.

- B. Connect to Controller and accessories per manufacturers recommendations.
- 3.10. **CONNECTIONS:**
- A. Make all electrical connections in conformance with local code requirements. Provide waterproof connectors for all underground electrical connections.
- B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- 3.11. **LABELING AND IDENTIFYING:**
- A. Provide valve tags at each remote control valve as shown on the approved shop drawings.
- B. Install Warning Stakes per detail
- 3.12. **FIELD QUALITY CONTROL:**
- A. Perform the following field tests and inspections and prepare test reports:
1. Hydrostatic Test: After installation and prior to backfilling, utilize quick-couple valves to charge mainline with pressurized air to 100 psi. System will be able to maintain pressure with no more than 5 psi loss in one hour.
- a. Owner's representative must be in attendance during test.
- b. Provide a minimum of 48 hours notice prior to scheduled test.
- c. Hydrostatic test results obtained without Owner's representative present will be rejected and Contractor will be required to re-test with representative in attendance.
2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Remove and replace defective units and retest as specified above until all requirements are met.
- 3.13. **STARTUP SERVICE:**
- A. Verify that controller is installed and connected according to the Owners direction.
- B. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements.
- C. Complete startup checks according to manufacturer's written instructions.
- 3.14. **ADJUSTING:**
- A. Adjust settings of controller and provide initial watering schedule per Owner's requirements.
- B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.
- 3.15. **CLEANING:**
- A. Flush dirt and debris from piping before installing sprinklers and other devices.
- 3.16. **DEMONSTRATION:**
- A. Schedule a complete demonstration and system walk-through with the Owner's representative. Final Payment will not be made until all items noted during demonstration and walk-through have been made by Irrigation Contractor and verified by Owner's staff.
1. Irrigation Contractor, Owner and Landscape Architect shall each certify that the system performs as designed and there are no unacceptable areas of overspray on adjacent pavements, buildings or other site elements or fixtures.
- 3.17. **MAINTENANCE**
- A. Irrigation Contractor shall maintain and coordinate system for plant establishment throughout 90 day maintenance period. At end of maintenance period, contractor shall set system for standard operation based on zone requirements. Any continued plant establishment or over watering necessary for continued plant establishment shall be given to the owner as a written notice.
- B. Provide one complete spring start-up and a fall shutdown by installer, at no extra cost to Owner. The Contractor shall provide this schedule at the end of the maintenance period.
- 3.18. **WARRANTY:**
- A. Irrigation Contractor shall warranty irrigation system for a minimum of 12 months starting from the date of Substantial Completion. Warranty shall be for all installed equipment and workmanship of installation.
- B. Irrigation Contractor shall be responsible for all system leaks due to quality of installation.

### 3.19 DOCUMENTATION

- A. Provide a complete operations and maintenance manual to the Owner in a three-ring binder with the following items, separated by tabbed dividers for clear organization.
  1. Provide a label on the spine of the binder clearly stating "IRRIGATION SYSTEM OPERATION AND MAINTENANCE".
  2. Table of Contents.
  3. Cut-sheets or manufacturer's data for all installed equipment including:
    - a. Remote Control Valves.
    - b. Quick Couple Valves.
    - c. Controller.
  4. Operations Data from manufacturers documenting diagnostic, repair and replacement procedures for all items "a" through "c" identified above.
  5. Complete description of spring start-up operations including:
    - a. Valve inspection.
    - b. Controller programming guidelines for spring, summer and fall watering schedules.
    - c. Controller battery replacement (As Required).
    - d. Rain Sensor Battery replacement (As Required)
- B. Provide an as-built drawing at the same size and scale as the design drawings with the following information clearly shown:
  1. Location of all sleeves with coordinates.
  2. Location of mainline and lateral pipe runs with sizes clearly indicated with coordinates.
  3. Location of all valves with coordinates.
  4. Location of controller and rain sensor (As Required)
  5. Utilize standard industry symbols and notations for all equipment.
- C. Provide a copy of the Maintenance/Operations Manual and As-Built Drawing to the owner for review and approval.
  1. Contractor shall make all revisions noted and required by the owner.
  2. Contractor is required to demonstrate completion of all revisions, which may include providing a revised copy for additional review at the discretion of the owner.
- D. Maintenance/Operations Manual and As-Built Drawing shall be completed and turned over to the owner before Final Payment will be made to the Irrigation Contractor.

END OF SECTION 328400

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