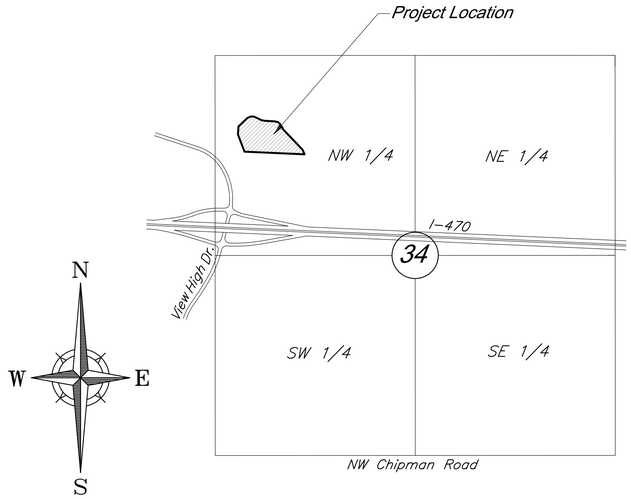
STORM SEWER IMPROVEMENTS AND MASS GRADING
FOR
PARAGON STAR MULTIFAMILY DEVELOPMENT

Sections 34–Township 48–Range 32
City of Lee's Summit
Jackson County, Missouri

SUMMARY OF QUANTITIES

No.	DESCRIPTION	UNIT	QUANTITY
1	Mobilization	LS	1
2	Fill (Unadjusted)	C.Y.	29,356
3	Cut (Unadjusted)	C.Y.	2,520
4	Sediment Fence	L.F.	1,803
5	Inlet Protection	EA.	3
6	Straw Wattle	L.F.	926
7	Temporary Construction Entrance	EA.	1
8	6'x4' Curb Inlet	EA.	2
9	6'–0" Dia. Storm MH	EA.	1
10	6'–0" Dia. Storm MH w/ Shallow Type Top and Grate	EA.	1
11	24" RCP	L.F.	218
12	30" RCP	L.F.	174
13	24" RCP Headwall w/ Conc. Toewall and Flapgate	Ea.	1
14	30" RCP Headwall w/ Conc. Toewall and Flapgate	Ea.	1
15	Riprap (D50=12")	S.Y.	59
16	Seeding (Temporary)	LS	1
17	Retaining Wall	S.F.	9,950



Scale: 1"=1000'

VICINITY MAP
Section 34-T48N-R32W

INDEX OF SHEETS

UTILITY CONTACTS

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PROJECT BENCHMARK:

BM #11 – Chiseled "L" on top Northeast corner of concrete guardrail at the Northeast corner of I470 bridge spanning View High Drive.
EL=833.80

DEVELOPED AND OWNED BY:
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LEE'S SUMMIT, MISSOURI 64086
PHONE: (816) 802–6801
CONTACT: Mr. Flip Short
EMAIL: fshort@legacytouch.com

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STATE OF MISSOURI
CLINT LOUMASTER
NUMBER PE–2011009651
6/25/21
REGISTERED PROFESSIONAL ENGINEER

PROJECT ENGINEER: DATE: 6/25/21

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6/25/21
7/30/21

EROSION AND SEDIMENT CONTROL NOTES

The layout of erosion control best management practices (BMPs) shown on the engineering plans is intended to control erosion and minimize, if not eliminate, the transport of sediment from the disturbed areas. The Contractor shall be responsible for the evaluation of existing surface drainage patterns and for making adjustments to the BMP locations to best control erosion and minimize, if not eliminate, the transport of sediment from the disturbed areas. The following are measures to achieve the control of erosion and sediment.

1. Stabilization Practices – Stabilization practices are very effective at preventing erosion by shielding the soil surface from the impact of rain, slowing the velocity of runoff, holding soils in place, and increasing infiltration of runoff and allowing the soil to absorb more rainfall.

   a. Temporary Seeding Stabilization – During acceptable growing periods (see Table 1 below); temporary seeding of annual vegetation with a straw mulch cover shall be used as a temporary cover until permanent vegetation is established. If there is a possibility that a vegetative cover will be required to control erosion for more than 1 year, then consider the addition of a perennial/permanent grass species as part of a seeding mixture.

Table 1. Temporary Seeding Dates and Minimum Application Rates

Seeding Dates	Temporary Seed Species	Minimum Application Rates (pure live seed lbs. per acre)	Straw Mulch (tons per acre)
Jan. 1 – Jan. 31	None	Not Applicable	2.5
Feb. 1 – May 31	Annual Ryegrass	120	1.5
June 1 – Aug.4	None	Not Applicable	2.5
Aug. 15 – Nov. 15	Cereal/Winter Rye	120	1.5
Nov. 16 – Dec. 31	None	Not Applicable	2.5

Seedbed Preparation – For broadcast seeding or drilling, loosen soil to depth of 3 inches. For no till drilling, loosen soil if it is compacted. Loosen compacted, hard or crusted soil surfaces with a disk, ripper, chisel, harrow or other tillage equipment. Avoid preparing the seedbed under excessively wet conditions. For establishment and long-term growth, apply a complete fertilizer at rates recommended by soil tests or as specified in plans and specifications. If soil pH is less than 6.0, apply lime according to soil tests. Incorporate necessary lime and fertilizer to a depth of 3 to 6 inches of soil.

Installation – For the best results use certified seed. Apply seed uniformly using a cyclone seeder, drop-type spreader, drill, cultipacker seeder or hydroseeder. When using a drill seeder, plant rye or other grains about 1 inch deep and plant grasses no more than ½ inch. A vegetative straw mulch cover shall be applied over the seed mixture to help germinate and establish plant cover, control weeds, and protect seed mixture against temperature extremes. Follow straw mulch preparation and application procedures described herein.

   b. Temporary Mulch Stabilization – During non-growing periods, a straw mulch cover shall be applied in unseeded areas to protect against erosion until temporary or permanent vegetation is established.

Site Preparation – Divert runoff water from areas above the site that will be mulched. Remove stumps, roots and other debris from the construction area. Grade area as needed to permit the use of equipment for seeding, mulching and maintenance. Shape area so that it is relatively smooth.

Application – Spread straw mulch uniformly over the area with a power blower, hydroseeder, or by hand. No more than 25% of the ground surface should be visible after spreading. Apply straw mulch at a rate of 1.5 tons per acre as a seed cover or 2.5 tons per acre as a stand alone cover. The straw should be dry, unchopped, unweathered; free of weed seeds and rot. In areas of steep slopes or high winds, or in critical areas such as swales, mulching may need to be secured to the ground with a binder, netting, or tacking.

   c. Permanent Seeding Stabilization – All disturbed areas shall be permanently seeded with a cool season grass mixture as specified in the Standards and Specifications of the City of Lee's Summit, Missouri.

Seedbed Preparation – loosen soil to depth of 3 inches. For no till drilling, loosen soil if it is compacted. Loosen compacted, hard or crusted soil surfaces with a disk, ripper, chisel, harrow or other tillage equipment. Avoid preparing the seedbed under excessively wet conditions. For establishment and long-term growth, apply a complete fertilizer at rates recommended by soil tests or as specified in plans and specifications. If soil pH is less than 6.0, apply lime according to soil tests. Incorporate necessary lime and fertilizer to a depth of 3 to 6 inches of soil.

Installation – For the best results use certified seed. Apply seed uniformly using a hydroseeder. A vegetative straw mulch cover shall be applied over the seed mixture to help germinate and establish plant cover, control weeds, and protect seed mixture against temperature extremes. Follow straw mulch preparation and application procedures described in the Standards and Specifications of the City of Lee's Summit, Missouri.

2. Structural Practices

   a. Silt Fence – A temporary sediment barrier consisting of a geotextile fabric shall be installed as shown on the attached engineering plans and details. Silt fencing shall be installed to maintain sediment onsite.

      Minimum Requirements:

      Location – Fence should be built on a nearly level grade and at least 10 feet from the toe of the slope to provide a broad shallow sediment pool. Install on the contour, where fence can intercept runoff as a sheet flow; not located crossing channels, waterways or other concentrated flow paths; not attached to existing trees.

      Spacing of Support Posts – 10 feet maximum for fence supported by wire; 6 feet maximum for high strength fabric without supportive wire backing. Support posts should be driven into the ground a minimum of 10 inches deep.

      Trench – Bottom 1 foot of fence must be buried minimum of 4 inches deep.

   b. Inlet Protection – When installation of the storm drainage system is complete, gravel curb inlet sediment traps will be placed at the drainage system inlets. Construction shall be in accordance with attached engineering plans and details.

   c. Stockpiles – The toe of stockpiles shall be placed a minimum of 10 feet from erosion control measures. If stockpiles are to remain for more than 14 days, they shall be temporarily stabilized with vegetative mulch and temporary seeding.

3. Maintenance – The contractor shall repair all erosion control measures or re-seed areas that are disturbed or damaged as a result of weather or other situations, within 2 days after the occurrence. This will include all areas bare of vegetation.

EROSION CONTROL GENERAL NOTES

1. The Contractor is responsible for erosion control during construction and until the Owner and City accepts the work as complete. The erosion control measures shown on this plan are a typical minimum installation. The Contractor shall be responsible for adjusting or adding to these measures as necessary during the phasing of the construction to assure adequate control.

2. Clearing and grubbing within 50' of a defined drainage course should be avoided when possible. Where changes to a defined drainage course occur, work should be delayed until all materials and equipment necessary to protect and complete the drainage change are on site. Changes shall be completed as quickly as possible once the work has been initiated. The area impacted by the construction activities shall be revegetated or protected from erosion as soon as possible, areas within 50' of a defined drainage ways should be recontoured as needed or otherwise protected within five (5) working days after grading has ceased.

3. Where soil disturbing activities cease in an area for more than 14 days, the disturbed areas shall be protected from erosion by stabilizing the area with mulch or other similarly effective erosion control measures. If the slope of the area is greater than 3:1 or if the slope is greater than 3% and greater than 150 feet in length, then the disturbed areas shall be protected from erosion by stabilizing the area with mulch or other similarly effective erosion control measures if activities cease for more than seven (7) days.

4. Existing vegetation shall be preserved to the extent and where practical. In no case shall disturbed areas remain without vegetative ground cover for a period in excess of 60 days.

5. Additional site management practices which shall be adhered to during the construction process shall include:

   –Solid and hazardous waste management including providing trash containers and regular site clean up for proper disposal of solid waste such as building and construction material, product/material shipping waste, food containers and cups, and providing containers for the proper disposal of waste paints solvents, and cleaning compounds.

   –Provisions of portable toilets for proper disposal of sanitary sewage.

   –Storage of construction materials away from drainage courses and low areas.

   –Installation of containment berms and use of drip pans at petroleum product and liquid storage tanks and containers.

6. All disturbed areas shall be seeded, fertilized and mulched, or sodded, in accordance with the Standards and Specifications adopted by the City of Lee's Summit, Missouri and good engineering practices. This shall be completed within fourteen (14) days after completing the work, in any area. If this is outside of the seeding period, silt barriers or other similarly effective measures shall be provided until such time that the areas can be seeded.

7. All erosion control measures, temporary or permanent, require maintenance to preserve their effectiveness. All erosion control devices shall be inspected immediately after each heavy rainstorm and at least daily during prolonged rainfall. Any required repairs should be made immediately. All costs associated with the repair work including related incidentals will be the contractor's responsibility and shall be included in the Contractor's bid for the proposed work. Only after the project is complete and accepted can the erosion control be removed.

8. Seeding shall be done before the proposed seedbed becomes eroded, crusted over, or dried out and shall not be done when the ground is frozen, or covered with snow. The seed shall comply with requirements of the Missouri Seed Law and the Federal Seed Act. Also, it shall contain no seed of any plant on the Federal Noxious Weed List. Other weed seed shall not exceed one percent by weight of mix.

9. During the dates Dec. 15 through May 30 ALL lime, fertilizer, seed, and mulch shall be applied to finished slopes of disturbed areas. During the months of June, July, October, and November 1st through December 15th, lime, fertilizer, seed, and mulch shall be applied at the following rates:

   Lime – 100% of the specified quantity
   Fertilizer – 75% of the specified quantity
   Seed – 50% of the specified quantity
   Mulch – 100% of the specified quantity

10. Mulch shall be Vegetative type, cereal straw form stalks of oats, rye, or barley, or approved equal. The straw shall be free of prohibited weed seed and relatively free of all other noxious and undesirable seed. Apply straw mulch at a rate of 1.5 tons per acre as a seed cover or 2.5 tons per acre as a stand alone cover. Mulch shall be embedded by a mulch anchoring tool or disk type roller having flat serrated disks spaced not more than 10 inches apart and cleaning scrapers shall be provided.

STATE OF MISSOURI
CLINT LOUMASTER
NUMBER PE-2011009651
6/25/21
RECORD PROFESSIONAL ENGINEER

Clint Loumaster
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License No. 21477

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DRAWN BY:	DRV
PROJECT NO.:	12720.21
SHEET NO.	2
TOTAL SHEETS	13

Storm Sewer Improvements and Mass Grading
Paragon Star Multifamily Development
Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	7/30/21	City Comments		

General Notes:

1. All Construction shall conform to the City of Lee's Summit Technical Specifications in effect at the time of the City's approval date shown on the approved plans and incorporated herein by reference.
2. All traffic control shall be the responsibility of the Contractor and shall be in conformance with the Manual of Uniform Traffic Control Devices (MUTCD).
3. Property Corners and/or Section corners disturbed or damaged by construction activities shall be reset by a Registered Land Surveyor licensed in the state of Missouri, at the Contractor's expense.
4. The Contractor shall be responsible for the restoration of the Right-of-Way and for damaged improvements such as curbs, driveways, sidewalks, street light and traffic signal junction boxes, traffic signal equipment, irrigation systems, etc. Damaged improvements shall be repaired in conformance with the latest City standards and to the City's satisfaction.
5. All work shall be confined within easements and/or construction limits as shown on the plans.
6. The Contractor shall, prior to the commencement of work, investigate surface and subsurface conditions to be encountered across the site and notify the Engineer if any discrepancies or changed conditions are noted.
7. All trash and debris identified on site shall be properly handled and disposed of in accordance with state of Missouri regulations.
8. All measurements on these plans are horizontal distances, not slope distances.
8. This project will include numerous activities occurring on site including storm sewer, sanitary sewer, grading, erosion control, etc. Contractor shall coordinate his work with other contractors on site.
9. Initial construction staking will be performed by GBA – Refer to Bid Documents.
10. All concrete shall be KCMMB 4,000 psi.
11. No oil or gas wells are located on site per Missouri Department of Natural Resources.
12. The contractor shall contact the City's Development Services Engineering Inspection to schedule a pre-construction meeting with a Field Engineering Inspector prior to any land disturbance work at (816) 969-1200.

Permitting:

13. Contractor is responsible for obtaining all required permits, paying all fees, and for otherwise complying with all applicable regulations governing the work.
14. No work shall be completed within the existing floodway until the CLOMR has been issued.
15. No work shall be completed within the delineated wetland or regulatory stream channels until the U.S. Corps of Engineers Section 404 permit is issued. All work shall adhere to the terms and conditions of this permit.

Erosion Control:

16. The Contractor is responsible for providing erosion and sediment control BMP's to prevent sediment from reaching paved areas, storm sewer systems, drainage courses, and adjacent properties. In the event the prevention measures are not effective, the contractor shall remove any debris, silt, or mud and restore the Right-Of-Way, or adjacent properties to original or better condition.
17. Contractor shall ensure that all construction shall conform to the requirements of the Stormwater Pollution Prevention Plan (SWPPP) a copy of which shall be maintained and updated on site by the Contractor.
18. The Contractor shall sod all disturbed areas within the Public Street Right-of-Way unless otherwise noted in the plans.
19. No trees shall be damaged or removed without prior authorization from owner unless otherwise shown on this plan.

Earthwork:

20. Slopes shall be constructed to a maximum slope of 3:1 (Horiz:Vert) unless specifically noted otherwise in the referenced Geotechnical reports.
21. Refer to "Geotechnical Engineering Report – Paragon Star Roadways and Borrow Site" Dated December 8, 2016 – along with Addendum #1 dated 1/4/17, and "Geotechnical Engineering Report – Soccer Fields" Dated July 27, 2016 prepared by Terracon Consultants, Inc. for grading recommendations and boring logs. All earthwork shall conform to the recommendations of the Reports.
22. Unless otherwise noted, all spot elevations and contours are shown to "finish" grade surface.
23. All temporary slopes and excavations should conform to Occupational Safety and Health Administration (OSHA) standards for the Construction Industry (29 CFR part 1026, subport P).
24. Earthwork for this phase of development is intended to balance. Contractor to cut only enough fill material from the borrow source at the north end of the project as required to accomplish the fills shown on this plan set.
25. All Permanent seeded area shall be dressed with 12" topsoil and permanent seed. All other disturbed areas shall be seeded with the temporary seed mix.
26. Shale fill shall be capped with a minimum of 24" of clay material.
27. Final tolerance for graded areas shall be +/– 0.2'.
28. Earthwork quantities shown on the plans assume 15% shrinkage for all fill material. The Contractor shall perform the fill to achieve the grades shown on the drawings. The determination of the actual adjustment of fill required due to shrink/swell of various materials shall be the responsibility of the Contractor.

Utility:

29. All Manholes, Catch Basins, Utility Valves, Meter Pits, and other utility equipment shall be adjusted or rebuilt to grade as required.
30. Prior to beginning work, the Contractor shall notify all utility companies who have facilities in the vicinity of the project area of the work to be performed.

Storm Sewer:

31. All RCP shall be Class III.
32. Pipe Lengths are called out from center of structure to center of structure.
33. Drainage across the project site during construction shall be the Contractor's responsibility. Surface drainage shall be controlled to reduce or prevent the flow of surface water onto adjacent grounds. Contractor shall control downstream erosion and silting during construction. Flexibility is given to to the Contractor to make minor grading revisions along roads or between building pads to improve drainage during construction, with prior approval of the engineer.
34. Prior to ordering precast storm sewer structures, Contractor shall provide shop drawings to the Engineer for review and approval.

General Notes

PROJECT BENCHMARK:

BM #11 – Chiseled "L" on top Northeast corner of concrete guardrail at the Northeast corner of I470 bridge spanning View High Drive. EL=833.80

STATE OF MISSOURI
CLINT LOUMASTER
NUMBER PE-2011009651
REGISTERED PROFESSIONAL ENGINEER

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DRAWN BY:	DRV
PROJECT NO.:	12720.21
SHEET NO.	3
TOTAL SHEETS	13

Clint Loumaster
Professional Engineer
License No. 21477

Storm Sewer Improvements and Mass Grading
Paragon Star Multifamily Development
Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
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Boundary Description:

All that part of the Northwest Quarter of Section 34, Township 48 North, Range 32 West of the Fifth Principal Meridian, and a part of Lot 2, Paragon Star First Plat, a subdivision in the City of Lee's Summit, Jackson County, Missouri, more particularly described as follows:

Commencing at the Southwest Corner of the Northwest Quarter, of said Northwest Quarter, said point also being the Southwest Corner of Tract G, of said subdivision; thence South 86°26'21" East, along the South line of said Northwest Quarter of the Northwest Quarter, and along the South line of Tract G, and Tract C, of said subdivision, a distance of 319.46 feet; thence North 03°33'39" East, departing said South lines, a distance of 85.67 feet, to the Point of Beginning, said point being on the South line of Lot 2, of said subdivision; thence North 20°09'22" West, a distance of 247.83 feet; thence North 48°39'29" East, a distance of 254.39 feet; thence South 63°50'31" East, a distance of 122.88 feet; thence South 86°22'21" East, a distance of 218.47 feet, to a point on a non-tangent curve; thence Southeasterly, along said curve to the right, having a radius of 80.01 feet, a central angle of 04°56'54", and whose initial tangent bearing is South 51°54'22" East, a distance of 6.91 feet; thence South 03°38'17" West, a distance of 1.83 feet; thence South 86°21'14" East, a distance of 6.09 feet; thence South 42°55'25" East, a distance of 440.53 feet; thence South 03°39'29" West, a distance of 50.94 feet, to a point on the South line of said Lot 2; thence North 86°20'31" West, along said South line, a distance of 743.41 feet, to the Point of Beginning, containing 236,554.57 square feet, or 5.43 acres, more or less.

Total Disturbed Area:

6.13 AC

FLOODPLAIN NOTE:

According to FEMA Flood Insurance Rate Map (FIRM) Community Panel No. 29095C0404G, effective Date 1/20/17, the tract lies partially within an area designated as Special Flood Hazard Areas. Special Flood Hazard Areas defined on portions of the site include regulatory floodway, Zone AE (with depths identified on site from 810 to 811), and 0.2% Annual Chance Flood Hazard Areas.

Existing Floodway/Floodplain refers to lines established on 1/20/2017 maps, proposed Floodway/Floodplain refers to lines established by the FEMA CLOMR dated 2/14/2020, Case No. 20-70-0520R.

Legend

- Cable TV Pedestal
- Power Pole
- Guy Anchor
- Electrical Manhole
- Electric Meter
- Electrical Transformer
- Electric Pedestal
- Power Pole/Telephone Pole
- Power Pole/Light Pole
- Bollard/Guard Post
- Gas Meter
- Gas Valve
- Curb Inlet
- Junction Box
- Sanitary Sewer Manhole
- Sanitary Cleanout
- Light Pole
- Yard Light
- Boring Hole
- Sign
- Property Corner
- Telephone Manhole
- Telephone Pedestal
- Telephone Pole
- Traffic Signal Controller Box
- Tree Coniferous
- Barbed Wire Fence
- Centerline
- Fiber Optic Line
- Gas Line
- Guard Rail
- Over Head Electric
- Over Head Telephone
- Over Head Cable TV
- Property Line
- Right-of-Way Line
- Sanitary Sewer Line
- Stream
- Tree Line
- Underground Electric
- Underground Telephone
- Underground Cable TV
- Water Line
- Proposed Grades
- Proposed Storm Sewers
- Existing Grades
- Existing Storm Sewers
- Tree Deciduous
- Fire Hydrant
- Water Meter

General Layout

Legend

- Proposed Contour
- Existing Contour
- Proposed Spot Grade
- Drainage Flow Arrow
- Geotechnical Boring Location
- Grading Limits

PROJECT BENCHMARK:

BM #11 – Chiseled "L" on top Northeast corner of concrete guardrail at the Northeast corner of I470 bridge spanning View High Drive.
EL=833.80

CAUTION:

Numerous utilities in area. Contractor to verify location and depth of all utilities prior to beginning any work.

STATE OF MISSOURI — CLINT LOUMASTER — NUMBER PE-2011009651 — 6/25/21 — REGISTERED PROFESSIONAL ENGINEER

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DATE:	6/25/21
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PROJECT NO.:	12720.21
SHEET NO.	4
TOTAL SHEETS	13

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Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
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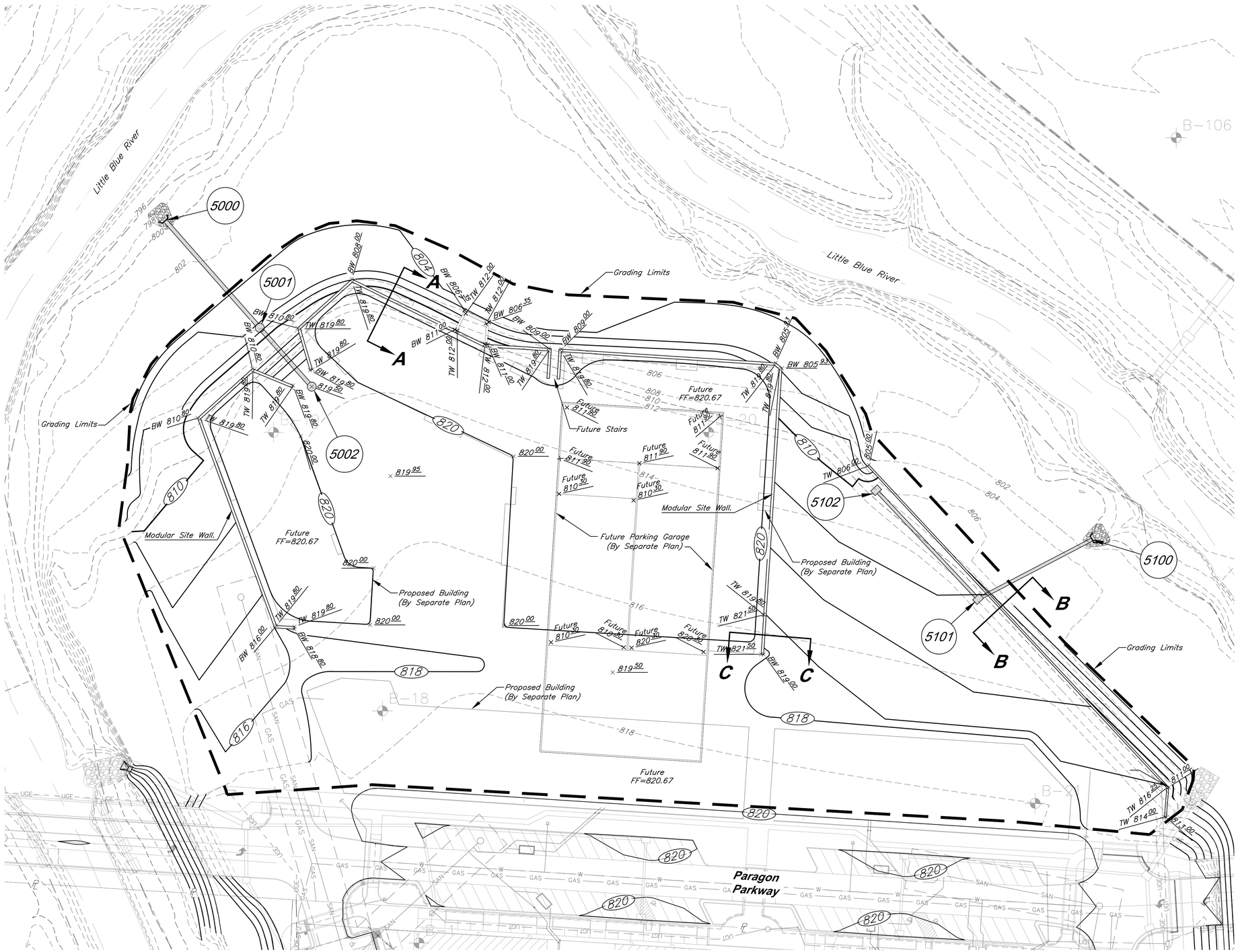
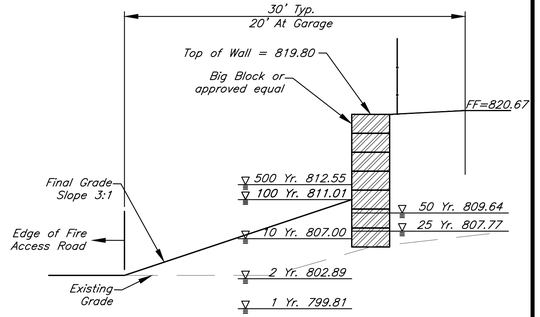
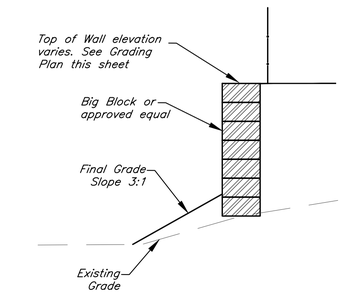


Grading Plan



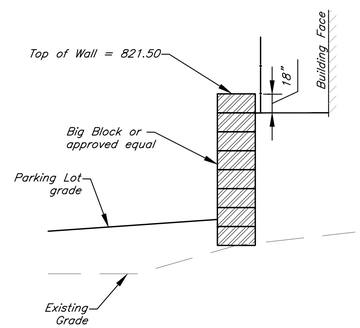
SITE WALL SECTION A-A

Not to Scale



SITE WALL SECTION B-B

Not to Scale



SITE WALL SECTION C-C

Not to Scale

PROJECT BENCHMARK:

BM #11 – Chiseled "L" on top Northeast corner of concrete guardrail at the Northeast corner of I470 bridge spanning View High Drive.
EL=833.80

CAUTION:

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SHEET NO:	5
TOTAL SHEETS	13

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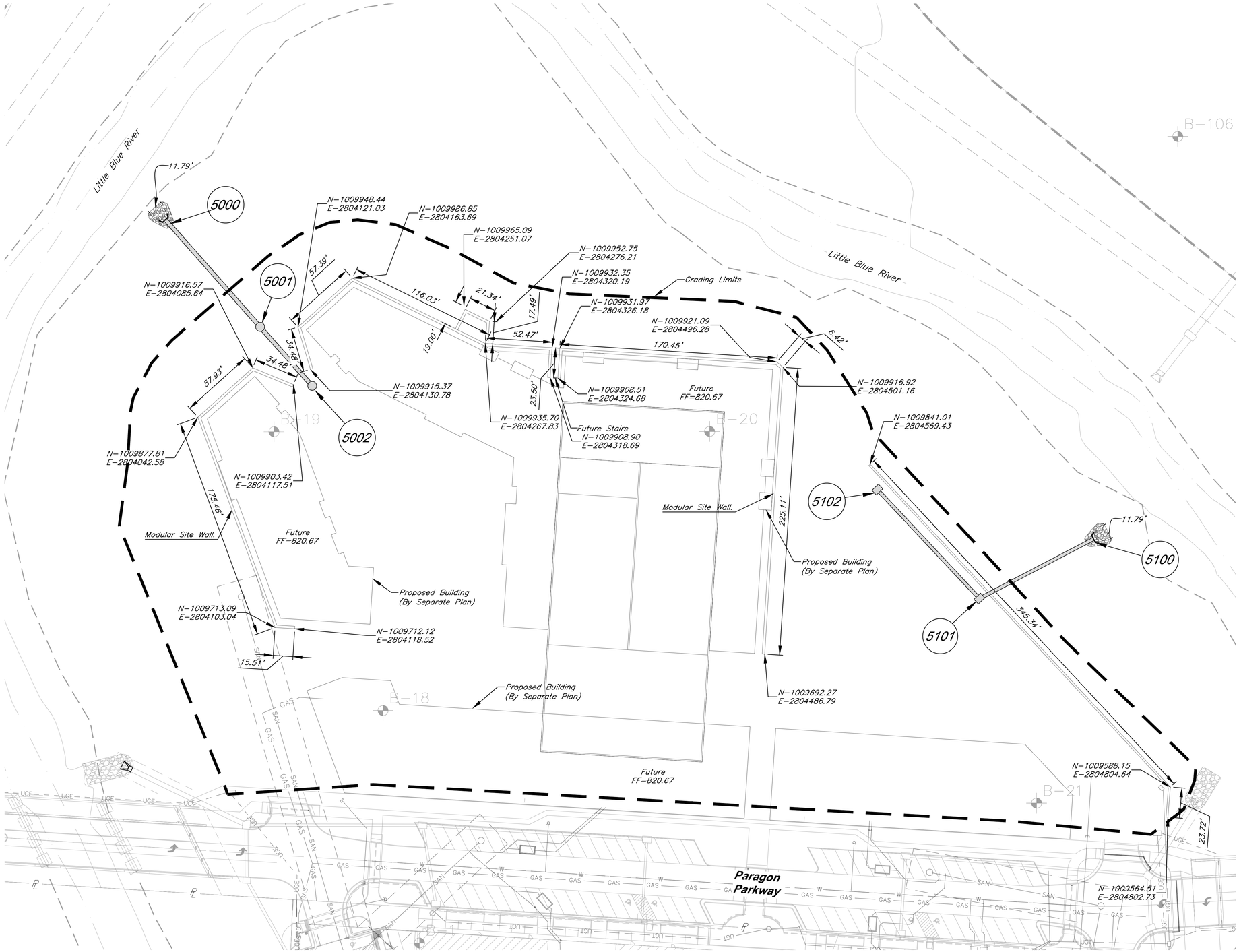

Dimension Plan

CAUTION:
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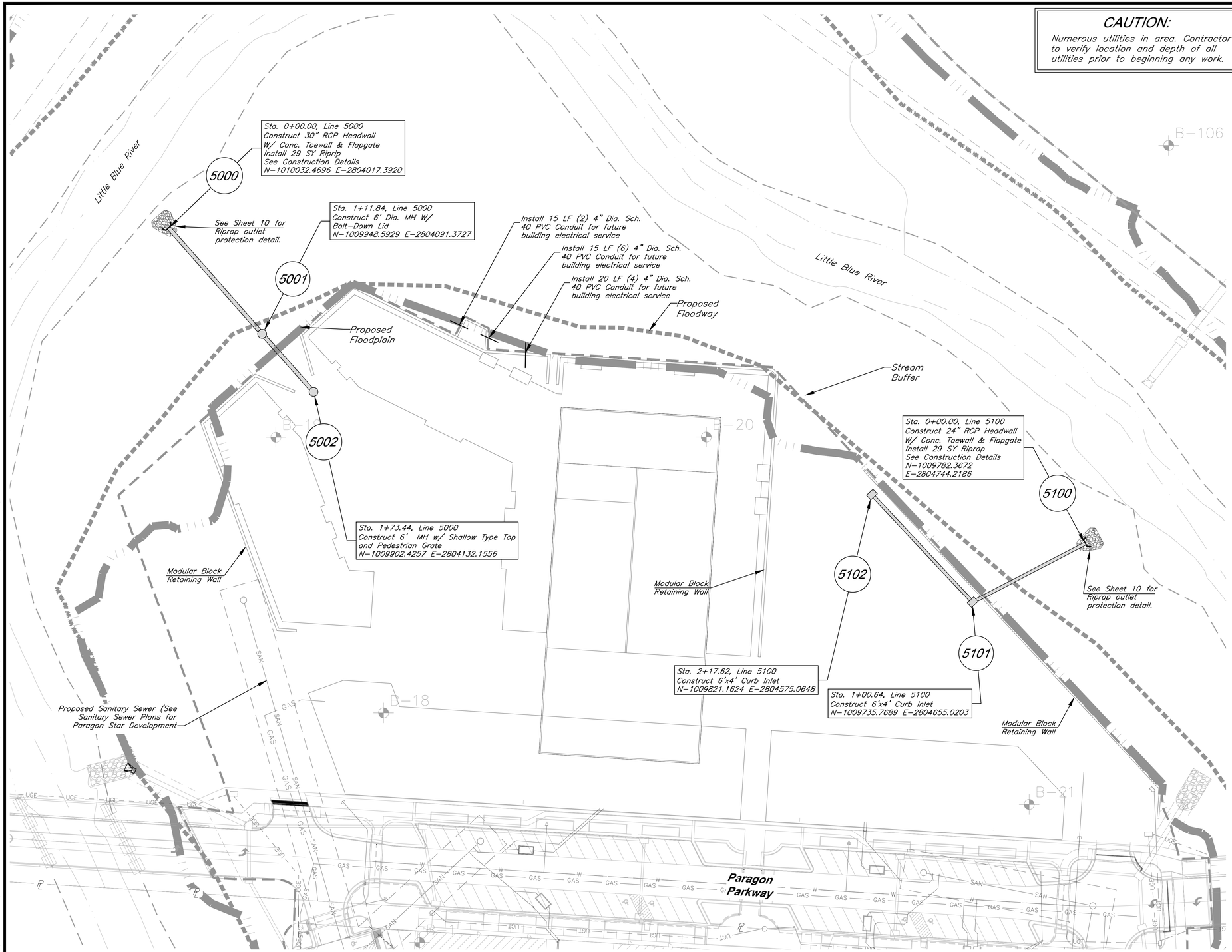

Storm Sewer General Notes:

1. All RCP shall be class III.
2. Storm sewer lengths are calculated from center of structure to center of structure.
3. All pipe connections to Inlets shall occur at center of structure wall unless specifically noted otherwise.
4. All work shall conform to City of Lee's Summit, MO standards.
5. Precast structures shall be constructed with KCMMB 4,000 psi concrete. Shop drawings shall be submitted to the Engineer for review prior to casting.
6. All in grade inlets shall match adjacent slope.
7. Drainage across the project site during construction shall be the Contractor's responsibility. Surface drainage shall be controlled to reduce or prevent the flow of surface water onto adjacent grounds. Contractor shall control downstream erosion and silting during construction. Flexibility is given to to the Contractor to make minor grading revisions along roads or between building pads to improve drainage during construction, with prior approval of the engineer.
8. See Sheet 10 for rip rap details and construction details.

Utility Legend

CATV Ped. Cable TV Pedestal	W.M. Water Meter
P.P. Power Pole	FO Fiber Optic Line
Guy Anchor	FP Fire Protection Line
E.M.H. Electrical Manhole	G Gas Line
Electrical Transformer	OHE Over Head Electric
G.M. Gas Meter	OHT Over Head Telephone
Curb Inlet	OHTV Over Head Cable TV
S.S.M.H. Sanitary Sewer Manhole	Property Line
S.O. Sanitary Cleanout	ROW Right-of-Way Line
L.P. Light Pole	SAN Sanitary Sewer Line
Boring Hole	UGE Underground Electric
Sign	UGT Underground Telephone
Tel. Ped. Telephone Pedestal	UGTV Underground Cable TV
T.S. Traffic Signal Post	W Water Line
T.M.H. Traffic Manhole	Proposed Storm Sewer
F.H. Fire Hydrant	Future Storm Sewer

40' 0' 40' 80'
SCALE : 1 INCH = 40 FEET

Utility Plan

STATE OF MISSOURI
CLINT LOUMASTER
NUMBER PE-2011009651
6/25/21
REGISTERED PROFESSIONAL ENGINEER

Clint Loumaster
Professional Engineer
License No. 21477

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gbateam.com

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DRAWN BY:	DRV
PROJECT NO.:	12720.21
SHEET NO.	6
TOTAL SHEETS	13

Storm Sewer Improvements and Mass Grading
Paragon Star Multifamily Development
Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	7/30/21	City Comments		

STATE OF MISSOURI
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TOTAL SHEETS	13

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Storm Sewer Improvements and Mass Grading

Paragon Star Multifamily Development

Lee's Summit, Missouri

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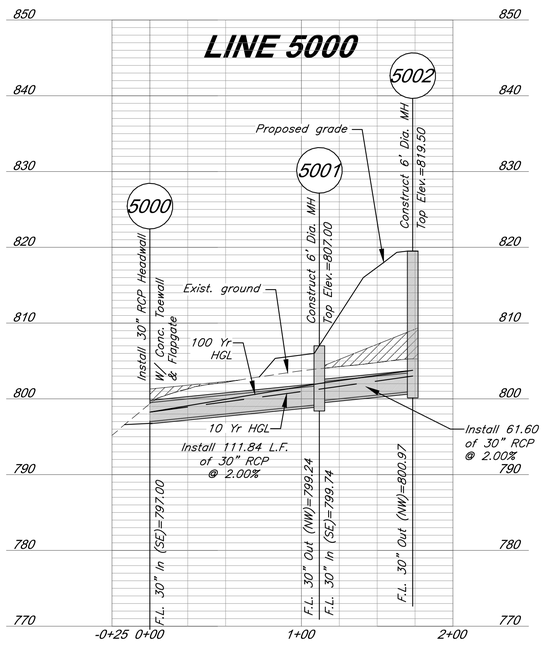
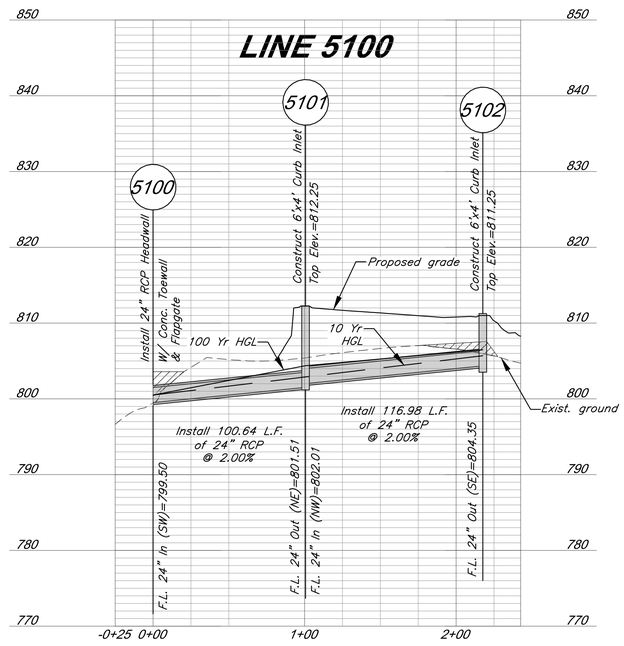
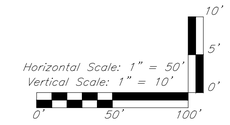


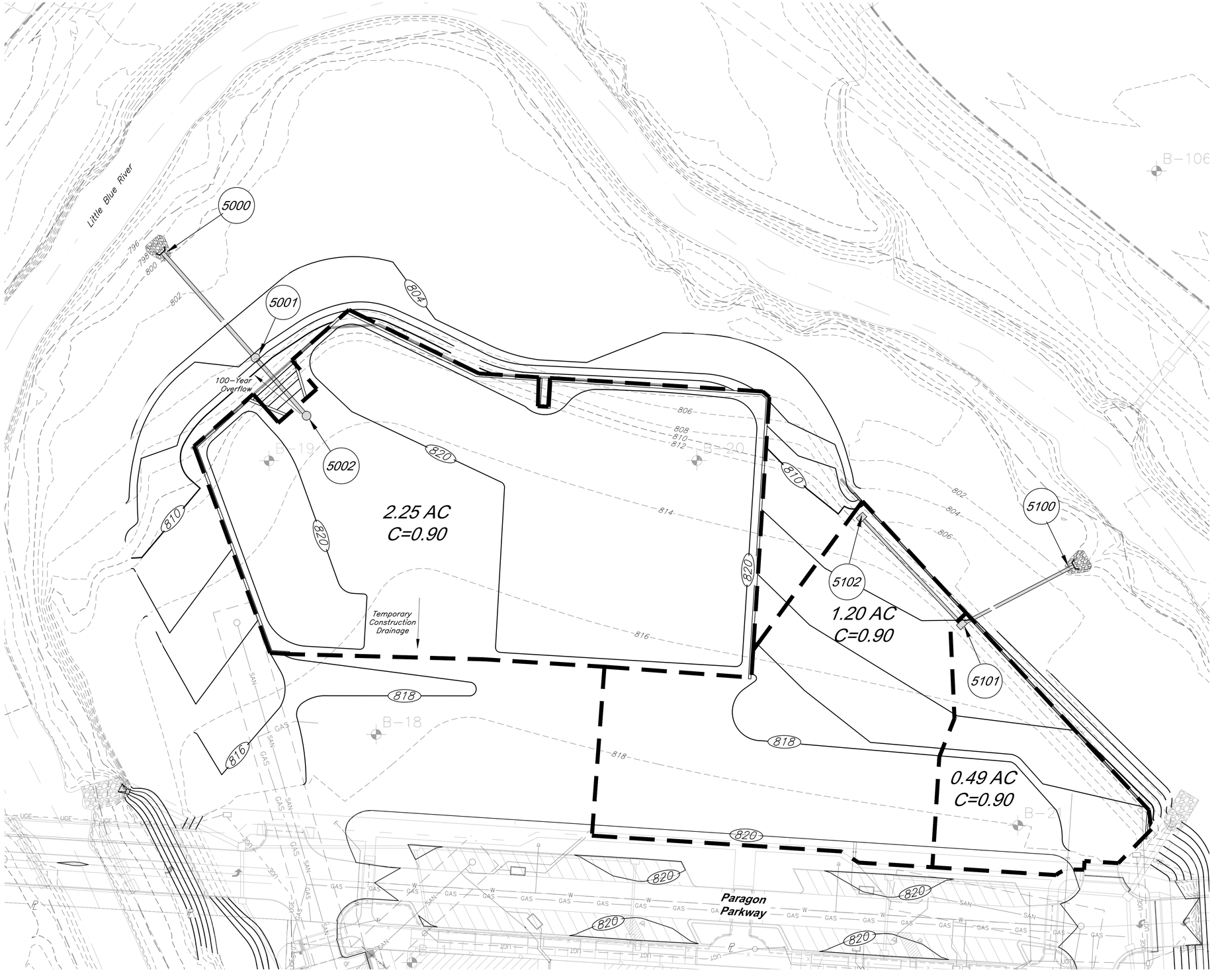




Legend

Compacted Fill to be placed to a minimum of 18" over the top of pipe prior to excavation

Storm Sewer Profiles



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SHEET NO.	8
TOTAL SHEETS	13

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Storm Sewer Improvements and Mass Grading

Paragon Star Multifamily Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	7/30/21	City Comments		

Legend

- 800 — Proposed Contours
- 800 — Existing Contour
- Proposed Drainage Area
- 0.28 Acres — Drainage Area
- Proposed Storm Sewer
- Future Storm Sewer

40' 0' 40' 80'
SCALE : 1 INCH = 40 FEET

Drainage Map

STATE OF MISSOURI
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PROJECT NO.:	12720.21
SHEET NO.	9
TOTAL SHEETS	13

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Storm Sewer Improvements and Mass Grading

Paragon Star Multifamily Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	7/30/21	City Comments		

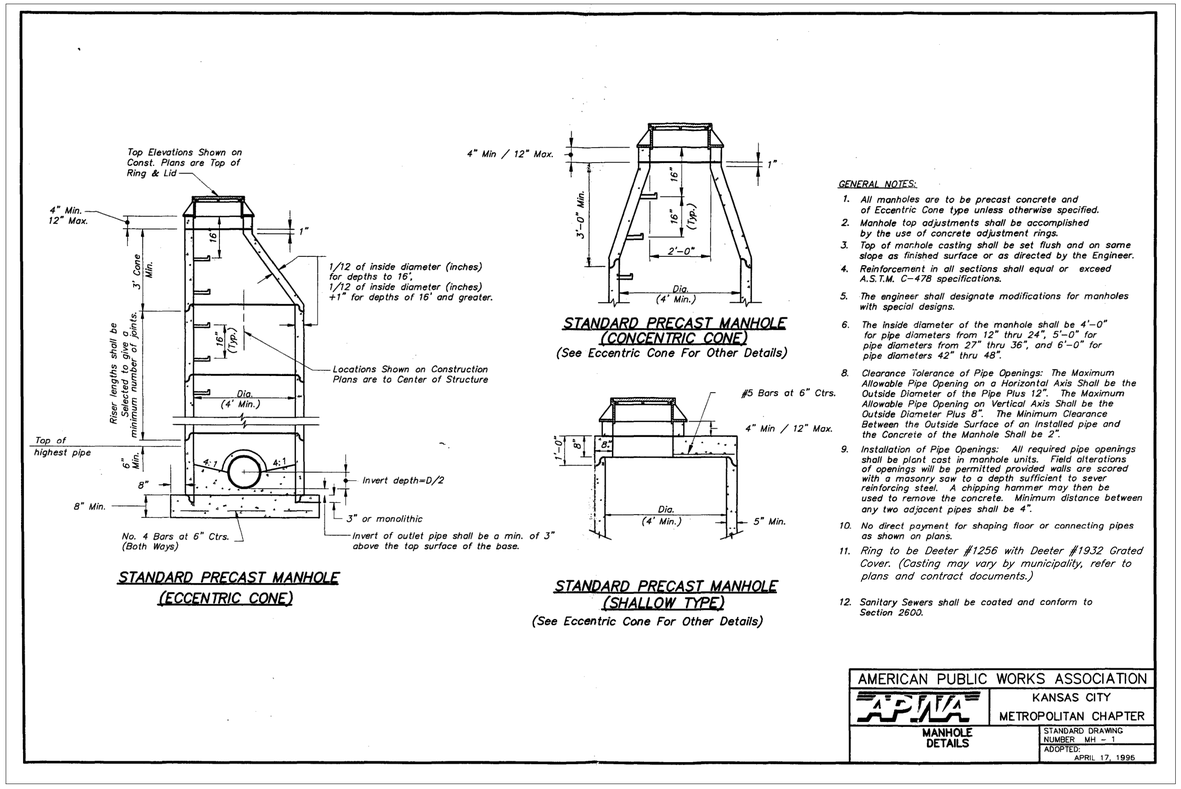
10 Year Storm

Structures			Runoff Calculations									Pipe Design									Design Checks											
			Direct	Line	Total																								Downstream	Hydraulic	Hydraulic	
From	To		Area	In	Area	C	K	Tc	Flow Time	Intensity	Design Q	Description	Pipe length	Pipe Slope	Pipe dia (in)	Manning's	Q full	Pipe	V full	Design V	Hw/D	outlet	HW, Inlet	HW, Outlet	Inlet Top	Upstream	Downstream	Inlet	Water	Grade Elev.	Grade	Comments
			(acre)	(acre)	(acre)			(min)	(min)	(in/hr)	(cfs)		(lin ft)	Slope, %		n Value	(cfs)	Area, sf	fps	fps		head, H	Control, (ft)	Control, (ft)	Elevation	flowline	flowline	Drop (ft)	Elevation	(Calculated)	(Allowable)	
Line 5000	5002		2.25			0.90	1.00	5.00		7.35	14.9	Grate Inlet													819.50			0.5		803.01	819.00	
		5001			2.25	0.90	1.00	5.00	0.10	7.35	14.9	RCP	61.60	2.00	30	0.013	58.16	4.91	11.85	9.90	0.8	0.35	803.01	801.63		800.97	799.74		801.28			
	5001		0.00			0.90	1.00	5.00		7.35	0.0	MH													807.00			0.5		801.28	806.50	Bolt down lid in streamway
		5000			2.25	0.90	1.00	5.10	0.19	7.32	14.8	RCP	111.84	2.00	30	0.013	58.16	4.91	11.85	9.84	0.8	0.49	801.28	798.74		799.24	797.00		798.25			
																														798.25		
Line 5100	5102		1.20			0.90	1.00	5.00		7.35	7.9	Curb Inlet													811.25					805.69	810.75	
		5101			1.20	0.90	1.00	5.00	0.23	7.35	0.0	RCP	116.98	2.00	24	0.013	32.08	3.14	10.21	8.44	0.7	0.00	805.69	802.89		804.35	802.01		802.89			
	5101		0.49			0.90	1.00	5.00		7.35	3.2	Curb Inlet													812.25			0.5		802.89	811.75	
		5100			1.69	0.26	1.00	5.23	0.18	7.28	3.2	RCP	100.64	2.00	24	0.013	32.08	3.14	10.21	9.26	0.7	0.06	802.89	800.56		801.51	799.50		800.50			
																														800.50		

100 Year Storm

Structures			Runoff Calculations									Pipe Design									Design Checks											
			Direct	Line	Total																								Downstream	Hydraulic	Hydraulic	
From	To		Area	In	Area	C	K	Tc	Flow Time	Intensity	Design Q	Description	Pipe length	Pipe Slope	Pipe dia (in)	Manning's	Q full	Pipe	V full	Design V	Hw/D	outlet	HW, Inlet	HW, Outlet	Inlet Top	Upstream	Downstream	Inlet	Water	Grade Elev	Grade	Comments
			(acre)	(acre)	(acre)			(min)	(min)	(in/hr)	(cfs)		(lin ft)	Slope, %		n Value	(cfs)	Area, sf	fps	fps		head, H	Control, (ft)	Control, (ft)	Elevation	flowline	flowline	Drop (ft)	Elevation	(Calculated)	(Allowable)	
Line 5000	5002		2.25			0.90	1.25	5.00		10.32	26.1	Grate Inlet													819.50			0.5		803.77	819.00	
		5001			2.25	0.90	1.25	5.00	0.09	10.32	26.1	RCP	61.60	2.00	30	0.013	58.16	4.91	11.85	11.51	1.1	1.08	803.77	803.11		800.97	799.74		802.03			
	5001		0.00			0.90	1.25	5.00		10.32	0.0	MH													807.00			0.5		802.03	806.50	Bolt down lid in streamway
		5000			2.25	0.90	1.25	5.09	0.16	10.29	26.0	RCP	111.84	2.00	30	0.013	58.16	4.91	11.85	11.45	1.1	1.52	802.03	799.77		799.24	797.00		798.25			
																														798.25		
Line 5100	5102		1.20			0.90	1.25	5.00		10.32	13.9	Curb Inlet													811.25					806.48	810.75	
		5101			1.20	0.90	1.25	5.00	0.20	10.32	13.9	RCP	116.98	2.00	24	0.013	32.08	3.14	10.21	9.82	1.1	1.35	806.48	805.73		804.35	802.01		804.38			
	5101		0.49			0.90	1.25	5.00		10.32	5.7	Curb Inlet													812.25			0.5		804.38	811.75	
		5100			1.69	0.90	1.25	5.20	0.16	10.24	19.5	RCP	100.64	2.00	24	0.013	32.08	3.14	10.21	10.68	1.4	2.36	804.38	802.86		801.51	799.50		800.50			
																														800.50		

Drainage Calculations



GENERAL NOTES:

1. All manholes are to be precast concrete and of Eccentric Cone type unless otherwise specified.
2. Manhole top adjustments shall be accomplished by the use of concrete adjustment rings.
3. Top of manhole casting shall be set flush and on same slope as finished surface or as directed by the Engineer.
4. Reinforcement in all sections shall equal or exceed A.S.T.M. C-478 specifications.
5. The engineer shall designate modifications for manholes with special designs.
6. The inside diameter of the manhole shall be 4'-0" for pipe diameters from 12" thru 24", 5'-0" for pipe diameters from 27" thru 36", and 6'-0" for pipe diameters 42" thru 48".
8. Clearance Tolerance of Pipe Openings: The Maximum Allowable Pipe Opening on a Horizontal Axis Shall be the Outside Diameter of the Pipe Plus 12". The Maximum Allowable Pipe Opening on Vertical Axis Shall be the Outside Diameter Plus 8". The Minimum Clearance Between the Outside Surface of an Installed pipe and the Concrete of the Manhole Shall be 2".
9. Installation of Pipe Openings: All required pipe openings shall be plant cast in manhole units. Field alterations of openings will be permitted provided walls are scored with a masonry saw to a depth sufficient to sever reinforcing steel. A chipping hammer may then be used to remove the concrete. Minimum distance between any two adjacent pipes shall be 4".
10. No direct payment for shaping floor or connecting pipes as shown on plans.
11. Ring to be Deeter #1256 with Deeter #1932 Grated Cover. (Casting may vary by municipality, refer to plans and contract documents.)
12. Sanitary Sewers shall be coated and conform to Section 2600.

AMERICAN PUBLIC WORKS ASSOCIATION
APWA
KANSAS CITY METROPOLITAN CHAPTER
MANHOLE DETAILS
STANDARD DRAWING NUMBER MH - 1
ADOPTED: APRIL 17, 1996

STATE OF MISSOURI
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6/15/21
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DRAWN BY:	DRV
PROJECT NO.:	12720.21
SHEET NO.	10
TOTAL SHEETS	13

Clint Loumaster
Professional Engineer
License No. 21477

Storm Sewer Improvements and Mass Grading
Paragon Star Multifamily Development
Lee's Summit, Missouri

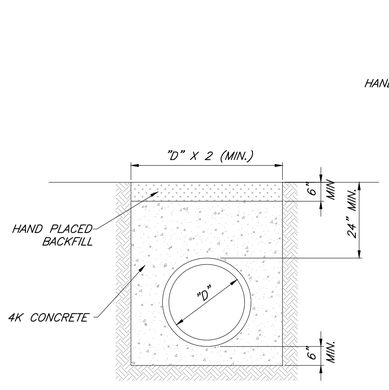
NO.	DATE	REVISIONS	BY	APPROVED
	7/30/21	City Comments		

Structure 5002
Direct Drainage Area: 0.60 AC
Q_{10}: 4.0 CFS
Q_{100}: 7.0 CFS

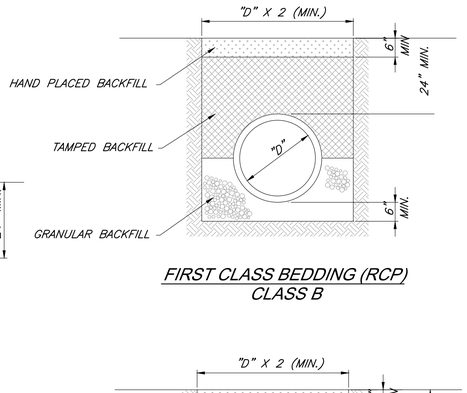
Orifice Equation: $Q=0.0108A(d)^{1/2}$

Assuming a Deeter #1932 grate with an open area of 176 in²

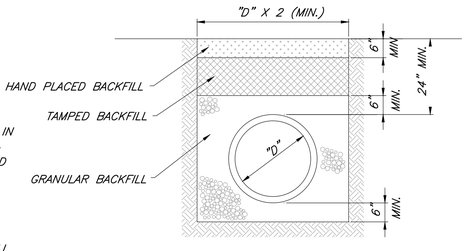
Depth Over Inlet (in)	Q (CFS)
4	3.80
5	4.25
6	4.66
7	5.02
8	5.38



CONCRETE ENCASEMENT
CLASS A



FIRST CLASS BEDDING (RCP)
CLASS B



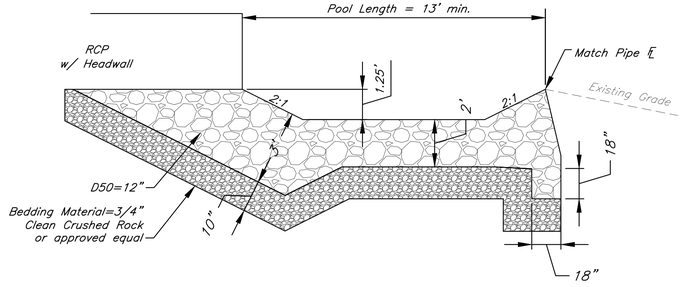
HDPE/PVC PIPE BEDDING
CLASS C

NOTES:

1. GRANULAR FILL SHALL BE 1/2" CLEAN ROCK, PLACED IN 6" LIFTS AND COMPACTED BY SLICING WITH A SHOVEL.
2. TAMPED FILL SHALL BE FINELY DIVIDED, JOB EXCAVATED MATERIAL FREE OF DEBRIS, ORGANIC MATERIAL, AND STONES, COMPACTED TO TYPE AA MR-5 COMPACTION.
3. HAND PLACED FILL SHALL BE FINELY DIVIDED MATERIAL, FREE OF DEBRIS AND STONES, COMPACTED TO TYPE AA MR-5 COMPACTION.
4. ALL PIPE SHALL BE INSPECTED PRIOR TO BACKFILL. ALL PIPE COVERED PRIOR TO INSPECTION SHALL BE UNCOVERED AT THE CONTRACTORS EXPENSE.

PIPE BEDDING DETAILS

Not to Scale



OUTLET EROSION PROTECTION - RIPRAP

Not to Scale

STATE OF MISSOURI
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TOTAL SHEETS	13

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Storm Sewer Improvements and Mass Grading

Paragon Star Multifamily Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
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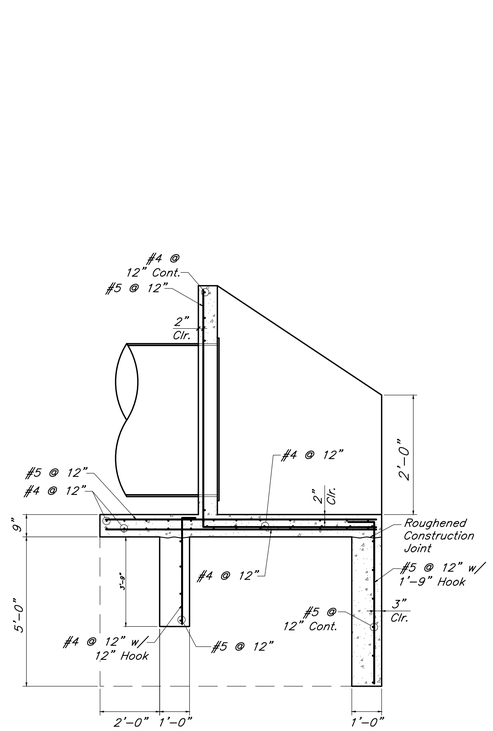
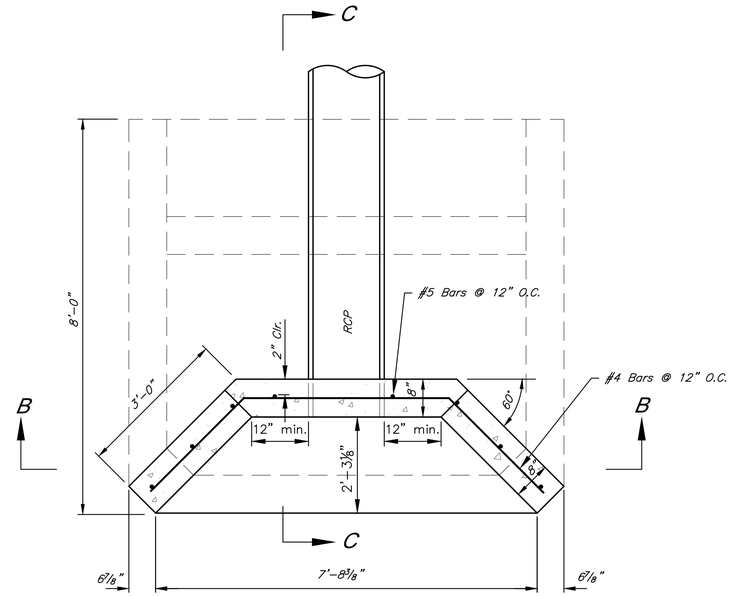
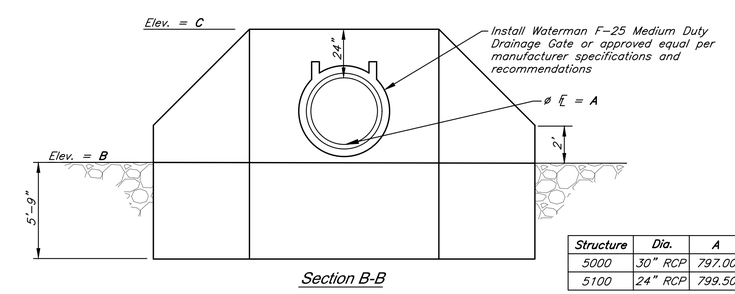


Section C-C





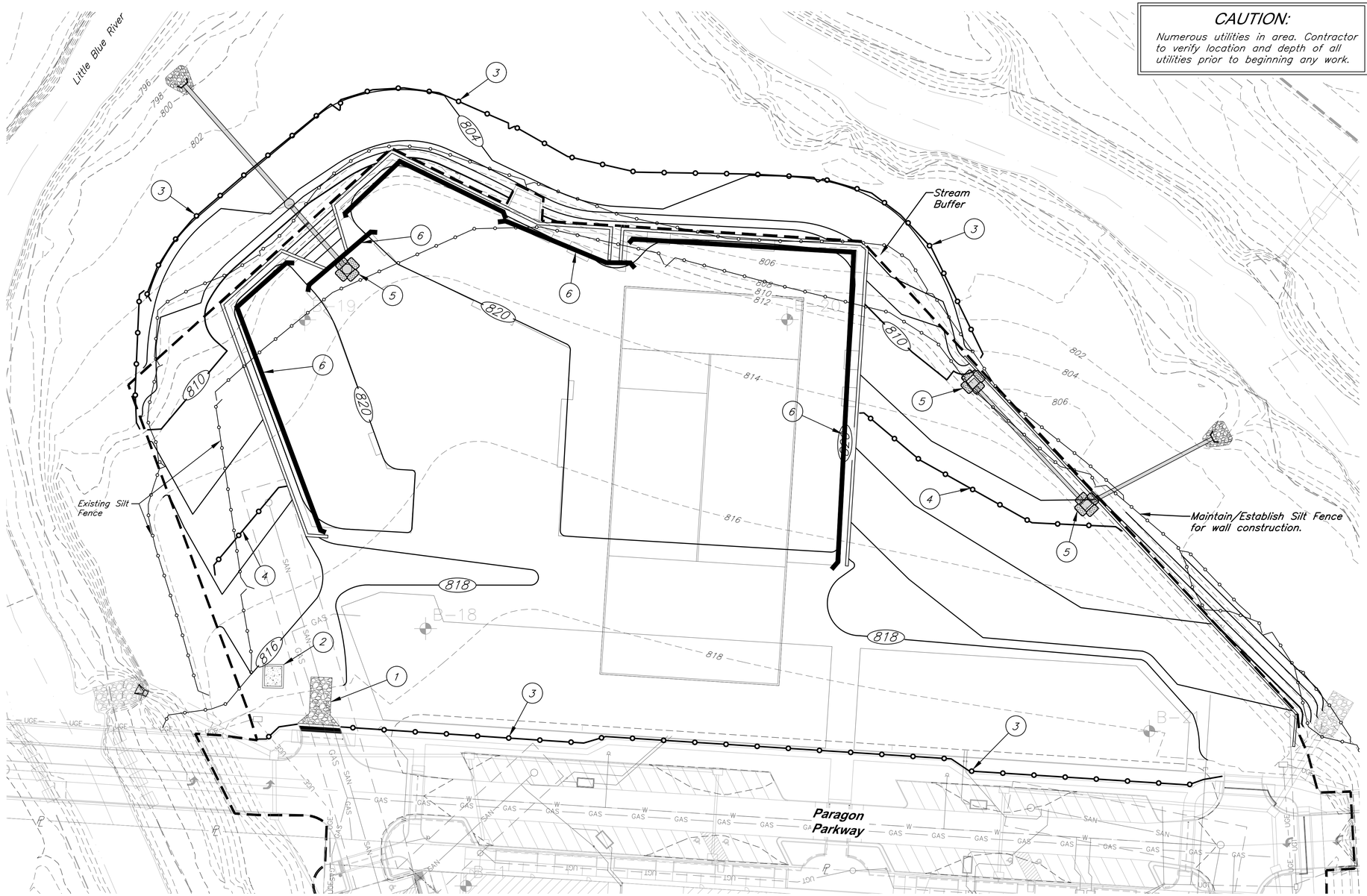
Section B-B

Structure	Dia.	A	B	C
5000	30" RCP	797.00	796.50	801.79
5100	24" RCP	799.50	799.00	803.75

HEADWALL DETAIL - STRUCTURE 5000/5100

Not to Scale

CAUTION:
Numerous utilities in area. Contractor to verify location and depth of all utilities prior to beginning any work.



40' 0' 40' 80'
SCALE : 1 INCH = 40 FEET

EROSION & SEDIMENT CONTROL STAGING CHART

Project Stage	Ref. No.	BMP Description	May Remove after Stage	Notes
A. Prior to Multifamily Mass Grading	1	Const. Entrance & Staging Area	C	
	2	Construct Concrete Wash-out	C	
	3	Perimeter Silt Fence	C	
B. Mass Grading	4	Silt Fence	C	
	5	Inlet Protection	C	
	6	Straw Wattles	C	Wattles to be kept on hand for perimeter control where needed.
C. Permanent Stabilization*	7	Seed & Mulch or Blanket or Sod		Erosion control blanket to be installed w/ seed. Check approved seeding dates and install temporary stabilization if out of seeding season. Install blanket according to manufacturer's instructions and stapling pattern.

*Permanent Stabilization will be considered stabilized when 100% of disturbed area is established with perennial vegetation with a density of 70%.

PROJECT BENCHMARK:

BM #11 – Chiseled "L" on top Northeast corner of concrete guardrail at the Northeast corner of I470 bridge spanning View High Drive. EL=833.80

Legend

- 810 — Proposed Contour
- 810 — Existing Contour
- B-1 — Geotechnical Boring Location
- Straw Wattles
- Inlet Filter Sock
- Grading Limits
- Sediment Fence
- Exist. Sediment Fence (to be maintained)

STATE OF MISSOURI — CLINT LOUMASTER — NUMBER PE-2011009651 — 6/25/21 — REGISTERED PROFESSIONAL ENGINEER

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TOTAL SHEETS	13

Clint Loumaster
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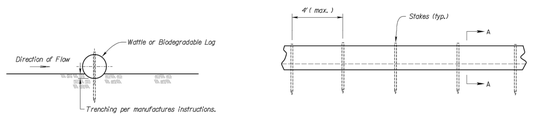
Storm Sewer Improvements and Mass Grading
Paragon Star Multifamily Development
Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	7/30/21	City Comments		

Erosion Control Plan



Section A–A

Typical Elevation

WATTLES AND BIODEGRADABLE LOG

Notes for Wattles and Biodegradable Log Slope Protection:

1. The Slope barriers shall be placed along contour lines, with a short section turned upgrade at each end of the barrier. The maximum length of the slope barrier shall not exceed 250 feet, and the barrier ends need to be staggered.
2. Install wattles and biodegradable logs per manufacturer's instructions.
3. Spacing of stakes per manufacturer's instructions with 4' max. spacing. Length of stakes shall be a minimum of 2 times the diameter of the log with minimum of 24".

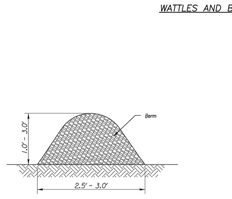


Figure 1
(Perimeter Control)

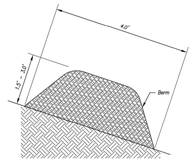


Figure 2
(Steep Slopes)

Notes for Mulch and Compost Filter Beam:

1. The sediment control berm shall be placed uncompacted in a windrow at locations shown on the plans or as directed by the engineer.
2. Parallel to the base of the slope, or around the perimeter of other affected areas, construct a 1 to 3 foot high by 2.5 to 3 foot wide berm (see Figure 1). For maximum water treatment ability or for steep slopes, construct a 1.5 to 3 foot high trapezoidal berm that is a minimum of 4 feet wide at the base (see Figure 2). In extreme conditions, or where specified by the engineer, a second berm shall be constructed at the top of the slope. Engineer will specify berm requirements.
3. If berm is to be left as permanent or part of the natural landscape, the compost berm may be seeded during application for permanent vegetation.
4. Do not use compost or wood mulch berms in any runoff channels or concentrated flow areas.
5. Wood mulch shall consist of tree and shrub debris resulting from clearing and grubbing and shall be ground by the mechanical means such as a chipper, hammermill, tub grinder or other approved method. Mulch sizing varies with a maximum width of 2" and a maximum length of 10".

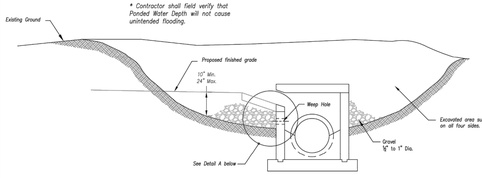
Maintenance for Mulch and Compost Filter Beam:

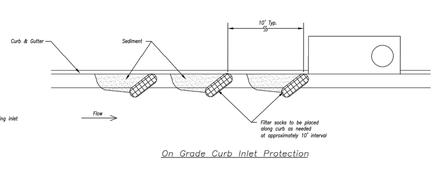
1. Berm shall be reshaped and material added as necessary to maintain function and dimensions.
2. Breaches in the berm shall be repaired promptly.

MULCH OR COMPOST FILTER BERMS

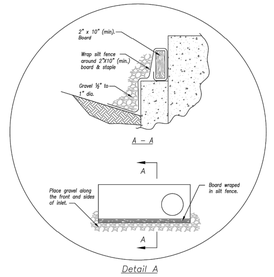
Modified from 2015 Overland Park Standard Details for Erosion and Sediment Control.

AMERICAN PUBLIC WORKS ASSOCIATION	
KANSAS CITY METRO CHAPTER	
WATTLES/BIODEGRADABLE LOG AND MULCH/COMPOST FILTER BERM	STANDARD DRAWING NUMBER ESC-04
	ADOPTED: 10/24/2016





On Grade Curb Inlet Protection



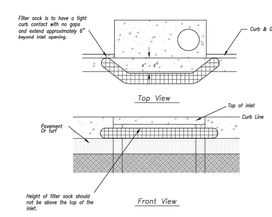
EARLY STAGE CURB INLET
(Open Box and Prior to Pouring Curb and Inlet Throat)

Notes:

1. Immediately following inlet construction and prior to construction of curb and inlet throat, protect inlet opening by installing 2" X 10" (min.) board wrapped in silt fence. Structures shall have excavated storage area on all four sides to allow settling of sediment (Early Stage Curb Inlet).
2. When inlet is completed and curb poured, filter socks or approved equal should be used (Late Stage Curb Inlet). Straw wattles are not approved for curb inlet use.
3. Contractor to field verify ponding water shall not create a traffic hazard.

Maintenance:

1. Remove deposited sediment from excavated storage areas when available storage has been reduced by 20%.
2. Remove deposited sediment from filter socks or similar when any accumulation of sediment is visible.
3. Repair or replace as necessary to maintain function and integrity of installation.

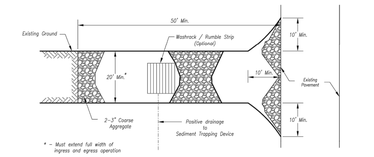


Sump Inlet Sediment Filter

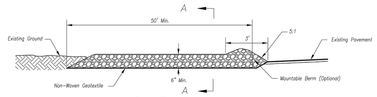
LATE STAGE CURB INLET
(After Pouring Curb and Inlet Throat)

Modified from 2015 Overland Park Standard Details for Erosion and Sediment Control.

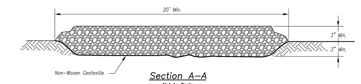
AMERICAN PUBLIC WORKS ASSOCIATION	
KANSAS CITY METRO CHAPTER	
CURB INLET PROTECTION	STANDARD DRAWING NUMBER ESC-06
	ADOPTED: 10/24/2016



Plan View
Not to Scale



Side Elevation
Not to Scale



Section A–A
Not to Scale

Notes for Construction Entrance:

1. Avoid locating on steep slopes, at curves on public roads, or downhill of disturbed areas.
2. Remove all vegetation and other unsuitable material from the foundation area, grade, and crown for positive drainage.
3. If slope towards the public road exceeds 2%, construct a 6– to 8–inch high ridge with 3H:1V side slopes across the foundation approximately 15 feet from the edge of the public road to divert runoff from it.
4. Install pipe under the entrance if needed to maintain drainage ditches along public roads.
5. Place stone to dimensions and grade as shown on plans. Leave surface sloped for drainage.
6. Divert all surface runoff and drainage from the entrance to a sediment control device.
7. If conditions warrant, place geotextile fabric on the graded foundation to improve stability.

Maintenance for Construction Entrance:

1. Reshape entrance as needed to maintain function and integrity of installation. Top dress with clean aggregate as needed.

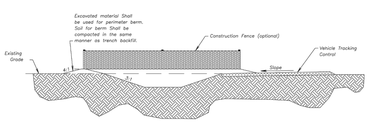
CONSTRUCTION ENTRANCE

Notes for Concrete Washout:

1. Concrete washout areas shall be installed prior to any concrete placement on site.
2. Concrete washout area shall include a flat subsurface pit sized relative to the amount of concrete to be placed on site. The slopes leading to the pit shall be no steeper than 3:1. The vehicle tracking pad shall be sloped towards the concrete washout area.
3. Vehicle tracking control is required at the access point to all concrete washout areas.
4. Signs shall be placed at the construction site entrance, washout area and elsewhere as necessary to clearly indicate the location(s) of the concrete washout area(s) to operators of concrete truck and pump rigs.
5. A one–piece impervious liner may be required along the bottom and sides of the subsurface pit in sandy or gravelly soils.

Maintenance for Concrete Washout:

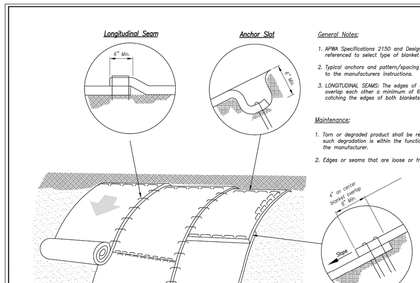
1. Concrete washout materials shall be removed once the materials have filled the washout to approximately 75% full.
2. Concrete washout areas shall be enlarged as necessary to maintain capacity for wasted concrete.
3. Concrete washout water, wasted pieces of concrete and all other debris shall be disposed of in accordance with laws for the job site in a water–tight container and disposed of properly.
4. Concrete washout areas shall remain in place until all concrete for the project is placed.
5. When concrete washout areas are removed, excavations shall be filled with suitable compacted backfill and topsoil, any disturbed areas associated with the installation, maintenance, and/or removal of the concrete washout areas shall be stabilized.



CONCRETE WASHOUT

Construction Entrance modified from 2015 Overland Park Standard Details for Erosion and Sediment Control; Concrete Washout modified from 2009 City of Great Bend Standard Drawings.

AMERICAN PUBLIC WORKS ASSOCIATION	
KANSAS CITY METRO CHAPTER	
CONSTRUCTION ENTRANCE AND CONCRETE WASHOUT	STANDARD DRAWING NUMBER ESC-01
	ADOPTED: 10/24/2016

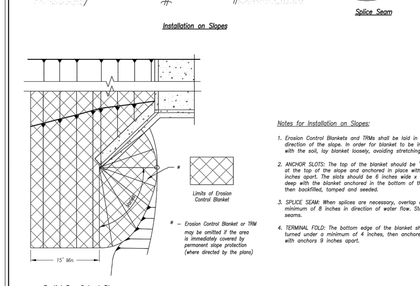


General Notes:

1. APWA Specifications 2150 and Design Guidance 5100 shall be referenced to select type of blanket or mat to be used.
2. Typical anchors and pattern/spacing shall be installed according to the manufacturers instructions.
3. LONGITUDINAL SEAMS: The edges of the blanket or mat should overlap each other a minimum of 6 inches, with anchors catching the edges of both blankets.

Maintenance:

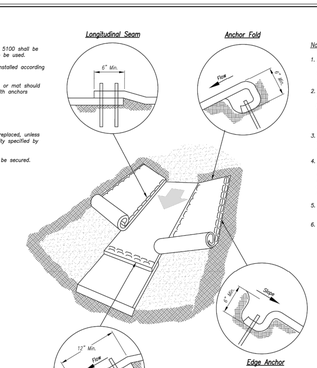
1. Torn or degraded product shall be repaired or replaced, unless such degradation is within the functional longevity specified by the manufacturer.
2. Edges or seams that are loose or frayed shall be secured.



Installation Around Culvert Slope

Notes for Installation on Slopes:

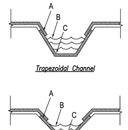
1. Erosion Control Blankets and TRMs shall be laid in the direction of the slope. In order for blanket to be in contact with the soil, lay blanket loosely, avoiding stretching.
2. ANCHOR SLOTS: The top of the blanket should be "slotted in" at the top of the slope and anchored in place with anchors 6 inches apart. The slots should be 6 inches wide x 6 inches deep with the blanket anchored in the bottom of the slot, then backfilled, tamped and seeded.
3. SPLICE SEAM: When splices are necessary, overlap end a minimum of 8 inches in direction of water flow. Stagger splice seams.
4. TERMINAL FOLD: The bottom edge of the blanket shall be turned under a minimum of 4 inches, then anchored in place with anchors 9 inches apart.



Installation in Channels

Notes for Installation in Channels:

1. Erosion Control Blankets and TRMs shall be laid in the direction of the flow, with the first course at the centerline of channel, where applicable. In order for the mat to be in contact with the soil, lay the mat loosely, avoiding stretching.
2. ANCHOR FOLD: The top of the mat should be folded under, buried and secured with wood or other approved anchors placed 6 inches apart. The top edge of the mat should be buried in a slot 6 inches wide x 6 inches deep, anchored in the bottom of the slot, backfilled, and the mat folded over the top as shown in detail.
3. SPLICE SEAM: When splices are necessary, overlap end a minimum of 12 inches in direction of water flow. Stagger splice seams.
4. CHECK SLOTS: Establish check slots transverse to slope every 30 feet. The slots should be 6 inches wide x 6 inches deep. The mat shall be cut to a length 12 inches beyond the slot. The top of the downstream mat shall be slotted in, secured and buried similar to the edge anchor fold. The upstream mat shall then cover the slot and be anchored as shown.
5. EDGE ANCHORS: Lay outside edge of mat into trench at top of the slope and anchor.
6. TERMINUS: The bottom edge of the mat shall be anchored.



Critical Points:

A – Overlaps and seams;

B – Projected water line;

C – Channel bottom / side slope vertices;

Modified from 2015 Overland Park Standard Details for Erosion and Sediment Control.

AMERICAN PUBLIC WORKS ASSOCIATION	
KANSAS CITY METRO CHAPTER	
EROSION CONTROL BLANKETS AND TURF REINFORMENT MATS	STANDARD DRAWING NUMBER ESC-02
	ADOPTED: 10/24/2016

STATE OF MISSOURI
CLINT LOUMASTER
NUMBER PE–2011009651
6/25/21
REGISTERED PROFESSIONAL ENGINEER

GBA
9801 Renner Blvd., Ste. 300
Lenexa, KS 66219
913.492.0400
gbateam.com

DATE:	6/25/21
DESIGN BY:	JRH
DRAWN BY:	DRV
PROJECT NO.:	12720.21
SHEET NO.	13
TOTAL SHEETS	13

Clint Loumaster
Professional Engineer
License No. 21477

Storm Sewer Improvements and Mass Grading

Paragon Star Multifamily Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	7/30/21	City Comments		

Erosion Control Details

STATE OF MISSOURI
CLINT LOUMASTER
NUMBER PE-2011009651
6/25/21
REGISTERED PROFESSIONAL ENGINEER

GBA
9801 Renner Blvd., Ste. 300
Lenexa, KS 66219
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gbateam.com

DATE:	6/25/21
DESIGN BY:	JRH
DRAWN BY:	DRV
PROJECT NO.:	12720.21
SHEET NO.	14
TOTAL SHEETS	13

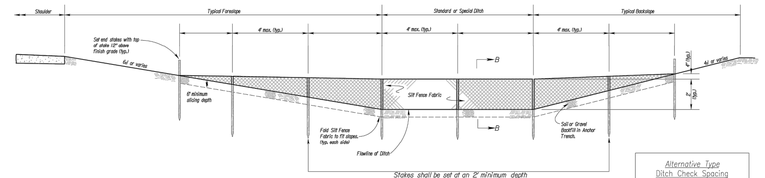
Clint Loumaster
Professional Engineer
License No. 21477

Storm Sewer Improvements and Mass Grading
Paragon Star Multifamily Development
Lee's Summit, Missouri

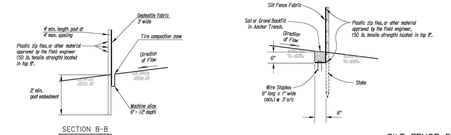
NO.	DATE	REVISIONS	BY	APPROVED
	7/30/21	City Comments		

Notes for Silt Fence Ditch Check:

1. Stakes shall be 4' (min.) long and one of the following materials:
   a. Hardwood – 1 ½" x 1 ½";
   b. Southern Pine (No. 2) – 2 ½" x 2 ½";
   c. Steel U, T, L, or C Section – .85 lbs. per 1'-0";
   d. Synthetic – same strength as wood stakes.
2. Cross pieces shall be of same material as stakes.
3. Attach fence fabric securely on 6" centers (max.).
4. Use of high flow material is acceptable.
5. Refer to plan sheets to estimate the length of silt fence required.
6. Use support fencing when tributary area is greater than 2.4 acres or when ditch gradient is greater than 2 percent.
7. Silt fence sliced in to a 6" minimum depth.
8. Elevation of tie in points shall be a minimum of 4" higher than the center.



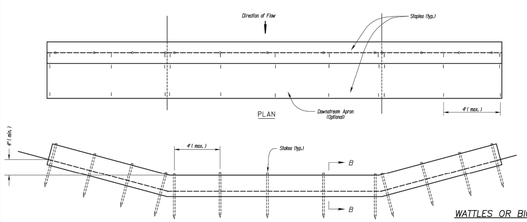
TYPICAL ELEVATION



SECTION B-B

SILT FENCE DITCH CHECK
NO SCALE

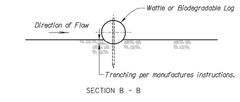
Alternative Type Ditch Check Spacing	
Ditch Centerline Slope (%)	Spacing Interval (Feet)
1.0	200
2.0	100
3.0	66
4.0	50
5.0	40
6.0	33
Note: Use this spacing for all except Rock Ditch Checks.	



TYPICAL ELEVATION

Notes for Wattles and Biodegradable Log Ditch Check:

1. Use as many biodegradable log sections as necessary to ensure water does not flow around end of ditch check.
2. Overlap sections a minimum of 18"
3. Stakes shall be per manufacturer's instructions. Length of stakes shall be a minimum of 2 times the diameter of the log or 24" minimum.
4. Use Erosion Control (Class 1) (Type C) as the downstream apron when directed by the Engineer.
5. Use 9" diameter logs when used with Erosion Control (Class 2) (Key Type) channel lining. Smaller diameter logs may be used with Erosion Control (Class 2) (Key Type) channel lining as directed by the Engineer.



SECTION B - B

WATTLES OR BIODEGRADABLE LOG DITCH CHECKS
OR Filter Sock Ditch Check
NO SCALE

Modified from Kansas Department of Transportation Standard Details for Erosion Control and Sediment Control.

AMERICAN PUBLIC WORKS ASSOCIATION
KANSAS CITY METRO CHAPTER

SILT FENCE AND WATTLE/ BIODEGRADABLE LOG DITCH CHECKS

STANDARD DRAWING NUMBER ESC-09
ADOPTED: 10/24/2016

Erosion Control Details