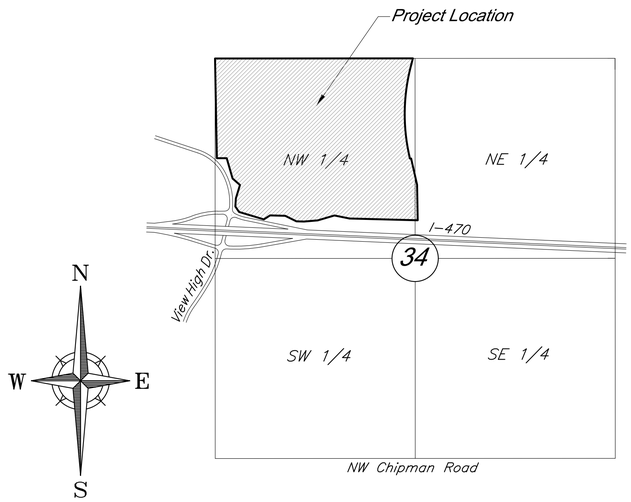
STORM SEWER IMPROVEMENTS AND MASS GRADING
FOR
PARAGON STAR DEVELOPMENT

Sections 33 & 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	Ac.	N/A	
3	Fill (Unadjusted)	C.Y.	459,133*	2
4	Cut (Unadjusted)	C.Y.	72,314	
5	Sediment Fence	L.F.	5,895	
6	Rock Check Dam	EA.	7	
7	Straw Wattle	L.F.	2,713	
8	Erosion Control Blanket (SC150)	S.Y.	15,691	
9	Temporary Construction Entrance	EA.	3	
10	5'x4' Curb Inlet	EA.	2	
11	7'x4' Curb Inlet	EA.	1	
12	8'x4' Curb Inlet	EA.	1	
13	9'x4' Curb Inlet	EA.	1	
14	7'x4' Junction Box	EA.	1	
15	8'x4' Junction Box	EA.	1	
16	30" RCP	L.F.	119.24	
17	42" RCP	L.F.	102.95	2
18	48" RCP	L.F.	117.11	
19	60" RCP	L.F.	212.54	
20	72" RCP	L.F.	204.00	
21	8'x8'x166' RCB	Ea.	1	
22	30" RCP End Section w/ Conc. Toewall	Ea.	1	
23	30" RCP Headwall w/ Conc. Toewall and Flapgate	Ea.	1	
24	48" RCP End Section w/ Conc. Toewall	Ea.	1	
25	60" RCP End Section w/ Conc. Toewall	Ea.	1	
26	60" RCP Headwall w/ Conc. Toewall and Flapgate	Ea.	1	
27	72" RCP End Section w/ Conc. Toewall	Ea.	2	
28	Caged Reinforced Concrete Encasement	L.F.	110	
29	Adjust Existing Sanitary Sewer Manhole	Ea.	5	
30	Riprap (D50=12")	S.Y.	284	
31	Riprap (Structure 300)	S.Y.	83	
32	Riprap (Structure 500)	S.Y.	90	
33	Seeding (Temporary)	LS	1	
34	Seeding (Permanent)	Ac.	8.2	
35	Retaining Wall	S.F.	1,225	3
36	12'x12'x134' RCB	Ea.	1	

*Base Earthwork: 459,133 CY Fill, 72,314 CY Cut
Topsoil Removed by Clearing Plan: 46,500 CY Fill
Total Fill Required: 340,319 CY



Scale: 1"=1000'

VICINITY MAP
Section 33 & 34-T48N-R32W

INDEX OF SHEETS

UTILITY CONTACTS

Sanitary Sewers
Mr. Jeff Thorn, PE
City of Lee's Summit Water Utilities
1200 SE Hamblen Road
Lee's Summit, MO 64063
(816) 969–1922
email: jeff.thorn@cityofLS.net

Mr. Jeff Shook
Little Blue Valley Sewer District
21101 East 78 Highway
Independence, MO 64057
(816) 285–1522
email: jshook@lbvsd.net

Kansas City, MO Public Works Department
(816) 513–2600

Kansas City, MO Water Services Department
(816) 513–2215

Water
Mr. Jeff Thorn, PE
City of Lee's Summit Water Utilities
1200 SE Hamblen Road
Lee's Summit, MO 64063
(816) 969–1922
email: jeff.thorn@cityofLS.net

Missouri One Call System 1–800–344–7483 (DIG–RITE)

Gas
Mr. Donnie Richards
Missouri Gas Energy
7500 E 35th Terrace
Kansas City, MO 64129
(816) 472–9464
Fax (816) 472–3488
email: donnie.richards@sug.com

Cable Television
Mr. Greg Thomas
Time Warner Cable
8221 W. 119th Street
Overland Park, KS 66213
(913) 643–1950
email: greg.thomas@twcable.com

Telephone
Ms. Glenda Charles
AT&T
1425 Oak Street
Kansas City, MO 64106
(816) 365–1669
Fax (816) 275–1109
email: gc6954@att.com

Electric Service
Mr. Nathan Michael
Kansas City Power & Light
P.O. Box 418679
Kansas City, MO 64141
(816) 220–5210
Fax (816) 245–3623
email: Nathan.Michael@kcpl.com

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

Sue Pyles 2023.05.17 10:30:00-05'00'

Record Drawing

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

PREPARED & SUBMITTED BY:
GEORGE BUTLER ASSOCIATES, INC.
9801 RENNER BOULEVARD
LENEXA, KANSAS 66219
PHONE: 913–492–0400
FAX: 913–577–8312
CONTACT: BRAD BURTON P.E.
EMAIL: BBURTON@GBATEAM.COM

PROJECT ENGINEER: DATE:

APPROVED:

CITY ENGINEER: DATE:

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is solely based on information obtained by GBA.

Date: 4/11/23

Certified by:

Bradley D. Burton, PE

Title: Senior Associate
Firm: GBA

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8–inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as–built" information. All other data is as designed and has not been field verified.

Record Drawings 4/7/2023

GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

North slope grading revisions	12/1/20
2 City Comments	3/10/20
Temporary River Crossing Repair	4/15/19
Temporary River Crossing Repair	4/11/19
Structure 700 removed from floodway	4/9/19
RFI 1	4/4/19
	11/29/18
Removed Floodway Grading	10/10/18
City Comments	9/14/18
City Comments	8/28/18
City Comments	8/7/18
Revised Field Elevations	5/15/18
	1/10/17

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.

Record Drawing

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	2
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

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.

Permitting:

11. Contractor is responsible for obtaining all required permits, paying all fees, and for otherwise complying with all applicable regulations governing the work.
12. No work shall be completed within the existing floodway until the CLOMR has been issued.
13. 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.
14. All work within KCMO city limits shall adhere to KCMO Site disturbance requirements.

Erosion Control:

15. 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.
16. 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.
17. The Contractor shall sod all disturbed areas within the Public Street Right-of-Way unless otherwise noted in the plans.
18. No trees shall be damaged or removed without prior authorization from owner unless otherwise shown on this plan.

Earthwork:

19. Slopes shall be constructed to a maximum slope of 3:1 (Horiz:Vert) unless specifically noted otherwise in the referenced Geotechnical reports.
20. 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.
21. Unless otherwise noted, all spot elevations and contours are shown to "finish" grade surface.
22. All temporary slopes and excavations should conform to Occupational Safety and Health Administration (OSHA) standards for the Construction Industry (29 CFR part 1026, subpart P).
23. Existing contours depicted on plans do not reflect topsoil root zone stripping completed under tree clearing scope. Existing grade will be approximately 4.5" average depth lower than shown. Refer to "Tree Clearing Plans for Paragon Star Development" for details.
24. Earthwork Quantities shown on plans do not account for stripped topsoil from previously issued Tree Clearing Plans.
25. Earthwork for this phase of development is intended to balance. Contractor to cut only enaugh fill material from the borrow source at the north end of the project as required to accomplish the fills shown on this plan set.
26. All Permanent seeded shall be dressed with 12" topsoil and permanent seed. All other disturbed areas shall be seeded with the temporary seed mix.
27. Shale fill shall be capped with a minimum of 24" of clay material.
28. All Soccer fields shall be provided with a minimum 24" of clay above shale or 3" minus material.
29. Final tolerance for graded areas shall be +/- 0.2'.
30. The west borrow area at the NW portion of the site is considered the primary borrow area and shall be cut and graded to the contours shown. Cuts shown in this area must be performed to completion before utilizing the eastern borrow area for the balance of fill required on the project.
31. 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:

32. All Manholes, Catch Basins, Utility Valves, Meter Pits, and other utility equipment shall be adjusted or rebuilt to grade as required.
33. 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:

34. All RCP shall be Class III.
35. Pipe Lengths are called out from center of structure to center of structure.
36. 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.
37. 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 1470 bridge spanning View High Drive.
EL=833.80

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	3
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

Boundary Description:

All that part of the Northwest Quarter of Section 34, Township 48 North, Range 32 West, of the 5th P.M., and all of GRAHAM COMMERCIAL CENTER, a subdivision in the in the City of Lee's Summit, Jackson County, Missouri, being more particularly described as follows:

BEGINNING at the Northwest corner of said Northwest Quarter of Section 34; thence South 86°33'45" East, along the North line of said Northwest Quarter, a distance of 2611.91 feet, to a point on the Westerly Right-of-Way line of Union Pacific Railroad, as now established; thence South 18°46'13" West, departing said North line, along said Westerly Right-of-Way line, a distance of 76.95 feet, to a point of curvature; thence Southwesterly and Southeasterly, continuing along said Westerly Right-of-Way line, along a curve to the left, having a radius of 2508.01 feet, and a central angle of 28°06'45", a distance of 1230.57 feet, to a point of tangency; thence South 09°20'32" East, continuing along said Westerly Right-of-Way line, a distance of 30.31 feet, to a point on the South line of the North half of said Northwest Quarter; thence South 86°26'21" East, continuing along said Westerly Right-of-Way line, and along said South line of the North half of the Northwest Quarter, a distance of 16.41 feet; thence South 09°20'32" East, departing said South line of the North half of the Northwest Quarter, continuing along said Westerly Right-of-Way line, a distance of 354.98 feet, to a point on the East line of said Northwest Quarter; thence South 02°29'17" West, continuing along said Westerly Right-of-Way line, and along said East line of the Northwest Quarter, a distance of 468.48 feet, to a point on the North Right-of-Way line of Interstate 470, as now established; thence North 85°05'37" West, departing said Westerly Right-of-Way line, along said North Right-of-Way line of Interstate 470, a distance of 899.87 feet; thence North 75°10'03" West, continuing along said North Right-of-Way line, a distance of 203.04 feet; thence South 77°15'22" West, continuing along said North Right-of-Way line, a distance of 228.93 feet, to a point on the East line of the Southwest Quarter of said Northwest Quarter, said point also being the Southeast corner of said GRAHAM COMMERCIAL CENTER; thence continuing South 77°15'22" West, continuing along said North Right-of-Way line, and along the South line of said subdivision, a distance of 1.94 feet; thence South 88°33'58" West, continuing along said North Right-of-Way line, and along said South line of said subdivision, a distance of 181.11 feet; thence North 85°01'31" West, continuing along said North Right-of-Way line, and said South line of said subdivision, a distance of 100.18 feet; thence North 60°06'43" West, continuing along said North Right-of-Way line, and said South line of said subdivision, a distance of 165.44 feet; thence North 85°08'16" West, continuing along said North Right-of-Way line, and said South line of said subdivision, a distance of 199.96 feet; thence South 60°28'02" West, continuing along said North Right-of-Way line, and said South line of said subdivision, a distance of 97.23 feet; thence North 69°50'05" West, continuing along said North Right-of-Way line, and said South line of said subdivision, a distance of 342.03 feet, to the Southwest corner of said subdivision; thence North 30°28'52" West, continuing along said North Right-of-Way line, and along the West line of said subdivision, a distance of 87.88 feet; thence North 07°21'08" East, continuing along said North Right-of-Way line and it's transition to the East Right-of-Way line of View High Drive, as now established, and said West line of said subdivision, a distance of 106.53 feet; thence North 20°25'39" East, departing said West line of said subdivision, continuing along said East Right-of-Way line of View High Drive, a distance of 185.39 feet; thence North 45°30'34" West, continuing along said East Right-of-Way line, a distance of 129.40 feet; thence North 12°40'32" West, continuing along said East Right-of-Way line, a distance of 278.96 feet, to a point on said South line of the North half of the Northwest Quarter; thence North 86°26'21" West, continuing along said East Right-of-Way line, and along said South line of the North half of the Northwest Quarter, a distance of 130.00 feet, to the Southwest corner of said North half of the Northwest Quarter; thence North 02°25'47" East, along the West line of said Northwest Quarter, a distance of 1316.45 feet, to the POINT OF BEGINNING, containing 5,217,462.56 square feet or 119.78 acres, more or less.

⚠5 *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.

Total Disturbed Area:

61.10 Ac.

200' 0' 200' 400'
SCALE : 1 INCH = 200 FEET

Record Drawing

General Layout

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

- Proposed Contour
- Existing Contour
- Proposed Spot Grade
- Drainage Flow Arrow
- Drainage Swale
- Geotechnical Boring Location
- Grading Limits
- Exist. Construction Fence for Tree Protection (to be maintained)
- Exist. Sediment Fence (to be maintained)

Swale Note 1:
Q=6.85 CFS
V=1.49 FT/S
Shear Stress=0.13 PSF
Acceptable for all forms of vegetation

Swale Note 2:
Q=5.86 CFS
V=1.07 FT/S
Shear Stress=0.07 PSF
Acceptable for all forms of vegetation

CAUTION!

Numerous Utilities on Site. Contractor to verify location and elevation of all utilities prior to commencing construction.

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	4
TOTAL SHEETS	43

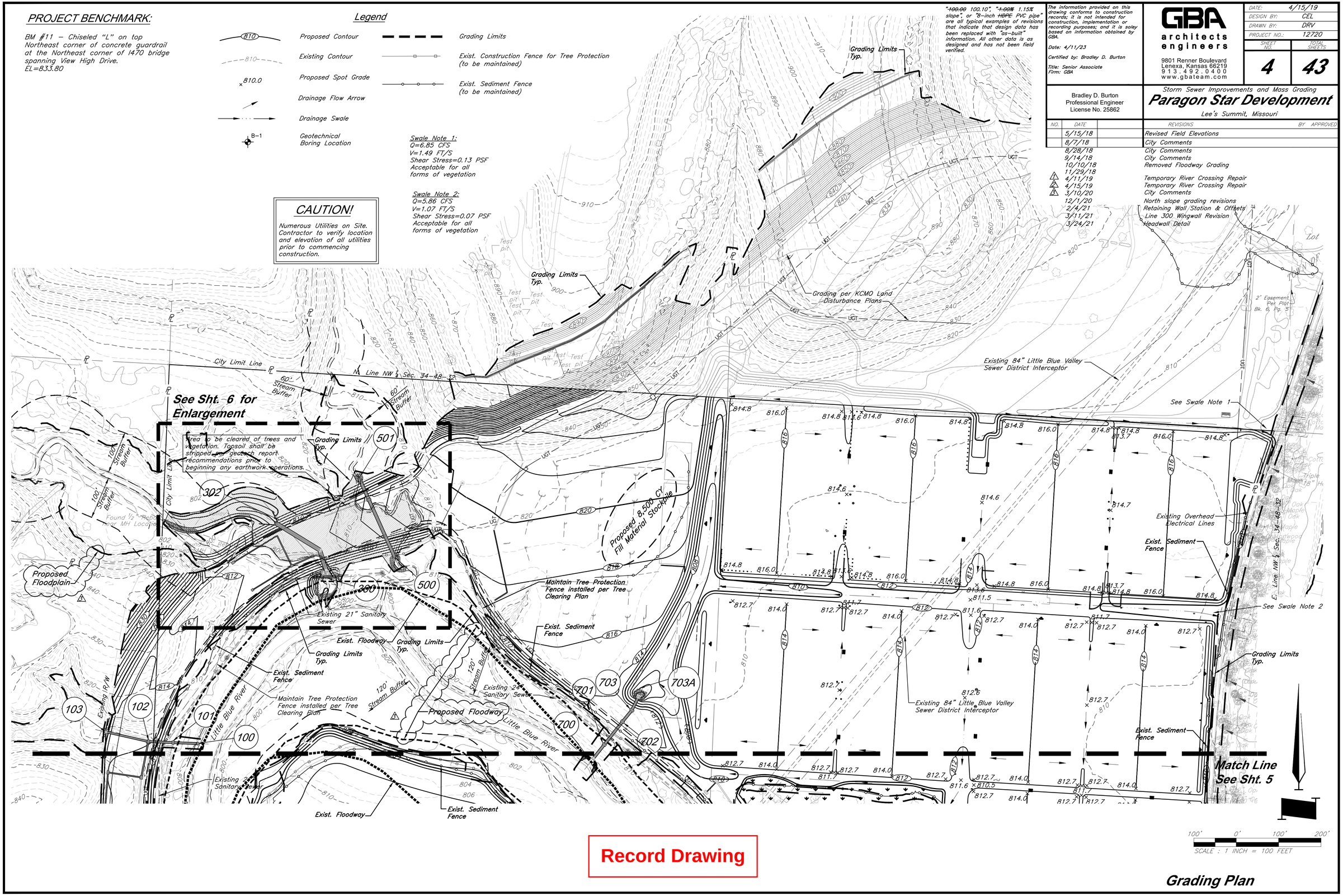
Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		



Record Drawing

Grading Plan

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

Symbol	Description
(810)	Proposed Contour
---810---	Existing Contour
×810.0	Proposed Spot Grade
	Drainage Flow Arrow
	Drainage Swale
B–1	Geotechnical Boring Location
	Grading Limits
	Exist. Construction Fence for Tree Protection (to be maintained)
	Exist. Sediment Fence (to be maintained)

NOTE:
No fill may be placed within the existing floodway until storm line 4100 is complete.

CAUTION!

Numerous Utilities on Site. Contractor to verify location and elevation of all utilities prior to commencing construction.

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8–inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as–built" information. All other data is as designed and has not been field verified.

Swale Note 3:
Q=5.86 CFS
V=1.07 FT/S
Shear Stress=0.07 PSF
Acceptable for all forms of vegetation

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

Bradley D. Burton
Professional Engineer
License No. 25862

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	5
TOTAL SHEETS	43

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

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
4	12/14/20	Revised Multifamily Grading		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Offset		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

Match Line
See Sht. 4

100' 0' 100' 200'
SCALE : 1 INCH = 100 FEET

Record Drawing

Grading Plan

Record Drawing

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

- Proposed Contour
- Existing Contour
- Proposed Spot Grade
- Drainage Flow Arrow
- Drainage Swale
- Geotechnical Boring Location
- Grading Limits
- Exist. Construction Fence for Tree Protection (to be maintained)
- Exist. Sediment Fence (to be maintained)

~~"100.00~~ 100.10", ~~"1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	6
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

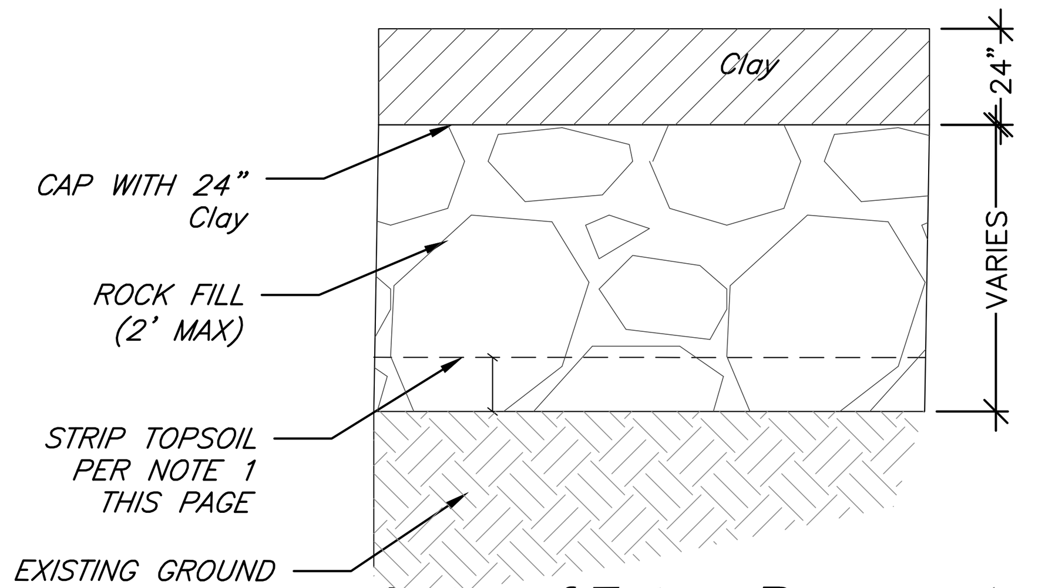
Storm Sewer Improvements and Mass Grading

Paragon Star Development

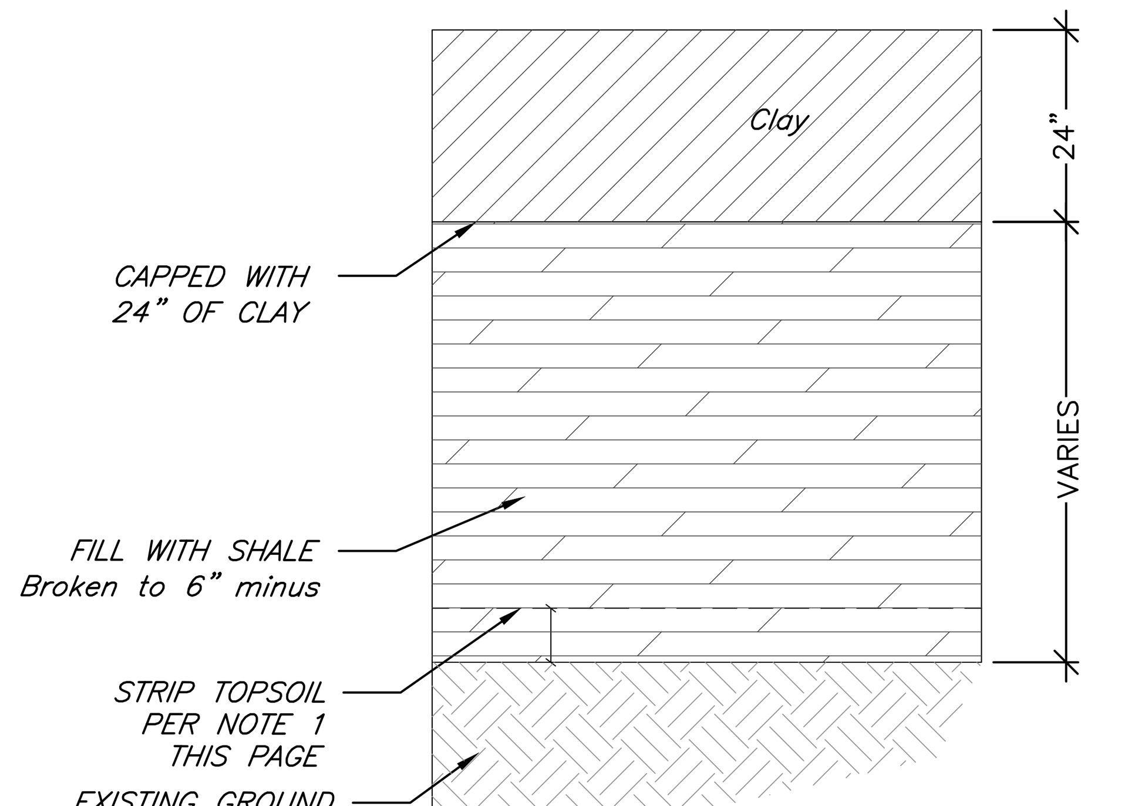
Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/1/21	Type 300 Wingwall Revision		
	3/4/21	Headwall Detail		

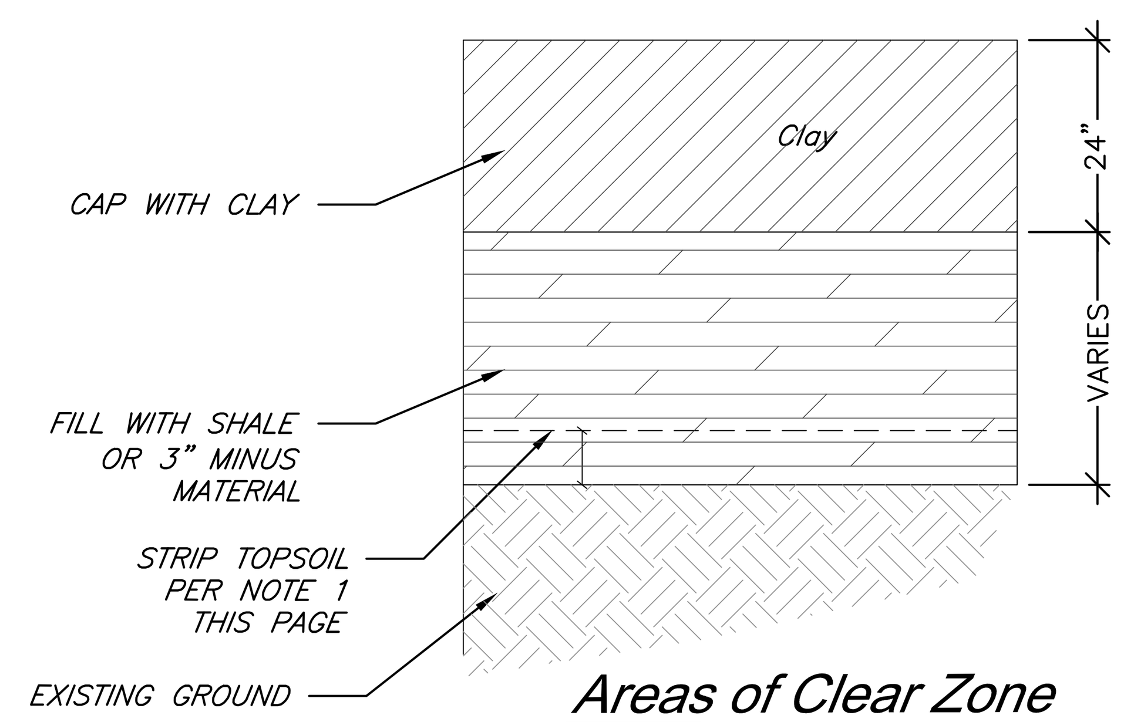
Grading Plan



Areas of Future Pavement Typical Rock Fill Section
Not to scale



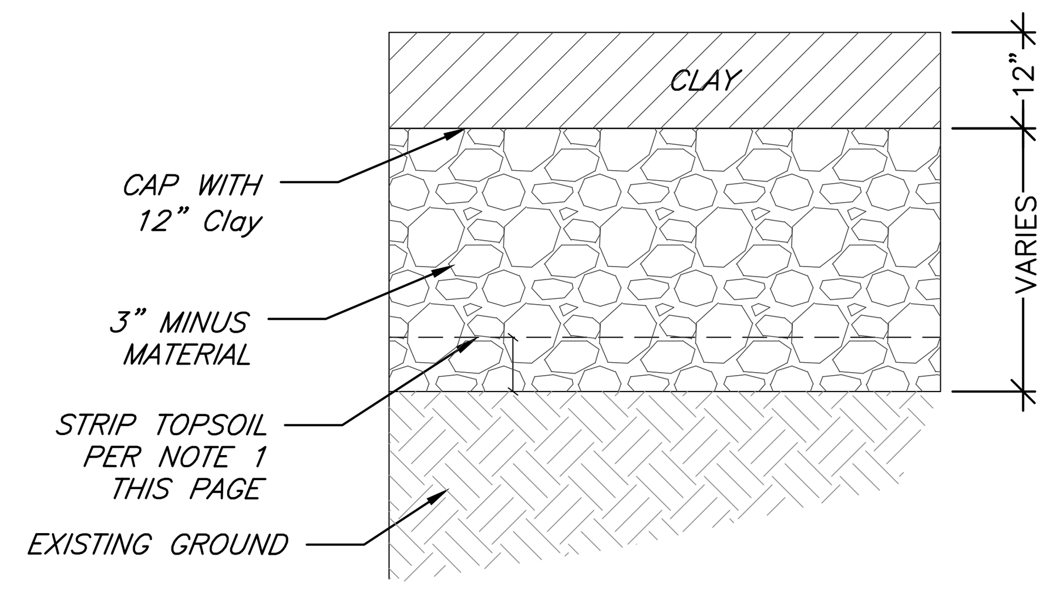
Areas of Future Pavement Typical Shale Fill Section
Not to scale



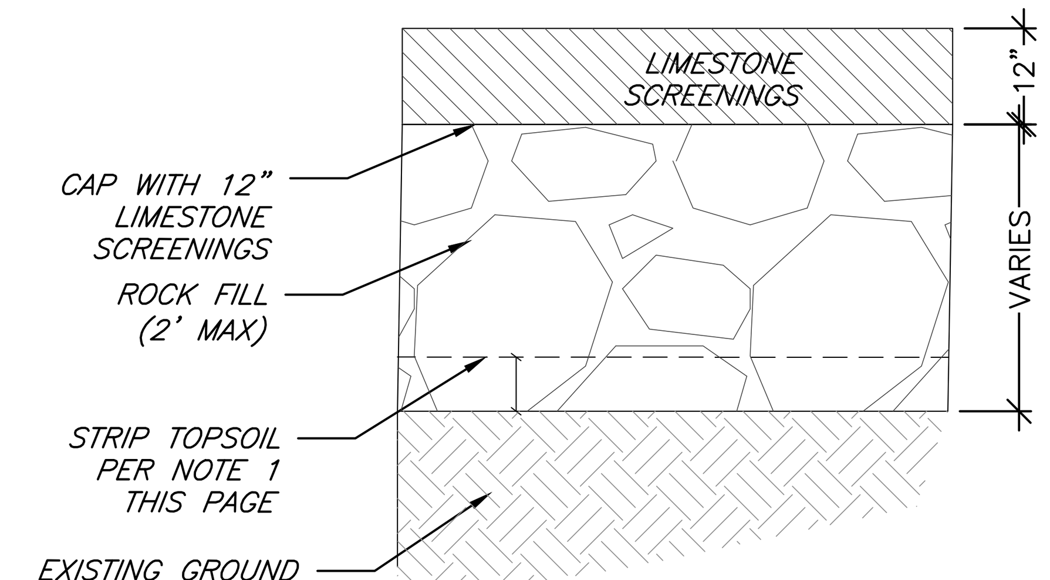
Areas of Clear Zone Typical Fill Section
Not to scale

Notes:

1. All areas shall be stripped of topsoil and proofrolled prior to any fill placement
2. Rock fill shall contain sufficient clay and finer material to completely fill voids in rock fragments.
3. Rock fill shall contain no fragments grater then 2'
4. Rock fill shall be capped with min 12" depth of limestone screenings. Rock fill areas outside fields may be capped with 12" depth, MODOT Type 5, or 3" minus material.
5. Depth of screenings on shall be ajusted at the edge of the fields if the depth of the trenches for the drains installed in the field exceeds 12". Clarkson and the field installer should verify.
6. Limestone screenings capping rock fill should not contain shall or clay.
7. Subgrade consisting of limestone screenings shall be graded to drain. Any areas ponding water shall be addressed immediately.
8. No construction traffic shall be allowed on subgrades constructed of limestone screenings until time of pavement or turf construction.
9. Subgrade shall be proofrolled within 48 hours prior to pavement or field construction. Subgrades to be re-evaluated is weather affects subgrades prior to construction.
10. Information shown on this sheet is based on Geotechnical reports provided by Terracon and Olsson Engineering.

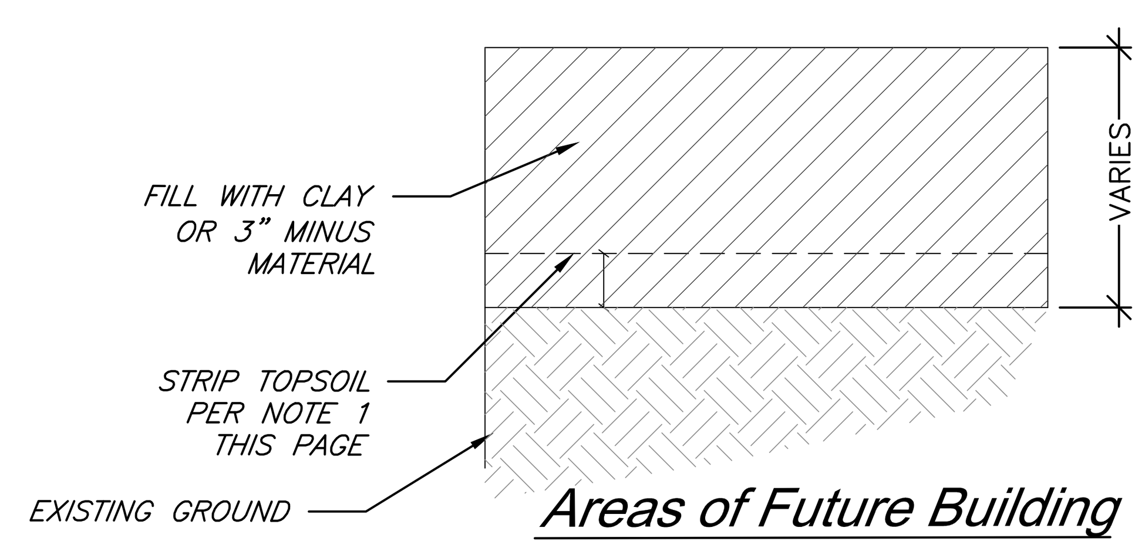


Areas of Future Pavement Typical 3" Minus Fill Section
Not to scale

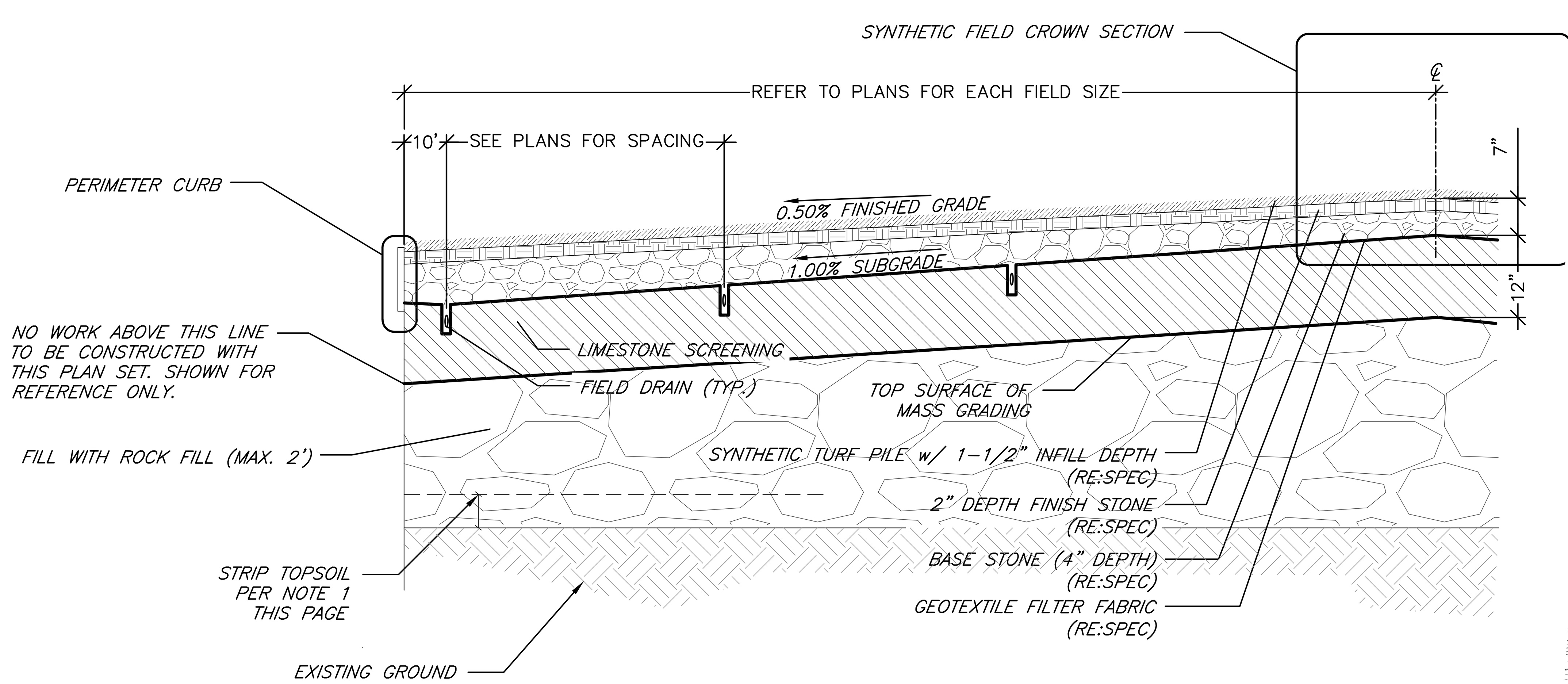


Areas of Future Pavement Typical Rock Fill Section
Not to scale

NOTE:
No fill may be placed within the existing floodway until storm line 4100 is complete.



Areas of Future Building Typical Fill Section
Not to scale



Record Drawing

Athletic Field Area - Typical Fill Section
Not to scale

Legend

- Areas of Future Pavement—Fill with Shale topped with 24" Clay, Rock Fill (2' max. capped with 12" Limestone screenings), or 3" Minus material topped with 12" Clay
- Clear Zone—Fill with Shale or 3" Minus material, top with 24" Clay
- Areas of Future Building—Fill with Clay or 3" Minus material
- Athletic of Field Area—Fill with Rock Fill (max. 2') cap with 12" Limestone Screenings

NOTE:
Fill placement shall be placed in accordance with Fill Placement Testing Plan Narrative, Dated March 24, 2020.

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

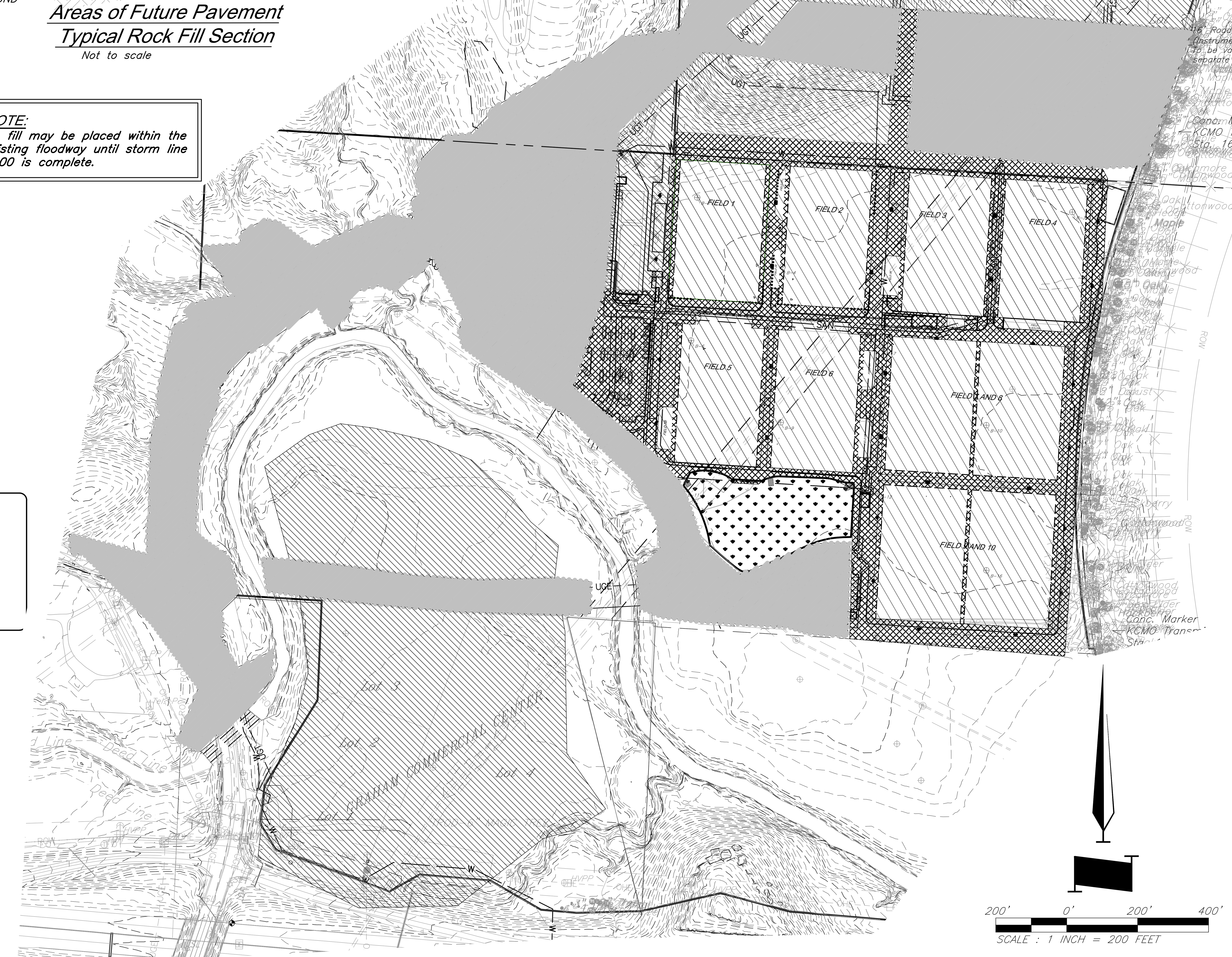
Title: Senior Associate
Firm: GBA

GBA
architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	JRH
PROJECT NO.:	12720
SHEET NO.	TOTAL SHEETS
7	43

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

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		



FOR INFORMATION ONLY

Typical Fill Sections

~~"100.00"~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	8
TOTAL SHEETS	43

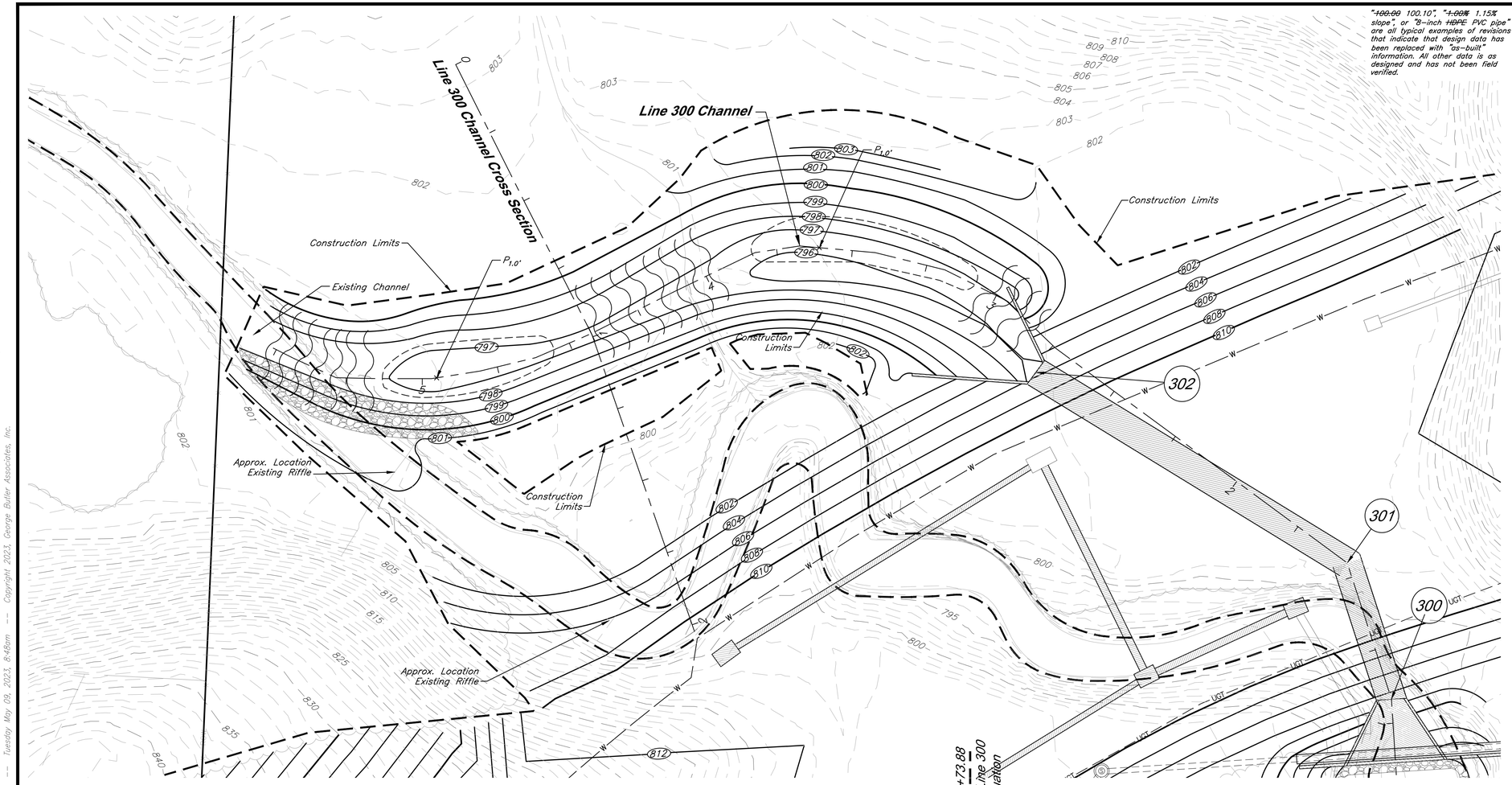
Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		



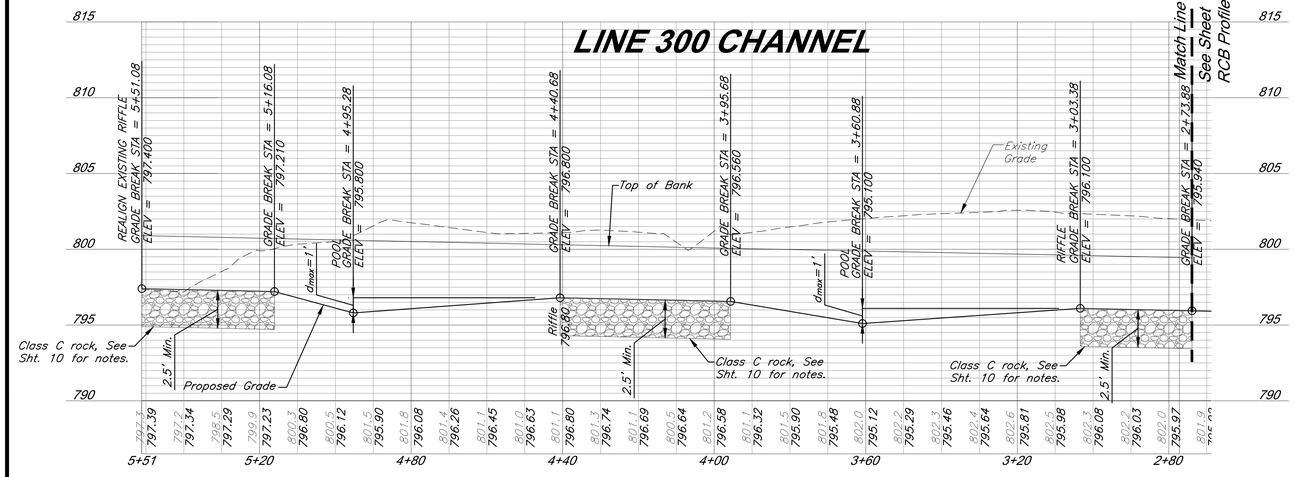
Legend

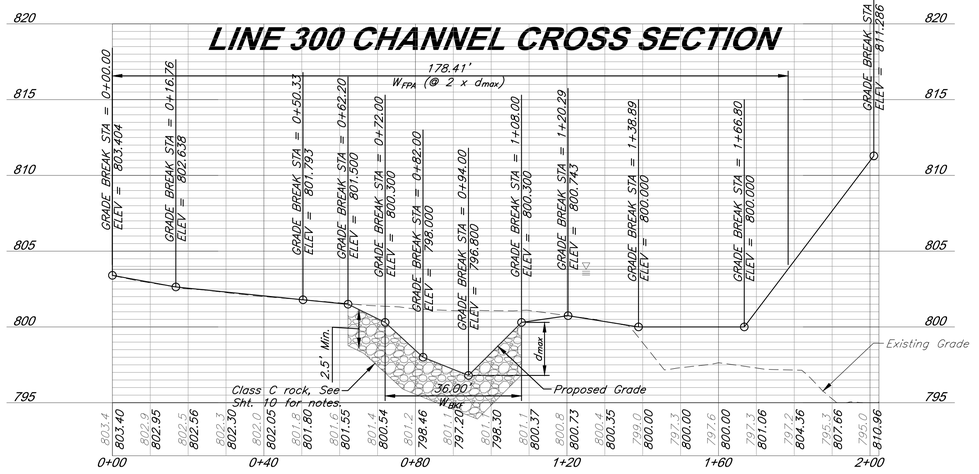
- Proposed Contour (within Floodway)
- Proposed Contour
- Existing Contour
- Riffle
- Pool (P_{dmax})
- Construction Limtis

Channel Design Parameters:

Area = 71 SF
d_{mean} (d_{max}) = 2.0' (3.5')
W_{BKF} = 36'
ER (W_{FPA}/W_{BKF}) = 5.0 (min.=2.2)
S = 0.5%
W/d_{mean} = 18.3

Horizontal Scale: 1" = 20'
Vertical Scale: 1" = 5'

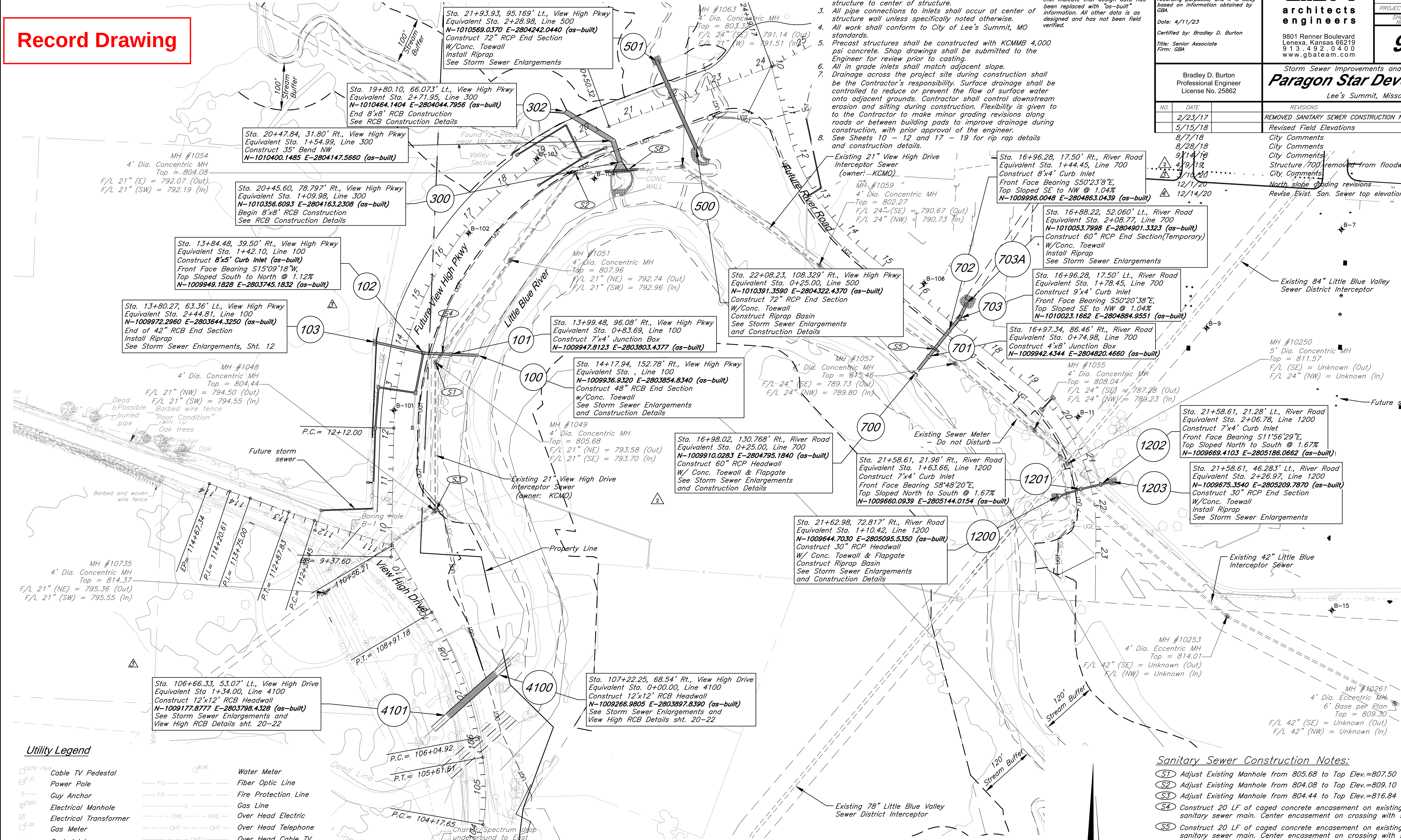




Record Drawing

Line 300 Channel Grading Plan

Record Drawing



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 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 Sheets 10 – 12 and 17 – 19 for rip rap details and construction details.

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	TOTAL SHEETS
9	43

Bradley D. Burton
Professional Engineer
License No. 25862

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

NO.	DATE	REVISIONS	BY	APPROVED
	2/23/17	REMOVED SANITARY SEWER CONSTRUCTION NOTE	DRV	CEL
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
2	4/9/19	Structure 700 removed from floodway		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
4	12/14/20	Revise Exist. San. Sewer top elevations		

Sanitary Sewer Construction Notes:

- S1 Adjust Existing Manhole from 805.68 to Top Elev.=807.50
- S2 Adjust Existing Manhole from 804.08 to Top Elev.=809.10
- S3 Adjust Existing Manhole from 804.44 to Top Elev.=816.84 (4)
- S4 Construct 20 LF of caged concrete encasement on existing 21" sanitary sewer main. Center encasement on crossing with storm sewer.
- S5 Construct 20 LF of caged concrete encasement on existing 24" sanitary sewer main. Center encasement on crossing with storm sewer.
- S7 Not Used
- S8 Construct 70 LF of Caged Concrete Encasement on existing 21" PVC sanitary sewer main, center encasement over storm sewer crossing.

Utility Legend

Symbol		Line	
CATV Ped.	Cable TV Pedestal	W.M.	Water Meter
P.P.	Power Pole	FO	Fiber Optic Line
	Guy Anchor	FP	Fire Protection Line
EMH	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
SSMH	Sanitary Sewer Manhole	PL	Property Line
C.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
TRMH	Traffic Manhole		Proposed Storm Sewer
F.H.	Fire Hydrant		Future Storm Sewer

CAUTION!
Numerous Utilities on site. Contractor to verify location and elevation of all utilities prior to commencing construction.

Note:
No Construction allowed within the existing Floodway prior to the Line 4100 RCB except for the temporary stream crossing, structures 100,300,700, and 1200 and associated outlet protection.

100' 0' 100' 200'
SCALE : 1 INCH = 100 FEET

Utility Plan

G:\12720\Civil 3D\Production Drawings\Mass Grading\Lee's Summit\12720C0900.dwg -- Layout: 9 Utility Plan -- Tuesday May 09, 2023, 8:48am

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	10
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

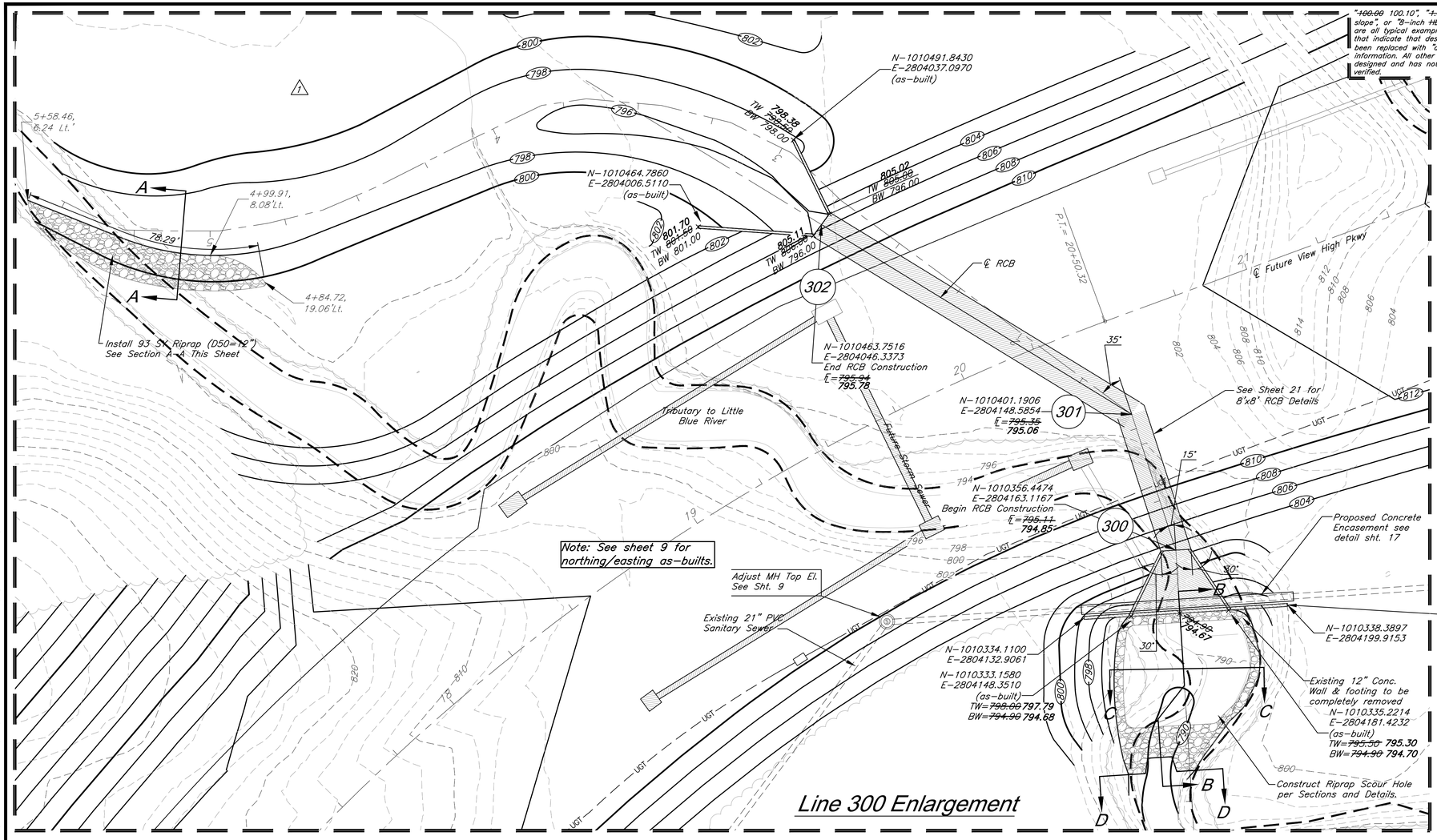
Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

Legend

- Cable TV Pedestal
- Power Pole
- Guy Anchor
- Electrical Manhole
- Electrical Transformer
- Gas Meter
- Curb Inlet
- Sanitary Sewer Manhole
- Sanitary Cleanout
- Light Pole
- Boring Hole
- Sign
- Telephone Pedestal
- Traffic Signal Post
- Traffic Manhole
- Fire Hydrant
- Water Meter
- Fiber Optic Line
- Fire Protection Line
- Gas Line
- Over Head Electric
- Over Head Telephone
- Over Head Cable TV
- Property Line
- Right-of-Way Line
- Sanitary Sewer Line
- Underground Electric
- Underground Telephone
- Underground Cable TV
- Water Line
- Proposed Contours
- Existing Contour
- Proposed Storm Sewer
- Future Storm Sewer

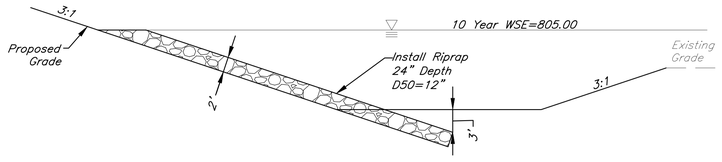


Riprap Material Notes:

1. Line 300 Composite Riprap Materials shall consist of the following properties:
   - 75% Boulders with D50=2' and D100=3'
   - 20% Class B Rock
   - 5% Class C Rock
2. Weir Backfill Materials shall consist of the following properties:
   - 65% Class B Rock
   - 35% Class C Rock

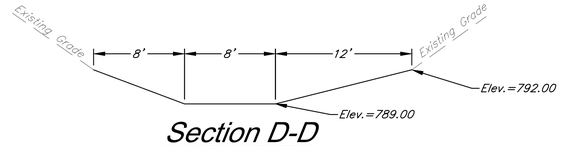
Class B Gradation	
Size	Rock Spec
14"	D100
9"	D85
7"	D60
6"	D50
3"	D15
2.5"	D10

Class C Gradation	
Size	Rock Spec
8"	D100
3"	D85
2"	D65
1.5"	D50
¼"	D15
⅛"	D10



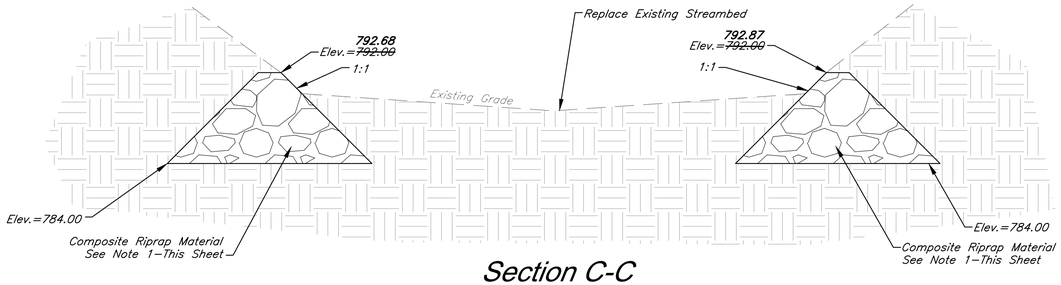
Section A-A Riprap Protection

NTS



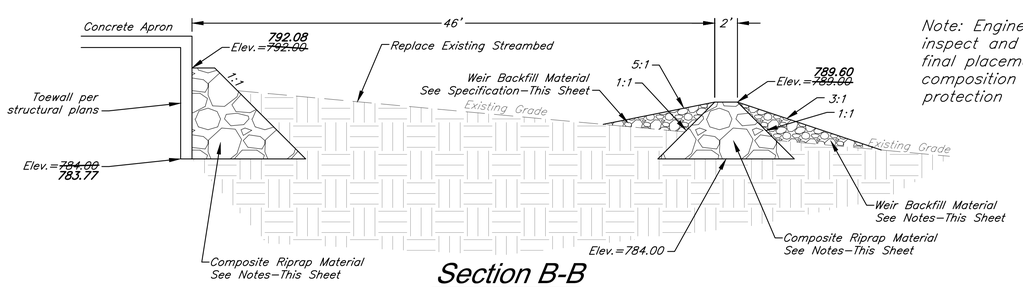
Section D-D

NTS



Section C-C

NTS



Section B-B

NTS

Note: Engineer shall inspect and approve final placement and composition of outlet protection

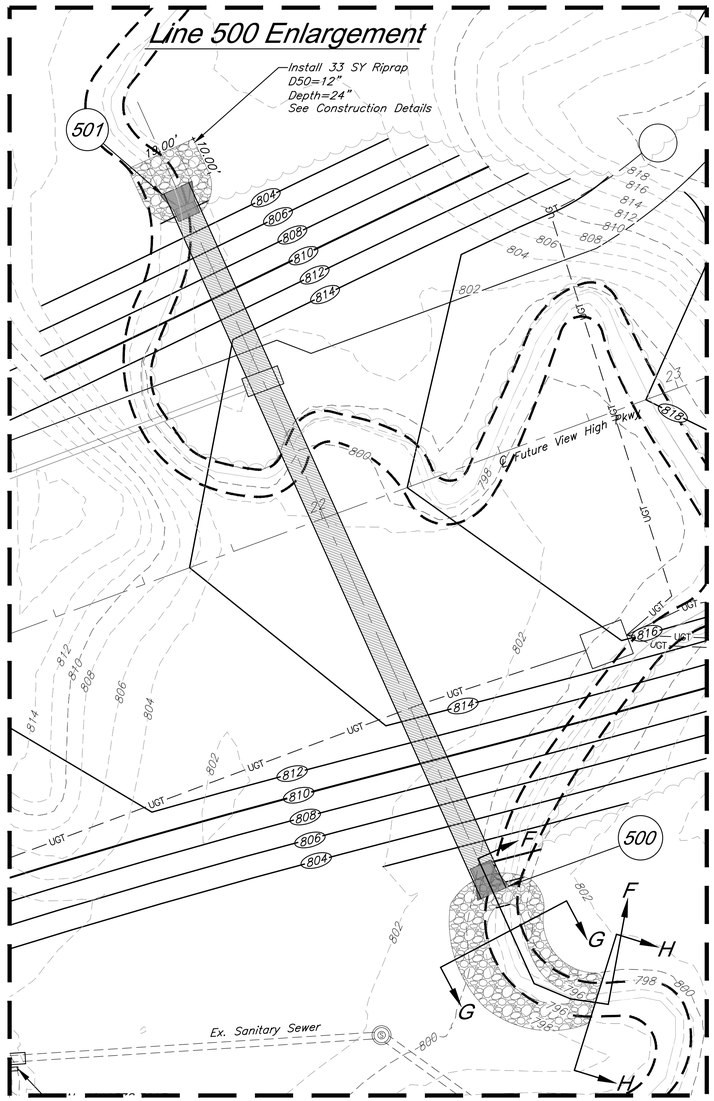
20' 0' 20' 40'

SCALE : 1 INCH = 20 FEET

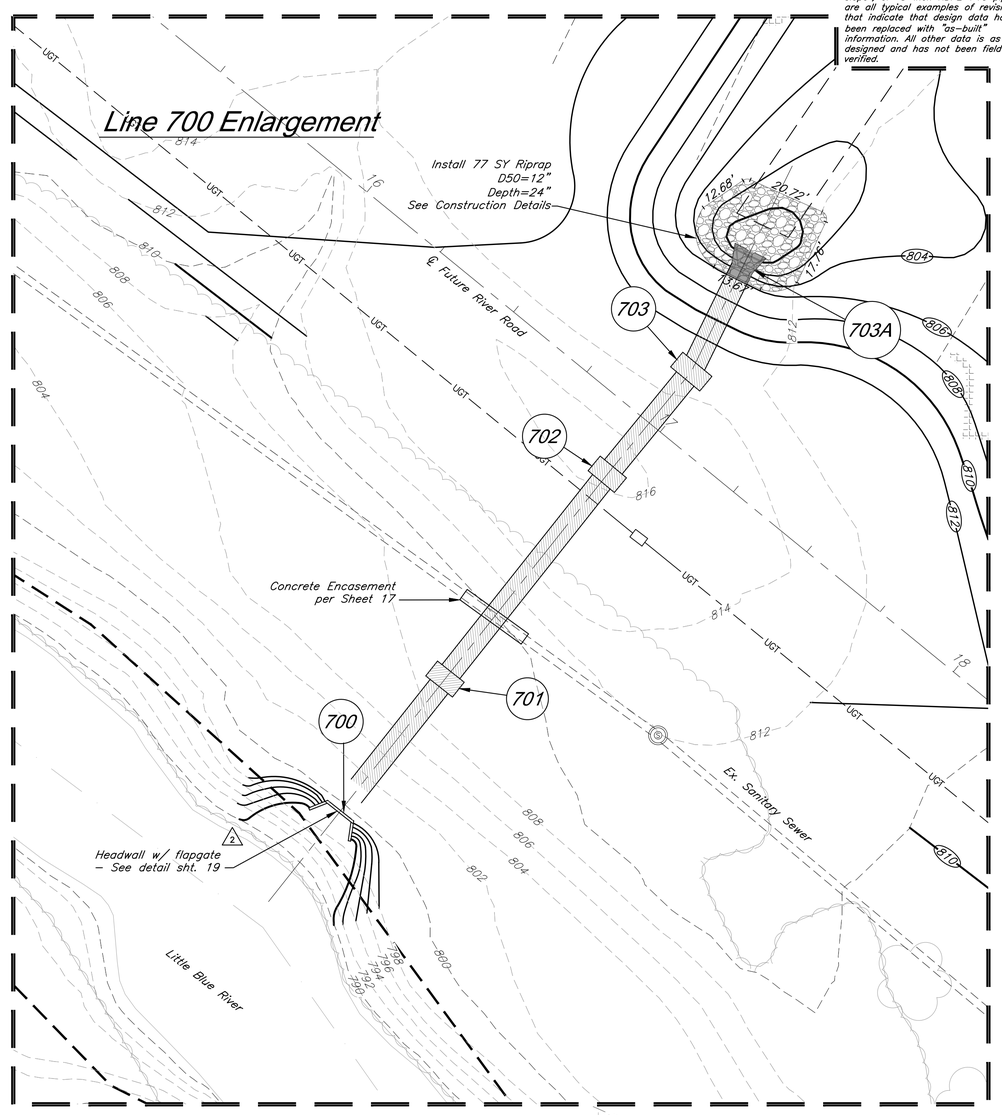
Record Drawing

Storm Sewer Enlargements

Line 500 Enlargement



Line 700 Enlargement



~~"100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.:	11
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

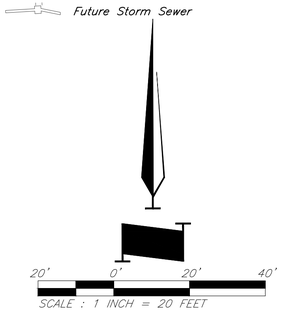
Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	3/4/21	Retaining Wall Station & Offsets		
	3/17/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

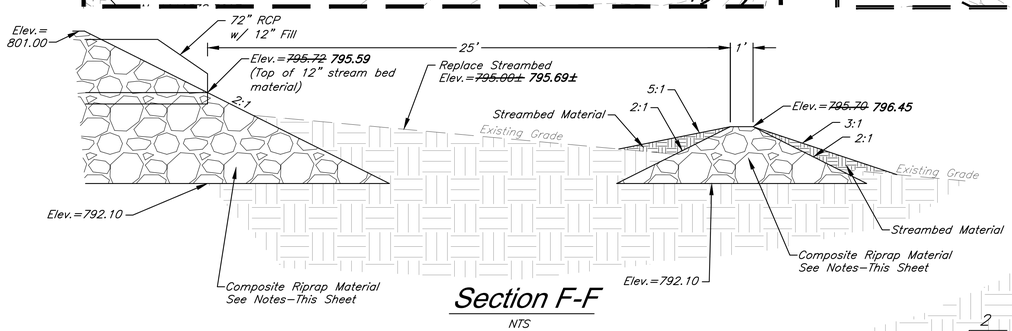
Legend

- Cable TV Pedestal
- Power Pole
- Guy Anchor
- Electrical Manhole
- Electrical Transformer
- Gas Meter
- Curb Inlet
- Sanitary Sewer Manhole
- Sanitary Cleanout
- Light Pole
- Boring Hole
- Sign
- Telephone Pedestal
- Traffic Signal Post
- Traffic Manhole
- Proposed Storm Sewer
- Future Storm Sewer
- Fire Hydrant
- Water Meter
- Fiber Optic Line
- Fire Protection Line
- Gas Line
- Over Head Electric
- Over Head Telephone
- Over Head Cable TV
- Property Line
- Right-of-Way Line
- Sanitary Sewer Line
- Underground Electric
- Underground Telephone
- Underground Cable TV
- Water Line
- Proposed Contours
- Existing Contour



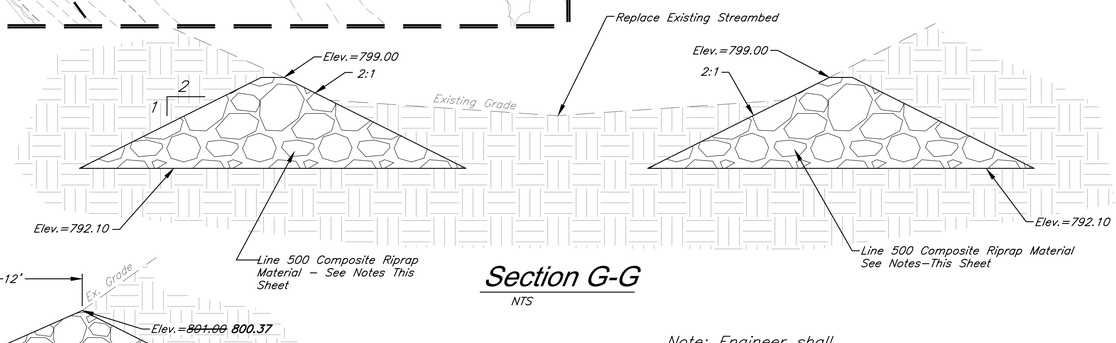
Class A Gradation	
Size	Rock Spec
20"	D100
16"	D85
13"	D65
12"	D50
5"	D15
4"	D10

Riprap Material Notes:
1. Line 500 Composite Riprap Materials shall consist of the following properties:
   - 20% Class A Rock
   - 60% Class B Rock
   - 20% Class C Rock
2. See Sheet 10 for Class B and Class C Rock Gradations.



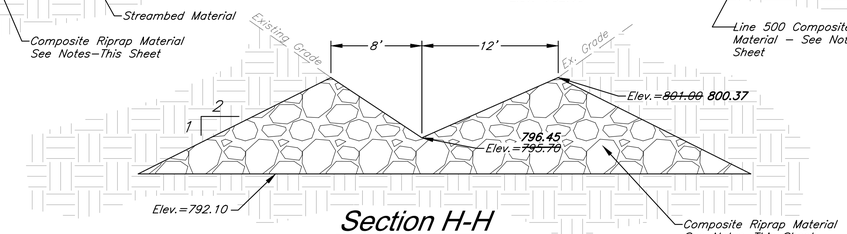
Section F-F

NTS



Section G-G

NTS



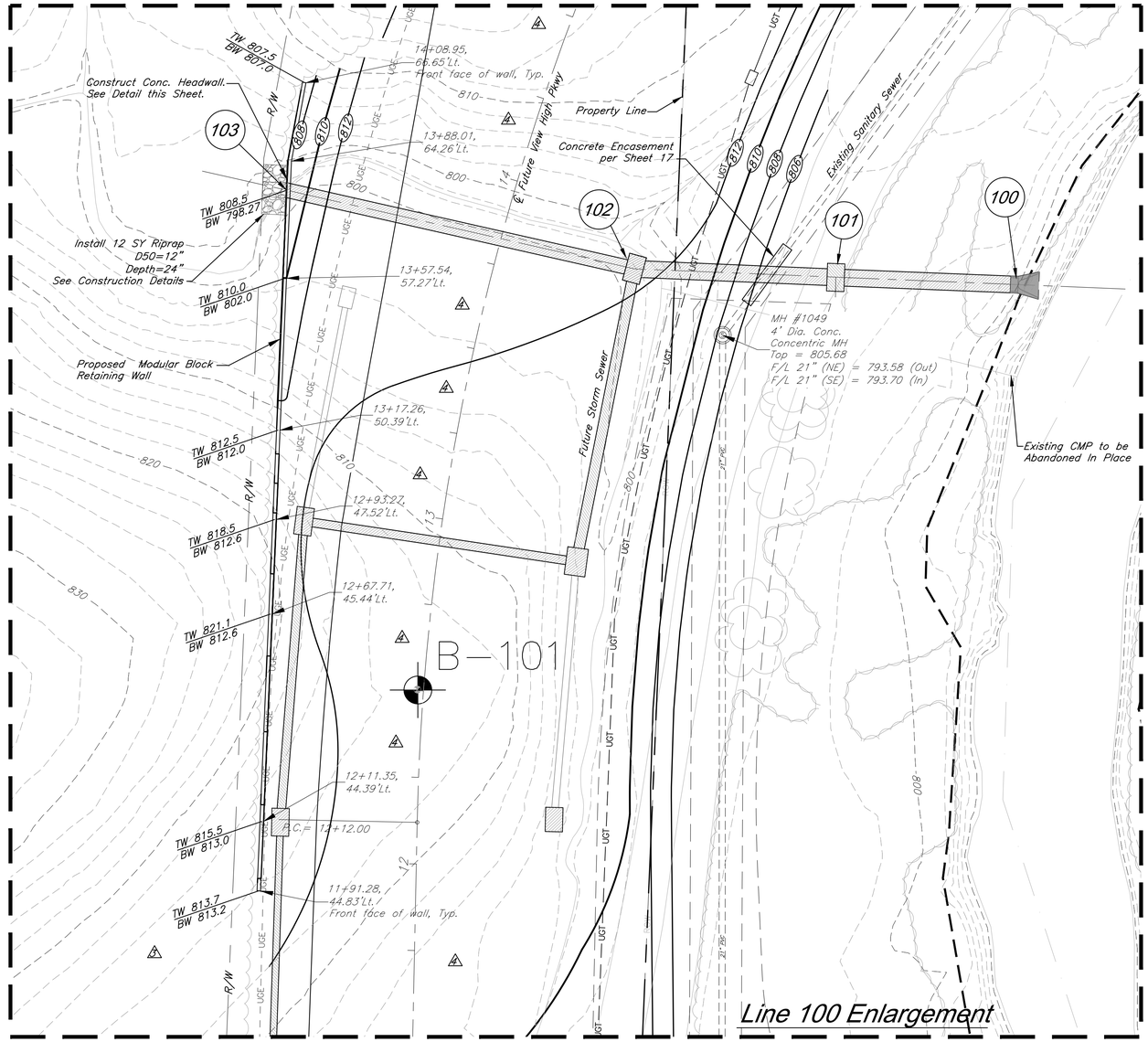
Section H-H

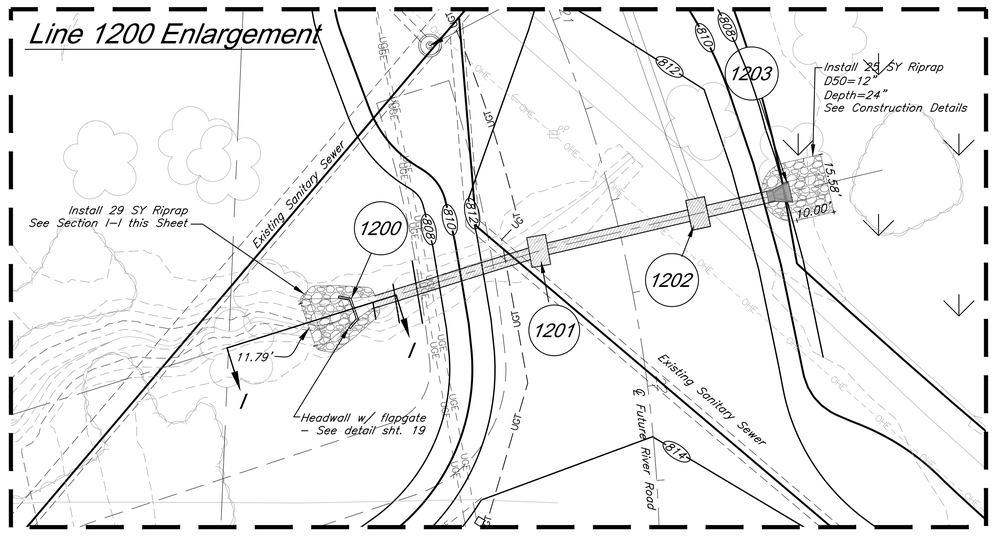
NTS

Note: Engineer shall inspect and approve final placement and composition of outlet protection

Record Drawing

Storm Sewer Enlargements





~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

Legend

- Cable TV Pedestal
- Power Pole
- Guy Anchor
- Electrical Manhole
- Electrical Transformer
- Gas Meter
- Curb Inlet
- Sanitary Sewer Manhole
- Sanitary Cleanout
- Light Pole
- Boring Hole
- Sign
- Telephone Pedestal
- Traffic Signal Post
- Traffic Manhole
- Proposed Storm Sewer
- Future Storm Sewer
- Water Meter
- Fiber Optic Line
- Fire Protection Line
- Gas Line
- Over Head Electric
- Over Head Telephone
- Over Head Cable TV
- Property Line
- Right-of-Way Line
- Sanitary Sewer Line
- Underground Electric
- Underground Telephone
- Underground Cable TV
- Water Line
- Proposed Contours
- Existing Contour

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is solely based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	12
TOTAL SHEETS	43

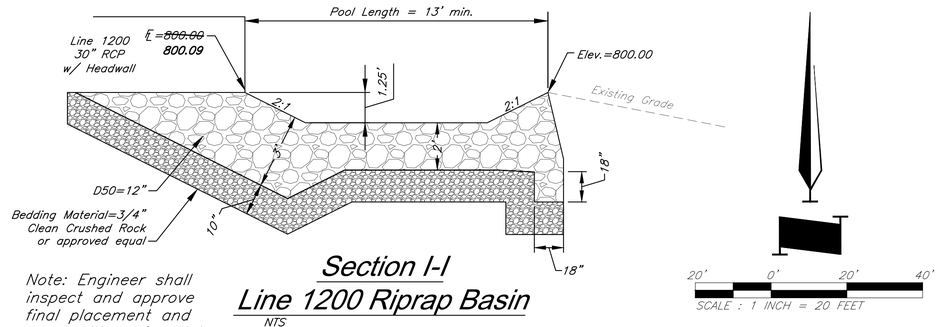
Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
4	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		



Note: Engineer shall inspect and approve final placement and composition of outlet protection

Section I-I
Line 1200 Riprap Basin

NTS

Record Drawing

CONCRETE HEADWALL DETAIL

NTS

Storm Sewer Enlargements

Legend

- Cable TV Pedestal
- Power Pole
- Guy Anchor
- Electrical Manhole
- Electrical Transformer
- Gas Meter
- Curb Inlet
- Sanitary Sewer Manhole
- Sanitary Cleanout
- Light Pole
- Boring Hole
- Sign
- Telephone Pedestal
- Traffic Signal Post
- Traffic Manhole
- Proposed Storm Sewer
- Future Storm Sewer
- Water Meter
- Fiber Optic Line
- Fire Protection Line
- Gas Line
- Over Head Electric
- Over Head Telephone
- Over Head Cable TV
- Property Line
- Right-of-Way Line
- Sanitary Sewer Line
- Underground Electric
- Underground Telephone
- Underground Cable TV
- Water Line
- Proposed Contours
- Existing Contour

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.:	13
TOTAL SHEETS	43

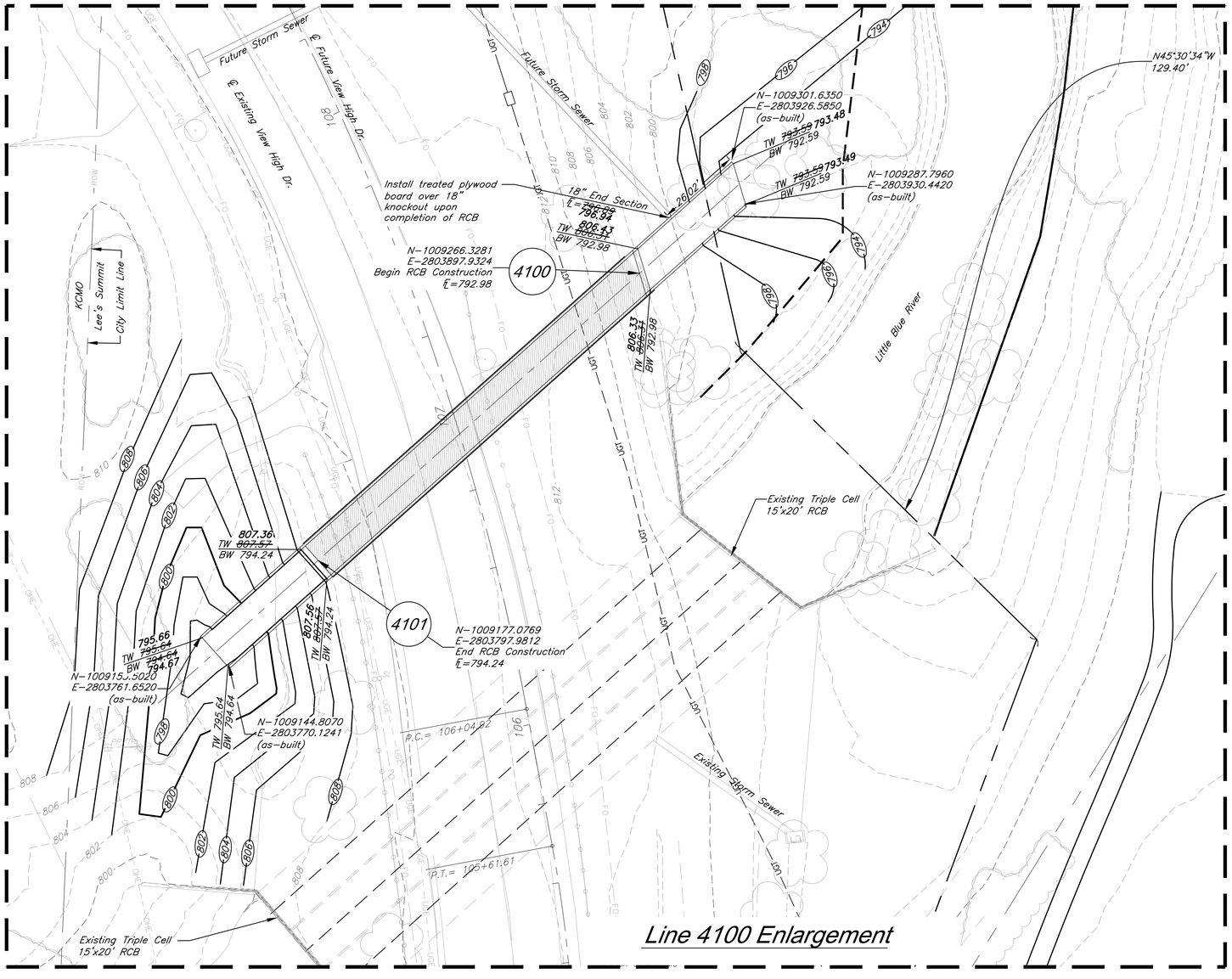
Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

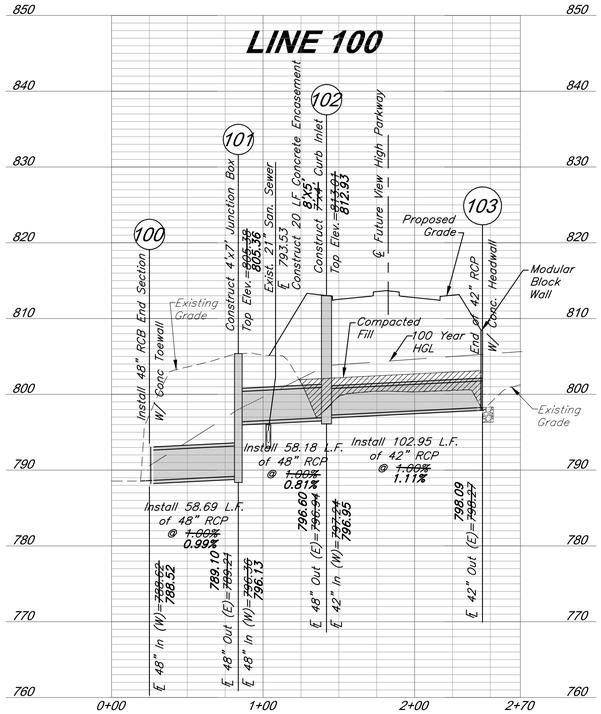


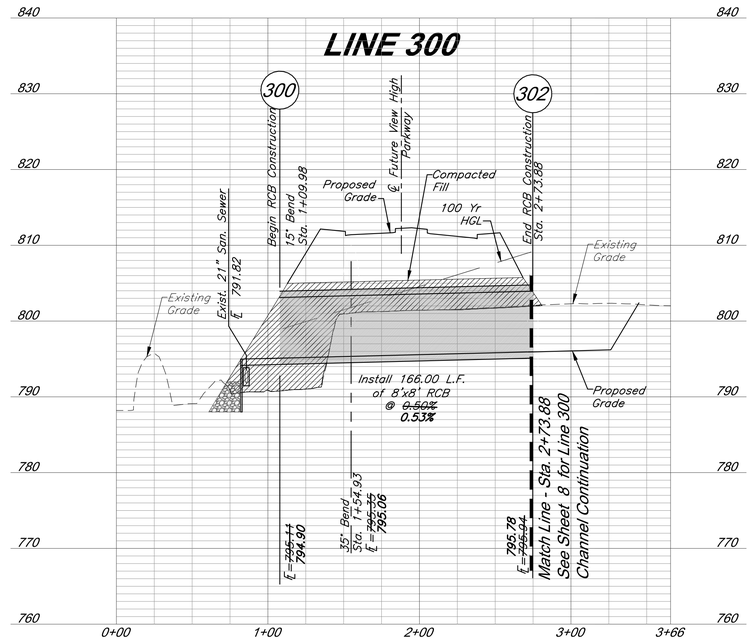
Line 4100 Enlargement

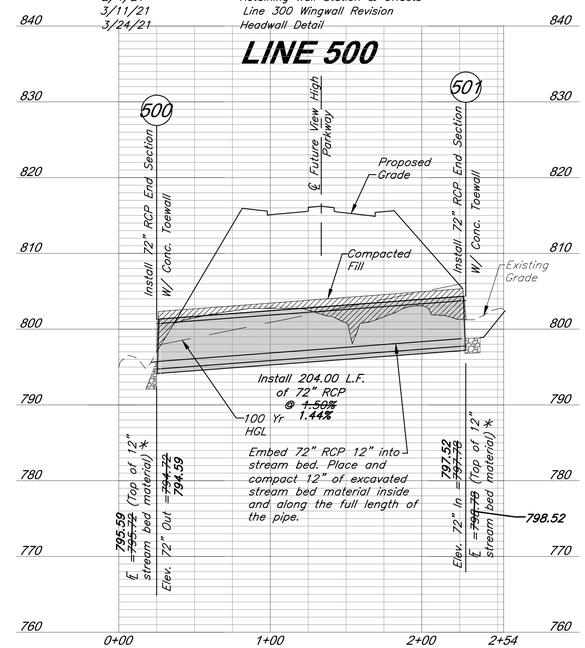
Record Drawing

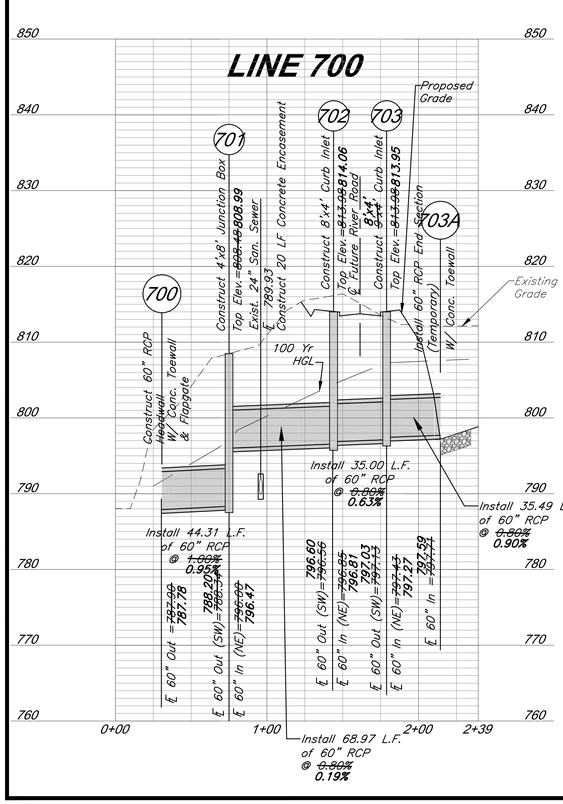
20' 0' 20' 40'
SCALE : 1 INCH = 20 FEET

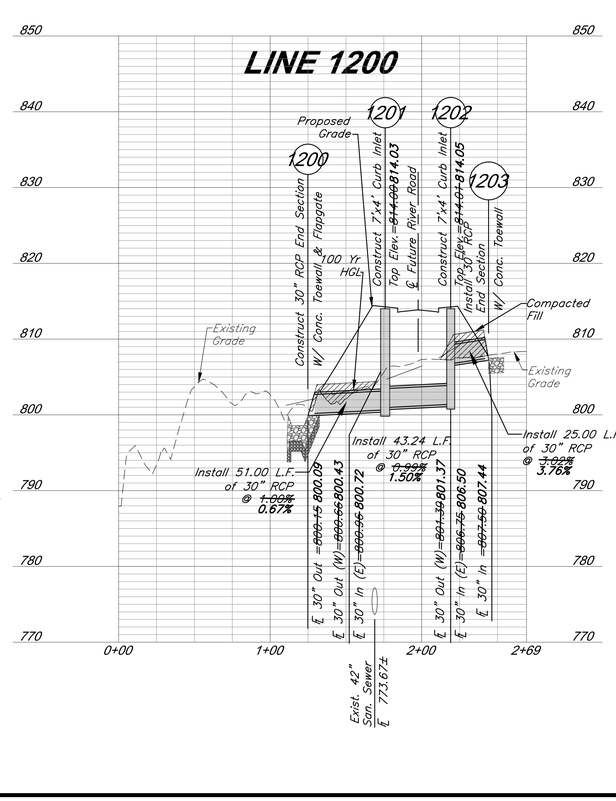
Storm Sewer Enlargements

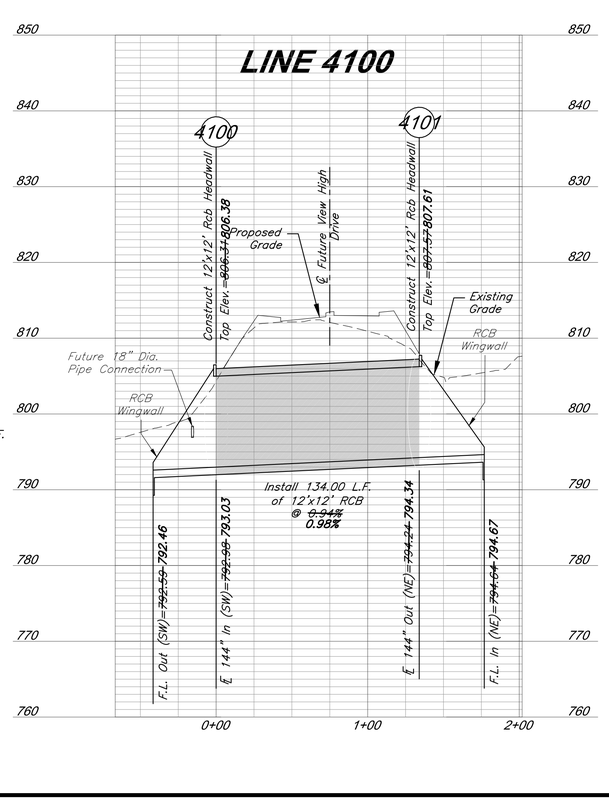












*See "Riprap Material Notes" on Sheet 11.

Legend

Compacted Fill to be placed prior to excavation

Horizontal Scale: 1" = 50'
Vertical Scale: 1" = 10'

Record Drawing

Storm Sewer Profiles

~~"100.00" 100.10", "1.00%" 1.15% slope", or "8-inch HDPE PVC pipe"~~ are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	14
TOTAL SHEETS	43

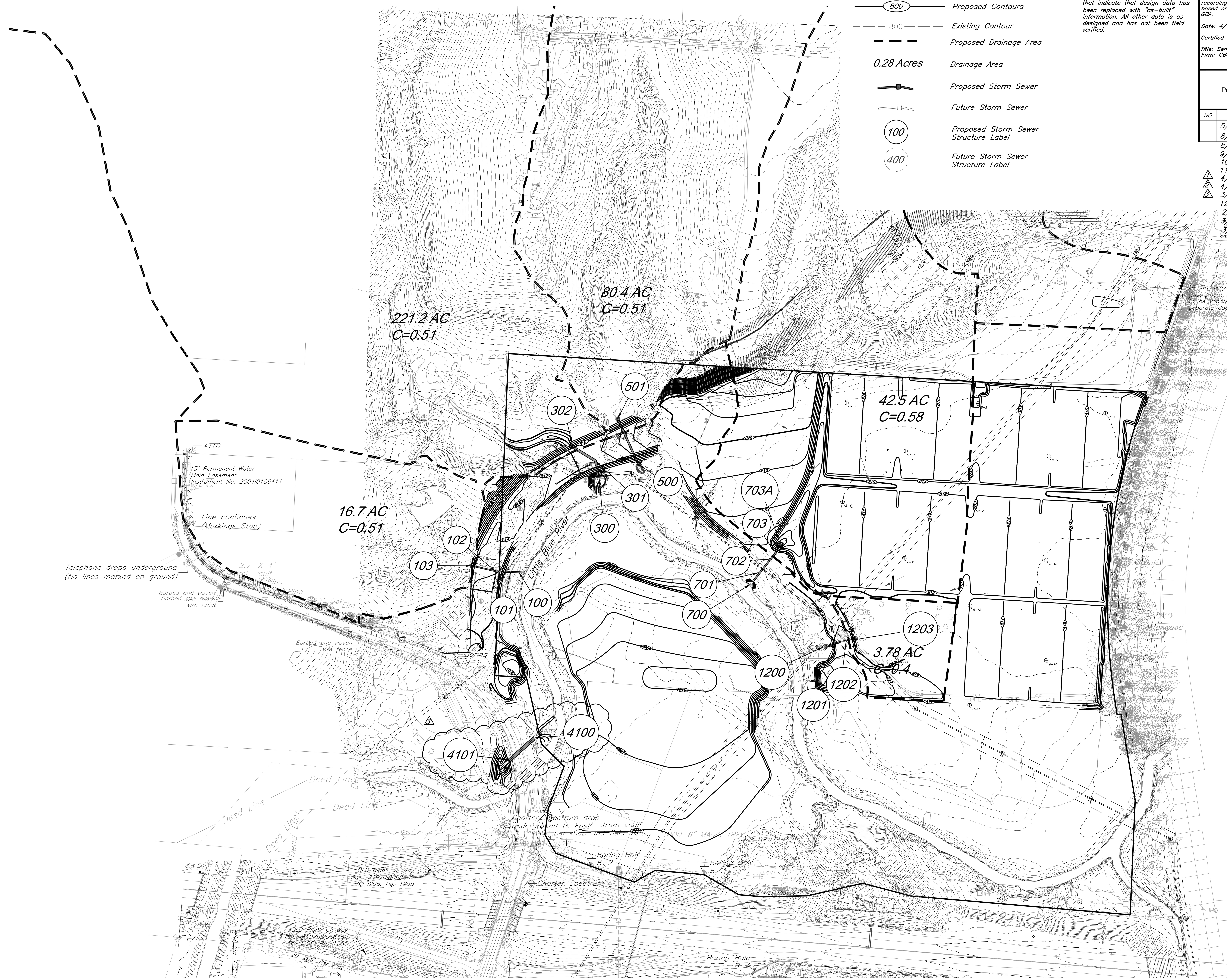
Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18	Structure 700 removed from floodway		
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		



Legend

Symbol	Description
800	Proposed Contours
800	Existing Contour
	Proposed Drainage Area
0.28 Acres	Drainage Area
	Proposed Storm Sewer
	Future Storm Sewer
100	Proposed Storm Sewer Structure Label
400	Future Storm Sewer Structure Label

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	JRH
PROJECT NO.:	12720
SHEET NO.	15
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

Record Drawing

200' 0' 200' 400'
SCALE : 1 INCH = 200 FEET

Drainage Map

~~"100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	JRH
PROJECT NO.:	12720
SHEET NO.	16
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

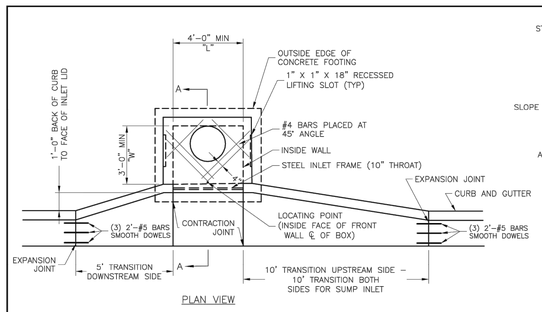
Note: Shaded storm sewer lines are shown for reference only, they will be part of a future plan set. Calculations are based on future storm water system and are shown for reference only.

10 Year Storm Preliminary - Subject to Change Upon Final Design Culverts have been designed to the 100 year Storm Indicates Future Storm Sewer

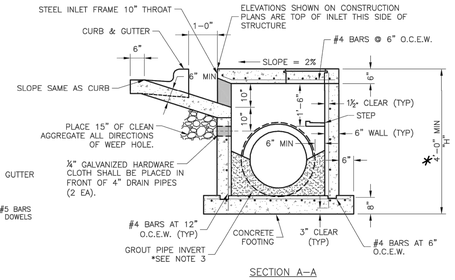
Structures		Runoff Calculations													Pipe Design										Design Checks						
From	To	Direct Area (acre)	Line In (acre)	Total Area (acre)	C	K	Tc (min)	Flow Time (min)	Intensity (in/hr)	Design Q (cfs)	Q Inlet (cfs)	Gutter Spread (ft.)	Street Slope (ft./ft.)	Q Captured (cfs)	Q Bypass (cfs)	Description	Pipe length (lin ft)	Pipe Slope Slope, %	Pipe dia (in)	Manning's n Value	Q full (cfs)	Pipe Area, sf	V full fps	Design V fps	Hw/D	outlet head, H	HW, Inlet Control, (ft)	HW, Outlet Control, (ft)	Inlet Top Elevation	upstream flowline	downstream flowline	Invert Drop (ft)	Downstream water elevation	Hydraulic Grade Elev. (Calculated)	Hydraulic Grade (allowable)	Comments
	103	16.70		16.70	0.40	1.25	5.90		9.96	83.2						End Section													N/A					803.85	813.50	
	102			16.70	0.40	1.25	5.90	0.18	9.96	83.2						RCP	129.01	1.00	42	0.013	100.88	9.62	10.49	11.83	1.5	3.34	803.85	798.21		798.53	797.24		794.87			
Line 100 (100 Yr)	102	0.26	2.40		0.90	1.25	5.90		9.96	2.9	2.880	11.427	0.011	2.18	0.697	Curb Inlet													813.01			0.3		802.62	811.18	Tie in from Line 200
	101			19.36	0.46	1.25	6.08	0.07	9.89	109.0						RCP	58.18	1.00	48	0.013	144.03	12.57	11.46	12.95	1.4	2.14	802.62	790.14		796.94	796.36		788.00			
	101	0.00			0.67	1.25	5.00		10.32	0.0						Junction Box													805.38			7.15		794.87	804.05	
	100			19.36	0.46	1.25	6.16	0.08	9.86	108.7						RCP	58.69	1.00	48	0.013	144.03	12.57	11.46	12.77	1.4	2.14	794.87	790.14		789.21	788.62		788.00			
																																	788.00		
	207	0.21			0.41	1.00	6.00		7.06	0.6						Flared End Section													834.75					834.08	834.75	
	208			0.21	0.41	1.00	5.00	0.08	7.35	0.6						HDPE	37.02	20.00	15	0.01	37.66	1.23	30.69	7.29	0.7	0.01	834.08	823.86		833.23	825.83		823.85			
	206	0.26			0.41	1.00	6.00		7.06	0.8	0.752	5.375	0.075	0.587	0.165	Curb Inlet													832.43			2.87		823.85	830.60	
	205			0.47	0.41	1.00	5.00	0.42	7.35	1.4						HDPE	185.17	3.99	15	0.01	16.82	1.23	13.71	7.29	0.7	0.22	823.85	809.00		822.96	815.57		808.78			
	205	0.43			0.43	1.00	5.00		7.35	1.4	1.5248	8.373	0.043	1.141	0.384	Curb Inlet													820.70			8.81		808.78	818.87	
	204			0.90	0.42	1.00	5.42	0.16	7.22	2.7						HDPE	81.84	2.00	18	0.01	19.36	1.77	10.96	8.67	0.7	0.17	807.86	808.78		806.76	805.12		808.62			
	204	0.00			0.55	1.00	5.00		7.35	0.0						Manhole													815.00			0.5		808.62	813.67	
	203			0.90	0.42	1.00	5.58	0.26	7.18	2.7						HDPE	132.75	1.00	18	0.01	13.69	1.77	7.75	8.67	0.7	0.24	805.72	808.86		804.62	803.29		808.62			
	203	0.84			0.55	1.00	5.00		7.35	3.4	3.7852	11.249	0.010	2.843	0.942	Curb Inlet													812.91			0.5		808.62	811.08	
	202			0.90	0.93	1.00	5.58	0.21	7.18	6.0						HDPE	85.12	1.00	18	0.01	13.69	1.77	7.75	6.76	1.0	0.84	804.26	808.62		802.79	801.94		807.78			
	202	0.82			0.55	1.00	8.24		6.47	2.9	3.86	11.889	L.P.	3.861	0.000	Curb Inlet													812.48			0.5		807.78	810.65	
	201			1.72	0.75	1.00	5.79	0.14	7.12	9.2						RCP	79.00	2.62	18	0.013	17.05	1.77	9.65	9.25	1.4	1.84	803.52	807.78		801.44	799.37		805.94			
	201	0.20	0.48		0.90	1.00	5.00		7.35	1.3	2.78	11.092	L.P.	2.784	0.000	Curb Inlet													812.48			0.5		805.94	810.65	Tie in from Line 3900
	102		2.40		0.79	1.00	5.93	0.15	7.08	13.5						RCP	86.79	1.88	24	0.013	31.10	3.14	9.90	9.92	1.0	1.02	800.94	805.94		798.87	797.24		804.92			Connect to Line 100
																																	804.92		
	302	221.20			0.40	1.25	17.10		6.94	767.3						RCB Headwall													N/A					809.03	811.00	
Line 300 (100 Yr)	301			221.20	0.40	1.25	17.10	0.13	6.94	767.3						RCB	118.95	0.50	8'x8' RCB	0.013	767.31	49.00	24.73	15.50	1.8	4.49	810.58	813.52		795.94	795.35		809.03			
	301	0.00			0.67	1.25	5.00		10.32	0.0						35° Bend													N/A			0		809.03	811.00	35 degree bend South
	300			221.20	0.40	1.25	17.23	0.05	6.91	764.7						RCB	47.05	0.50	8'x8' RCB	0.013	767.31	49.00	24.73	15.50	1.8	4.49	809.92	793.82		795.35	795.11		789.33			
																																	789.33		Tie in from Line 400
	403	0.67			0.75	1.00	5.00		7.35	3.7	4.58	10.808	0.014	3.346	1.236	Curb Inlet													812.38					808.29	810.55	
	402			0.67	0.75	1.00	5.00	0.19	7.35	3.7						HDPE	122.00	1.00	18	0.01	13.69	1.77	7.75	10.73	0.8	0.41	808.29	806.70		807.11	805.89		806.28			
	402	0.25			0.95	1.00	5.00		7.35	1.7	3.17	10.415	L.P.	3.166	0.000	Curb Inlet													811.40			1.07		806.28	809.57	
Line 400	401			0.92	0.80	1.00	5.00	0.12	7.35	5.4						RCP	79.00	2.96	24	0.013	39.03	3.14	12.42	10.73	0.7	0.16	806.28	800.02		804.82	802.48		799.86			Tie in From Line 3700
	401	0.48	0.45		0.90	1.00	5.00		7.35	3.2	3.84	11.841	L.P.	3.838	0.000	Curb Inlet													811.40			4.5		799.86	809.57	
	400		1.85		0.85	1.00	5.12	0.10	7.32	11.5						HDPE	71.73	4.02	24	0.01	59.12	3.14	18.82	11.78	0.9	0.66	799.86	795.76		797.98	795.10		795.10			Connect to RCB Wall
	501	80.40	1.04		0.40	1.25	25.00		5.71	229.7						End Section													N/A					804.52	815.50	Tie in From Line 3800
Line 500 (100 Yr)	500			81.44	0.40	1.25	25.00	0.18	5.71	233.5						RCP	204.00	1.50	72	0.013	520.09	28.27	18.39	18.90	1.1	2.64	804.52	800.36		797.78	794.72		797.72			
	500				2.25	1.25	25.00		5.71	0.0						End Section																		797.72		
	605	0.62			0.45	1.00	6.43		6.94	1.9	3.35	11.185	0.016	2.466	0.887	Curb Inlet													823.27					813.76	821.94	
	604			0.62	0.45	1.00	25.00	0.08	4.00	1.1						RCP	46.76	1.00	12	0.013	3.57	0.79	4.55	9.58	0.8	0.14	813.90	813.90		813.15	812.68		813.76			
	604	0.16			0.67	1.00	6.43		6.94	0.7	1.48	6.780	0.016	1.164	0.311	Curb Inlet													823.37			0.5		813.76	822.04	
	603			0.78	0.50	1.00	6.43	0.31	6.94	2.7						HDPE	177.25	1.00	12	0.01	4.64	0.79	5.91	9.58	1.1	2.43	813.31	813.76		812.18	810.41		811.33			
	603	0.00			0.00	1.00	6.43		6.94	0.0						Man Hole													818.50			0.3		811.33	817.17	
Line 600	602			0.78	0.50	1.00	6.43	0.27	6.94	2.7						HDPE	155.82	1.00	12	0.01	4.64	0.79	5.91	9.58	1.1	2.16	811.24	811.33		810.11	808.55		809.17			
	602	0.42			0.67	1.00	6.43		6.94	2.0	2.26	8.946	0.010	1.764	0.499	Curb Inlet													818.26			0.66		809.17	816.93	
	601			1.20	0.56	1.00	6.43	0.06	6.94	4.6						RCP	35.39	1.95	18	0.013	14.71	1.77	8.32	9.58	0.9	0.28	809.17	806.41		807.89	807.20		806.13			
	601	0.25			0.67	1.00	6.24		6.99	1.2	1.17	5.861	0.010	0.935	0.235	Curb Inlet													818.25			2.5		806.13	816.92	
	600			1.45	0.58	1.00	6.49	0.13	6.92	5.8						HDPE	117.31	5.07	18	0.01	30.83	1.77	17.45	14.67	1.0	0.98	806.13	799.73		804.70	798.75		798.75			
	708	17.12			0.51	1.25	18.92		6.61	72.2						End Section													N/A					820.30	828.00	
	707			17.12	0.51	1.25	18.92	0.15	6.61	72.2						HDPE	121.26	1.55	48	0.01	233.11	12.57	18.55	13.74	1.0	1.29	820.30	820.05		816.31	814.43		818.76			
	707	0.43			0.80	1.25	5.50		10.12	4.4	4.35		0.017	2.93	1.418	Curb Inlet													828.30			0.3		818.76	826.47	
	706			17.55	0.52	1.25	19.07	0.06	6.59	74.7						RCP	38.10	1.00	48	0.013	144.03	12.57	11.46	10.90	1.0	0.89	818.22	818.76		814.13	813.75		817.88			
	706	0.21			0.80	1.25	6.21		9.84	2.1	2.07		0.017	1.34	0.732	Curb Inlet													828.30			0.3		817.88	826.47	
	705			17.76	0.52	1.25	19.13	0.64	6.58	76.0						HDPE	416.22	3.15	48	0.01	332.32	12.57	26.44	10.90	1.0	3.25	817.59	817.88		813.45	800.34		814.62			
	705		16.96		0.81	1.25	5.92		9.95	0.0						Curb Inlet													817.62			0.3		814.62	816.29	
Line 700 (100 Yr)	704			34.72	0.86	1.25	19.76	0.41	6.47	242.5						HDPE	289.40	1.00	66	0.01	437.73	23.76	18.42	11.68	1.4	5.27	807.87	814.62		800.04	797.14		809.35			
	704	2.39			0.79	1.25	8.11		9.17	0.0	0.73		0.020	0.59	0.146	Curb Inlet													812			0.30		809.35	810.67	
	703			37.11	0.86	1.25	20.17	0.06	6.40	255.1						RCP	51.87	0.80	66	0.013	301.17	23.76	12.68	15.71	1.5	2.81	805.12	809.35		796.84	796.43		806.54			
	703	0.25			0.67	1.25	5.00		10.32	2.2	2.66	8.402	0.010	2.06	0.596	Curb Inlet													813.98			0.3		806.54	812.15	
	702			37.36	0.86	1.25	20.23	0.04	6.40	256.1						RCP	35.00	0.80	66	0.013	301.17	23.76	12.68	16.31	1.5	2.61	804.44	806.54		796.13	795.85		803.93			
	702	0.29			0.90	1.25	5.00		10.32	3.4	3.60	10.908	0.010	2.71	0.889	Curb Inlet													813.98			0.3		803.93	812.15	
	701			37.65	0.86	1.25	20.27	0.09	6.39	257.9						RCP	68.97	0.80	66	0.013	301.17	23.76	12.68	12.62	1.5	3.09	803.93	798.85		795.55	795.00		795.76			
	701	0.00			0.90	1.25	5.00		10.32	0.0						Junction Box													808.48			7.62		795.76	807.15	
	700			37.36	0.86	1.25	20.27	0.07	6.39	257.9						RCP	56.70	1.00	66	0.013	336.71	23.76	14.17	13.66	1.5	2.93	795.76	789.93		787.38	786.81		787.00			
																																	787.00		
	1203	4.52			0.51	1.00	8.33		6.45	14.9						End Section													N/A					809.54	810.00	
	1202			4.52	0.51	1.00	8.33	0.04	6.45	14.9						RCP	25.00	3.02	30	0.013	71.47	4.91	14.56	11.45	0.8	0.24	809.54	803.95		807.50	806.75		803.70			
Line 1200	1202	0.19	0.61		0.90	1.00	6.35		6.96	1.2	1.19	5.903	0.017	0.95	0.244	Curb Inlet													814.01			5.36		803.70	812.18	Tie in from Line 3300
	1201	5.32			0.57	1.00	8.37	0.06	6.44	19.6						RCP	43.24	1.00	30	0.013	41.13	4.91	8.38	11.62	0.9	0.51	803.70	803.59		801.39	800.96		803.08			
	1201	0.29			0.90	1.00	5.00		7.35	1.9	1.92	7.989	0.017	1.49	0.430	Curb Inlet													814.00			0.3		803.08	812.17	
	1200	5.61			0.59	1.00	8.43	0.07	6.43	21.2						RCP	51.00	1.00	30	0.013	41.13	4.91	8.38	11.79	1.0	0.65	803.08	800.65		800.66	800.15		800.00			
																																	800.00		
Line 1300	1301	0.17			0.67	1.00	5.00		7.35	0.8						Area Inlet													811.00					#REF!	809.17	
	3304			0.17	0.67	1.00	5.00	0.29	7.35	0.8						HDPE	128.63	2.00	15	0.01	11.91	1.23	9.70	7.29	0.7	0.06	#REF!	803.47		#REF!	#REF!		803.41			Connect to Line 3300
																																	803.41		
Line 3200	3201	0.31			0.90	1.00	5.00		7.35	2.1	3.37	11.649	L.P.	3.370	0.000	Curb Inlet													811.65					805.59	810.32	
	3302			0.31	0.90	1.00	5.00	0.16	7.35	2.1						RCP	35.00	1.00	15	0.013	6.48	1.23	5.28	3.83	0.8	0.13	805.59	805.05		804.64	804.29		804.92			Connect to Line 3700
																																	804.92		
Line 3300	3303	0.00			0.00	1.00	8.11		6.50	0.0						Manhole													811.58			0.5		805.98	810.25	
	3302			0.00	0.00	1.00	8.11	0.16	6.50	0.0						HDPE	68.49	0.50	24	0.01	20.85	3.14	6.64	7.31	0.7	0.00	805.98	805.19		804.64	804.29		805.19			
	3302	0.30	0.31		0.95	1.00	6.66		6.87	2.0	2.80	10.292	L.P.	2.799	0.000	Curb Inlet													811.65			0.5		805.19	809.82	Tie in from Line 3200
	3301			0.61	0.92	1.00	8.27	0.30	6.47	3.6						HDPE	132.71	0.50	24	0.01	20.85	3.14	6.64	7.40	0.7	0.10	805.19	804.12		803.79	803.13		804.02			
	3301	0.00			0.66	1.00	6.66		6.87	0.0						Manhole													814.14			0.5		804.02	812.81	
	1202			0.61	0.92	1.00	8.57	0.18	6.40	3.6						HDPE	80.28	0.92	24	0.01	28.28	3.14	9.00	7.38	0.7	0.07	804.02	802.96		802.63	801.89		802.89			Connect to Line 1200
																																	802.89		
Line 3700	3700	0.45			0.90	1.00	5.00		7.35	3.0	2.98	8.426	0.010	2.304	0.674	Curb Inlet													811.65					805.40	809.82	
	401			0.45	0.90	1.00	5.00	0.08	7.35	3.0						HDPE	51.60	3.00	24	0.01	51.08	3.14	16.26	10.73	0.7	0.04	805.40	0.04		804.03	802.48		0.00			Conect to Line 400
	3802	0.13			0.95	1.25	25.00		5.71	0.9	0.88	6.036	0.033	0.698	0.184	Curb Inlet													812.39			2.5		804.52	811.06	
Line 3800	3801			0.13	0.95	1.25	25.00	0.20	5.71	0.9						HDPE	115.01	1.00	18	0.01	13.69	1.77	7.75	9.58	0.7	0.02	809.24	803.17		808.22	807.07		803.14			
	3801	0.91			0.45	1.25	25.00		5.71	2.9	2.93	9.198	0.033	2.102	0.823	Curb Inlet													815.44			7.95		803.14	814.11	Conect to Line 500
	500			1.04	0.51	1.25	25.00	0.26	5.71	3.8						RCP	148.12	1.50	72	0.013	520.09	28.27	18.39	9.58	0.7	0.00	803.14	0.00		799.12	796.90					
Line 3900	3900	0.48			0.90	1.00	5.00		7.35	3.2	3.18	11.025	0.010	2.413	0.763	Curb Inlet													812.86					805.13	811.03	
	201			0.48	0.90	1.00	5.00	0.12	7.35	3.2						HDPE	74.75	1.00	18	0.01	13.69	1.77	7.75	10.73	0.8	0.21	801.25	805.13		800.12	799.37		804.92			Conect to Line 200
Line 4000	4001	0.16			0.85	1.00	5.00		7.35	1.0	1.00	6.497	0.043	0.780	0.220	Curb Inlet													820.93			0.5		812.85	819.10	
	205			0.16	0.85	1.00	5.00	0.09	7.35	1.0						RCP	55.65	1.00	12	0.013	3.57	0.79	4.55	10.73	0.7	0.13	812.85	808.91		812.12	811.56		808.78			Conect to Line 200

Record Drawing

Drainage Calculations

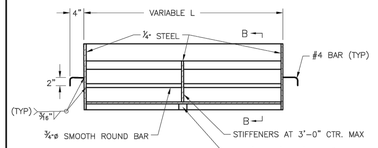


PLAN VIEW

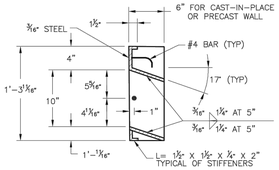


SECTION A–A

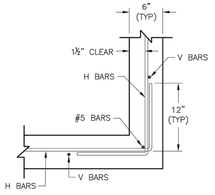
*See Sheet 23 for structures over 7'–0"



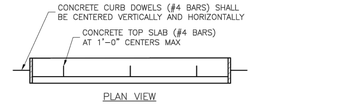
FRONT ELEVATION



SECTION B–B



WALL CORNER DETAIL



PLAN VIEW

STEEL FRAME NOTES:
1. ALL WELDS SHALL BE PERFORMED IN ACCORDANCE WITH APPROPRIATE AWS SPECIFICATIONS AND PROCEDURES.
2. ALL WELDS ON EXPOSED SURFACES SHALL BE DRESSED SO AS TO PROVIDE A PLEASING FINISHED APPEARANCE.
3. THE ENTIRE FRAME SHALL BE PAINTED A SINGLE COAT OF CHEM–PRIME #37H–78 PRIMER (GRAY) OR EQUAL.

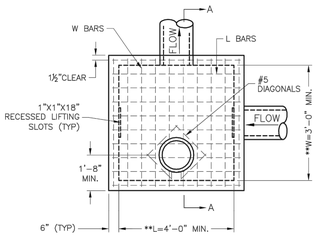
GENERAL NOTES:
1. THE FIRST DIMENSION LISTED IN THE CONSTRUCTION NOTES IS THE "L" DIMENSION. THE SECOND DIMENSION IS THE "W" DIMENSION.
2. FLOW LINES LISTED ON THE PROJECT PLANS ARE LISTED AT THE INSIDE FACE OF THE WALL.
3. FLOOR OF INLET GROUTED AND SHAPED TO MATCH PIPE INVERT TO PROVIDE SMOOTH FLOW.
4. LOCATE MH RING AND COVER ON BLANK WALL IF POSSIBLE.
5. STEPS SHALL BE SPACED AT 1'–4" O.C. VERTICALLY ON BLANK WALL IF POSSIBLE.
6. BEVEL ALL EXPOSED EDGES WITH ¾"CHAMFER OR ½" TOOLED EDGE.
7. ON–GRADE INLETS SHALL CONFORM TO THE STREET GRADE AND SUMP INLETS SHALL BE LEVEL.
8. PRECAST LIDS SHALL BE PINNED, SEALED WITH NON–SHRINKABLE GROUT AND REMOVABLE FOR FUTURE MAINTENANCE.
9. LIFTING RINGS SHALL BE REMOVED AND SEALED WITH NON–SHRINKABLE GROUT
10. FOR RING AND COVER SEE THE STORMWATER APPROVED PRODUCT LIST.

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

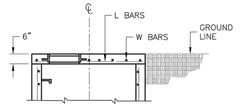
Project: STANDARD DETAILS — CITY OF LEE'S SUMMIT, MO — LEE'S SUMMIT, JACKSON COUNTY, MO
Sheet Name: CURB INLET DETAIL

Drawn By: MJF
Checked By: DL
Date: 04/17
Proj. #:

STM-1



PLAN

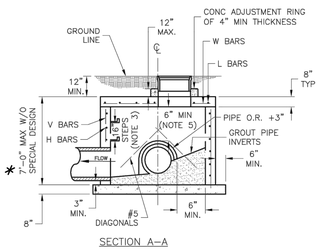


SLAB TOP ALTERNATE FOR JUNCTION BOX (SHALLOW)

** INCREASE IN MULTIPLES OF 6" (7'–0") MAX WITHOUT SPECIAL DESIGN. (SEE PROJECT PLANS FOR DETAILS)

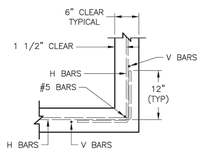
REINFORCING

BARS	BAR SIZE	SPACING (IN.)
H	4	12
V	4	12
L	5	6
W	5	6



SECTION A–A

*See Sheet 23 for structures over 7'–0"



WALL CORNER DETAIL

GENERAL NOTES:
1. LOCATE RING AND COVER ON BLANK WALL.
2. USE ¾" CHAMFER STRIP OR ½" R EDGER TOOL ON ALL EXPOSED CONCRETE CORNERS.
3. STEPS REQUIRED AT 16" O.C. WHEN DEPTH FROM TOP OF CASTING TO INVERT EXCEEDS 4' ON BLANK WALL IF POSSIBLE.
4. BOXOUTS WILL NOT BE ALLOWED TO PROJECT THROUGH THE CORNERS OF THE STRUCTURE AND THE MINIMUM DISTANCE BETWEEN BOXOUTS IS 6".
5. THE MINIMUM REINFORCING SHALL BE 1 H–BAR OVER A CAST–IN–PLACE PIPE AND 2 H–BARS OVER A PRECAST BOXOUT.
8. PRECAST LIDS SHALL BE PINNED, SEALED WITH NON–SHRINKABLE GROUT AND REMOVABLE FOR FUTURE MAINTENANCE.
9. REINFORCING OF COVERS IN STREETS REQUIRE SPECIAL DESIGN.
10. FOR RING AND COVER SEE THE STORMWATER APPROVED PRODUCT LIST.

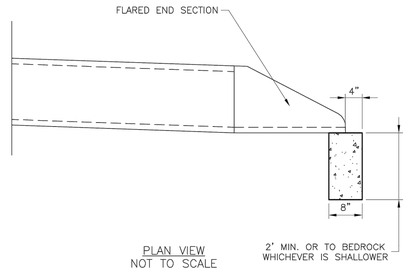
LEE'S SUMMIT MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063

Project: STANDARD DETAILS — CITY OF LEE'S SUMMIT, MO — LEE'S SUMMIT, JACKSON COUNTY, MO
Sheet Name: JUNCTION BOX DETAIL

Drawn By: MJF
Checked By: DL
Date: 04/17
Proj. #:

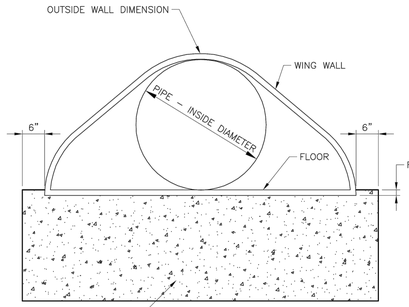
STM-3

"100.00 100.10", "1.00% 1.15% slope", or "8-inch HDPE PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.



PLAN VIEW
NOT TO SCALE

2' MIN. OR TO BEDROCK WHICHEVER IS SHALLOWER



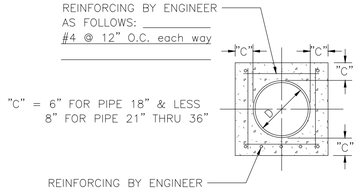
END VIEW
NOT TO SCALE

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

FLARED END SECTION SUPPORT DETAIL

Date: 04/17
Drawn By: MJF
Checked By: DL

STM-5



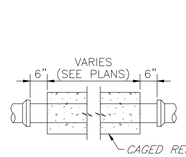
CAGED REINFORCED CONCRETE ENCASEMENT

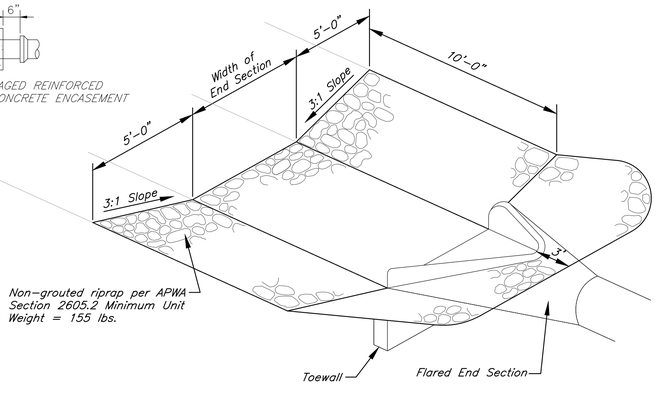
"C" = 6" for pipe 18" & less
8" for pipe 21" thru 36"

Notes:
1. *All encasements shall be centered on the crossing.*
2. *All concrete shall be KCMMB 4K*

CAGED REINFORCED CONCRETE ENCASEMENT

Not to Scale

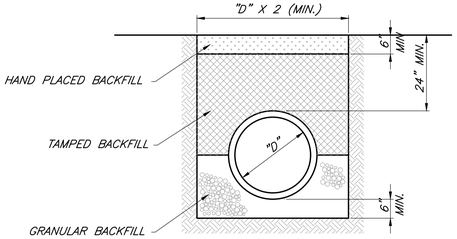




ENTRANCE EROSION PROTECTION - RIPRAP

Not to Scale

Record Drawing



FIRST CLASS BEDDING (RCP)

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

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.:	17
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

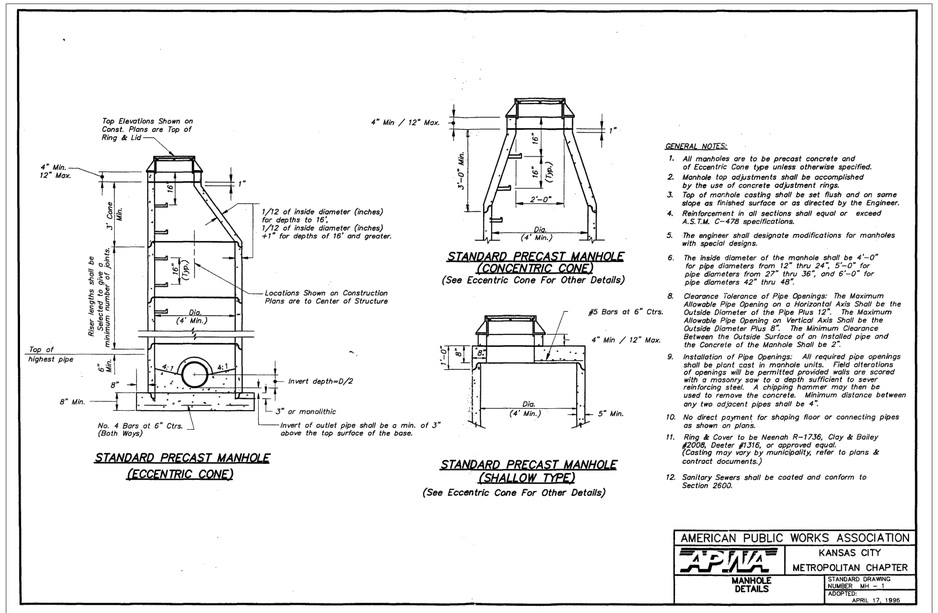
Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
2	3/10/20	City Comments		
	12/1/20	North slope grading revisions		

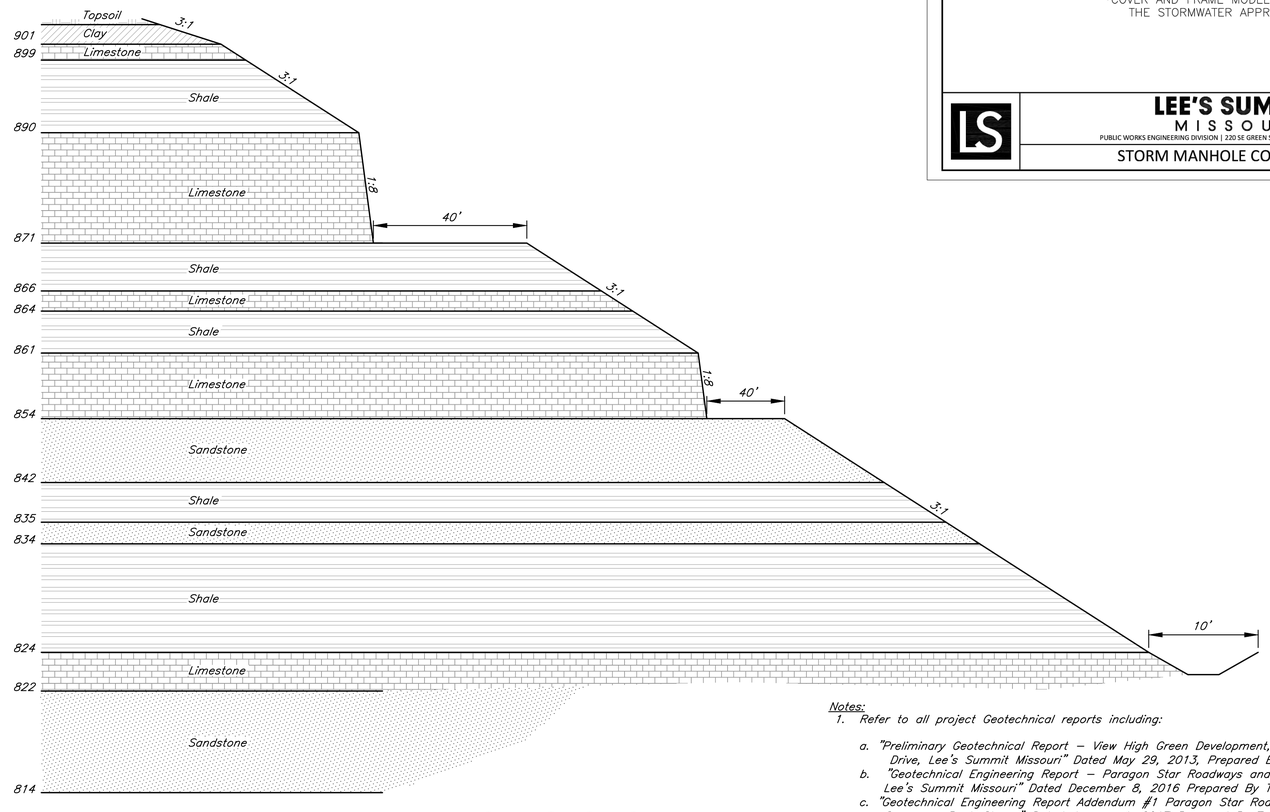
Construction Details



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 & Cover to be Neenah R-1736, Clay & Bailey #2008, Dexter #1316, or approved equal. (Casting may vary by municipality, refer to plans & contract documents.)
12. Sanitary Sewers shall be coated and conform to Section 2600.

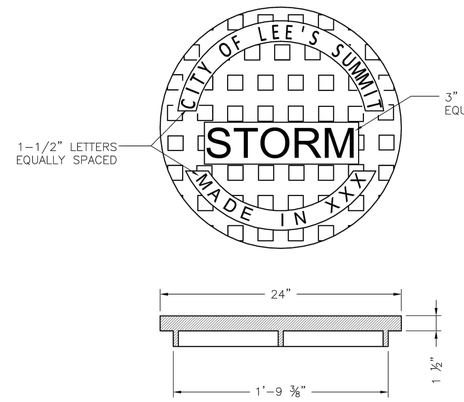
AMERICAN PUBLIC WORKS ASSOCIATION		
APWA	KANSAS CITY METROPOLITAN CHAPTER	
MANHOLE DETAILS	STANDARD DRAWING NUMBER: MH - 1 ADOPTED: APRIL 17, 1996	



CUT SECTION
Not to Scale

Notes:

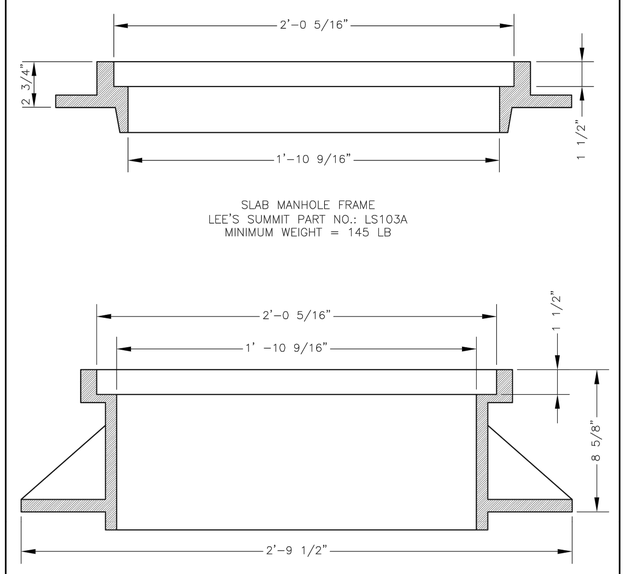
1. Refer to all project Geotechnical reports including:
   a. "Preliminary Geotechnical Report – View High Green Development, I-470 & View high Drive, Lee's Summit Missouri" Dated May 29, 2013, Prepared By Terracon Consultants, Inc.
   b. "Geotechnical Engineering Report – Paragon Star Roadways and Borrow Source, Lee's Summit Missouri" Dated December 8, 2016 Prepared By Terracon Consultants, Inc.
   c. "Geotechnical Engineering Report Addendum #1 Paragon Star Roadways and Borrow Source – Rock Slopes" Dated January 4, 2017 Prepared By Terracon Consultants, Inc.
2. Section Based off of Boring B-109, Actual elevations of each geological strata may vary on site.
3. On-Site Geotechnical Engineer will identify limits of each strata, and resulting slope recommendations.



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	Date: 04/17
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063	Drawn By: MJF
STORM MANHOLE COVER DETAIL	Checked By: DL
	STM-6



SLAB MANHOLE FRAME
LEE'S SUMMIT PART NO.: LS103A
MINIMUM WEIGHT = 145 LB

STANDARD 24" MANHOLE FRAME
LEE'S SUMMIT PART NO.: LS101A
MINIMUM WEIGHT = 250 LB

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

LEE'S SUMMIT MISSOURI	Date: 04/17
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063	Drawn By: MJF
STORM MANHOLE FRAME DETAIL	Checked By: DL
	STM-7

Record Drawing

~~"100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	18
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

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

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
2	3/10/20	City Comments		
	12/1/20	North slope grading revisions		

Construction Details

~~"100.00"~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is solely based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

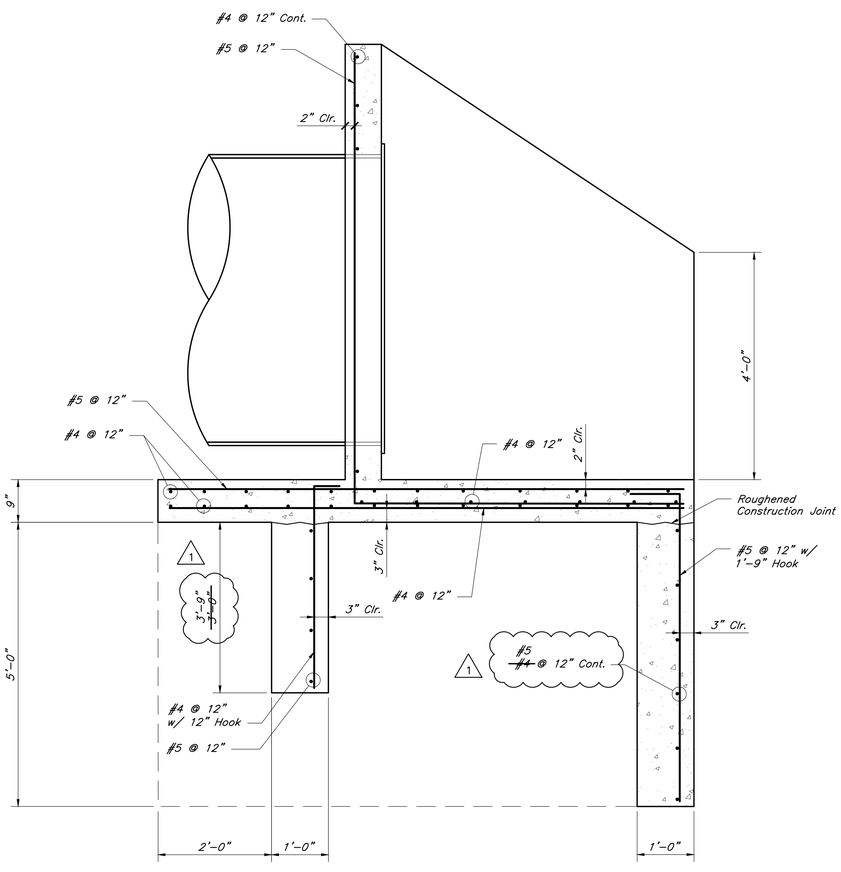
GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	19
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

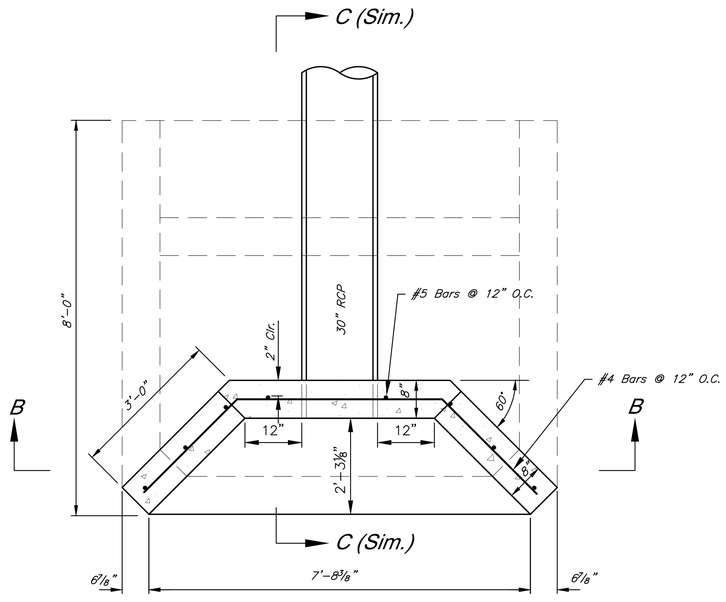
Storm Sewer Improvements and Mass Grading
Paragon Star Development
Lee's Summit, Missouri

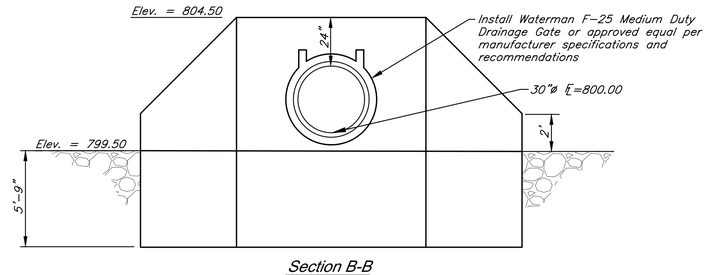
NO.	DATE	REVISIONS	BY	APPROVED
1	2/23/17	KEYWAY DEPTH AND REINFCEMENT	RJF	EWB
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
2	4/9/19	Structure 700 removed from floodway		
2	3/10/20	City Comments		
	12/1/20	North slope grading revisions		



SECTION C-C - STRUCTURE 700

Not to Scale

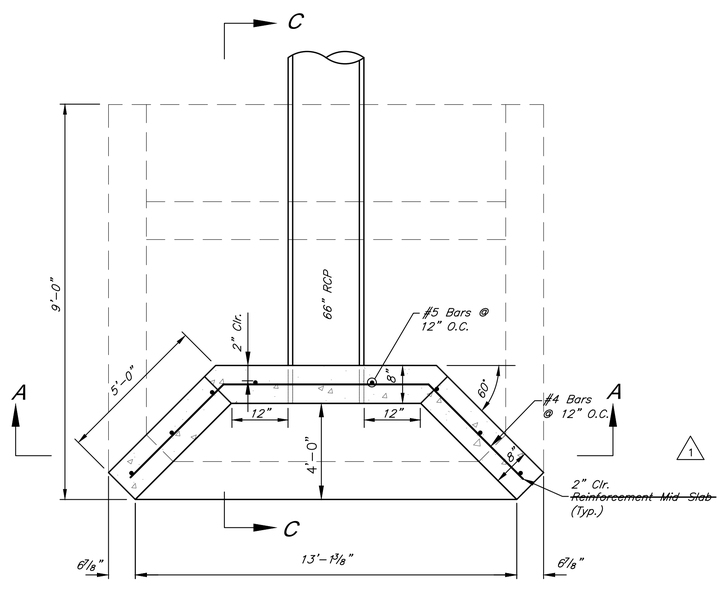


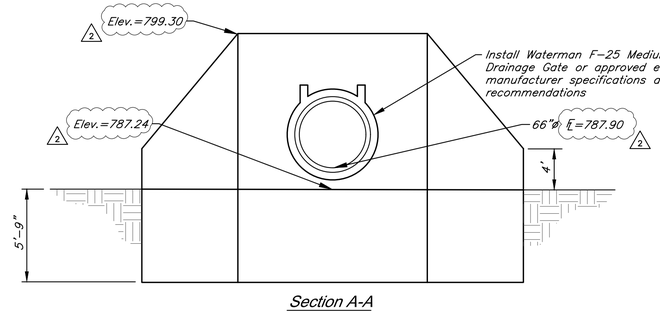


Section B-B

HEADWALL DETAIL - STRUCTURE 1200

Not to Scale





Section A-A

HEADWALL DETAIL - STRUCTURE 700

Not to Scale

Record Drawing

Headwall Details

GENERAL NOTES – STRUCTURAL

DESIGN SPECIFICATIONS: ACI 318R–11, AISC 14TH EDITION

GENERAL:

1. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY OBSERVED DISCREPANCIES IN DIMENSIONS, DETAILING, OR OTHER ITEMS AS SHOWN ON THE PLANS OR SPECIFIED PRIOR TO PROCEEDING WITH WORK RELATING TO SAID DISCREPANCIES.

2. THE CONTRACTOR SHALL NOT ALTER OR MODIFY WORK SHOWN ON THE STRUCTURAL DRAWINGS WITHOUT RECEIVING WRITTEN APPROVAL FROM THE ENGINEER.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPLYING SHOP DRAWINGS REINFORCING STEEL, HANDRAILS AND POST–INSTALLED ANCHORS. SHOP DRAWINGS MUST BE REVIEWED FOR CONFORMANCE WITH THE MEANS, METHODS, TECHNIQUES, SEQUENCES, AND OPERATIONS OF CONSTRUCTION, AND SAFETY PRECAUTIONS AND PROGRAMS INCIDENTAL THERETO, ALL OF WHICH ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE STAMPED "APPROVED" BY THE CONTRACTOR PRIOR TO SUBMITTAL. SHOP DRAWINGS SUBMITTED WITHOUT THE CONTRACTOR'S STAMPED APPROVAL WILL BE RETURNED REJECTED. ALL SHOP DRAWINGS SHALL BE REVIEWED BY THE STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION.

4. THE STRUCTURAL SYSTEMS SHOWN ON THESE DOCUMENTS HAVE BEEN DESIGNED FOR THE FINAL IN PLACE USAGE OF THE STRUCTURE BASED ON THE INTENDED OCCUPANCY AND CODE REQUIREMENTS. WHILE GENERAL CONSTRUCTABILITY HAS BEEN CONSIDERED, THE STRUCTURAL SYSTEMS HAVE NOT BEEN DESIGNED TO ACCOMMODATE SPECIFIC CONSTRUCTION MEANS AND METHODS THAT MIGHT BE UTILIZED BY THE CONTRACTOR.

5. THE CONTRACT STRUCTURAL DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED STRUCTURE, AND EXCEPT WHERE SPECIFICALLY SHOWN, DO NOT INDICATE THE METHOD OR MEANS OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, PROCEDURES, TECHNIQUES, SEQUENCE, AND SAFETY PRECAUTIONS AND PROGRAMS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR THE ACTS OR OMISSION OF THE CONTRACTOR, SUBCONTRACTOR, OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK, OR FOR THE FAILURE OF ANY OF THEM TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

6. PERIODIC SITE OBSERVATION BY FIELD REPRESENTATIVES OF GBA, IF PROVIDED, IS SOLELY FOR THE PURPOSE OF DETERMINING IF THE WORK OF THE CONTRACTOR IS PROCEEDING IN GENERAL ACCORDANCE WITH THE STRUCTURAL CONTRACT DOCUMENTS. THIS LIMITED SITE OBSERVATION SHOULD NOT BE CONSTRUED AS EXHAUSTIVE OR CONTINUOUS TO CHECK THE QUALITY OR QUANTITY OF THE WORK, BUT RATHER PERIODIC IN AN EFFORT TO GUARD THE OWNER AGAINST DEFECTS OR DEFICIENCIES IN THE WORK OF THE CONTRACTOR.

7. MODOT SPECIFICATIONS SHALL APPLY TO ALL ITEMS NOT SPECIFICALLY ADDRESSED IN THESE PLANS.

FOUNDATIONS:

1. FOUNDATIONS FOR THIS PROJECT HAVE BEEN DESIGNED IN ACCORDANCE WITH REQUIREMENTS SET FORTH IN A SOILS REPORT PREPARED BY TERRACON CONSULTANTS, INC. DEC. 8, 2016 (TERRACON PROJ. NO. 02165208). WALLS HAVE BEEN DESIGNED FOR AN ALLOWABLE SOIL BEARING VALUE OF 1500 PSF. THE CONTRACTOR SHALL REFER TO SOIL REPORT FOR ALL REQUIREMENTS AND RECOMMENDATIONS PERTINENT TO THIS PROJECT.

CONCRETE AND REINFORCING STEEL:

1. CONCRETE MIX DESIGNS SHALL MEET THE FOLLOWING REQUIREMENTS:
(TAKEN FROM ACI 211.1)

MINIMUM COMPRESSIVE STRENGTH (psi)	MAXIMUM AGGREGATE SIZE (IN.)	MIN. CEMENT (LBS.)	MAXIMUM WATER/CEMENT RATIO	MAXIMUM SLUMP (IN.)	AIR ENTRAINMENT PERCENT (%)
4000	¾	611	.48	4	6±1

NOTE: DO NOT ADD WATER TO CONCRETE DURING DELIVERY, AT PROJECT SITE, OR DURING PLACEMENT. THE INTENT OF THESE SPECIFICATIONS IS THAT THE CONTRACTOR SUPPLY CONCRETE MIXES WITH A MINIMUM AMOUNT OF MIX WATER IN ORDER TO LIMIT PLASTIC SHRINKAGE CRACKING. IT IS EXPECTED THAT WORKABILITY FOR CONCRETE MIXES WILL REQUIRE THE ADDITION OF WATER–REDUCING AND/OR SUPER–PLASTICIZING ADMIXTURES.

2. LAP SPLICE LENGTHS FOR HORIZONTAL #4 AND #5 BARS ARE 2'–0" AND 2'–6" RESPECTIVELY.

3. ALL CONCRETE IS REINFORCED UNLESS SPECIFICALLY CALLED OUT AS UN–REINFORCED. REINFORCE ALL CONCRETE NOT OTHERWISE SHOWN WITH SAME STEEL AS IN SIMILAR SECTIONS OR AREAS.

4. NO ALUMINUM ITEMS SHALL BE EMBEDDED IN ANY CONCRETE OR PLACED IN CONTACT WITH CONCRETE.

5. CAST–IN–PLACE CONCRETE CONSTRUCTION SHALL CONFORM TO THE LATEST AMERICAN CONCRETE INSTITUTE DOCUMENTS. ACI301, 305, 306, 315, 318, AND 347 UNLESS OTHERWISE NOTED IN THESE CONTRACT DOCUMENTS.

6. PRIOR TO PLACING CONCRETE IN ANY LOCATION, IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO HAVE THOROUGHLY CHECKED AND COORDINATED ALL DIMENSIONS, ELEVATIONS, OPENINGS, RECESSES, AND BLOCKOUTS SHOWN ON THE ARCHITECTURAL, STRUCTURAL AND MECHANICAL/ELECTRICAL/PLUMBING DRAWINGS. IN THE EVENT ERRORS, CONFLICTS, OR OMISSIONS EXIST, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE ARCHITECT OR ENGINEER FOR NECESSARY CORRECTIVE ACTION.

7. REINFORCING BARS #4 AND LARGER (EXCEPT TIES AND STIRRUPS) SHALL MEET ASTM A615 WITH SUPPLEMENTARY REQUIREMENTS (S1), GRADE 60. SMALLER BARS SHALL BE GRADE 40.

8. CONCRETE COVERAGE OF REINFORCEMENT SHALL HAVE THE FOLLOWING CLEAR DISTANCES UNLESS NOTED OTHERWISE ON THE DRAWINGS:

CAST AGAINST EARTH _____3"

FORMED CONCRETE EXPOSED
TO EARTH OR WEATHER_____2"

NOT EXPOSED TO EARTH
OR WEATHER_____1" SLABS, 1–½" BEAMS AND COLUMNS

9. EMBEDDED AND ALL REINFORCING BARS MARKED CONTINUOUS SHALL BE EMBEDDED TO DEVELOP THE FULL TENSION CAPACITY OF THE BAR. LAPS SHALL BE CLASS B TENSION LAPS UNLESS SPECIFIED OTHERWISE ON THE DRAWINGS.

10. ALL BARS ARE TO BE SUPPORTED IN FORMS AND SPACED WITH WIRE BAR SUPPORTS PER ACI "MANUAL OF STANDARD PRACTICE FOR DETAILING CONCRETE STRUCTURES" (LATEST EDITION). BARS SHALL BE SECURELY WIRED PER LATEST EDITION OF CRSI'S "RECOMMENDED PRACTICE FOR PLACING REINFORCING BARS." ACCESSORIES FOR EXPOSED CONCRETE SHALL BE PLASTIC OR HAVE PLASTIC–TIPPED FEET.

11. CONCRETE PLACED DURING COLD WEATHER SHALL CONFORM TO THE REQUIREMENTS OF ACI 306R–88. COLD WEATHER IS DEFINED AS A PERIOD WHEN, FOR MORE THAN 3 SUCCESSIVE DAYS, THE MEAN DAILY TEMPERATURE DROPS BELOW 40°F.

12. CONCRETE PLACED DURING HOT WEATHER SHALL CONFORM TO THE REQUIREMENTS OF ACI 305R–99. HOT WEATHER IS DEFINED AS THAT COMBINATION OF AIR TEMPERATURE, RELATIVE HUMIDITY AND WIND SPEED THAT WILL CAUSE A RATE OF EVAPORATION OF 0.2 LB/SQ.FT./HR. OR MORE AS DEFINED BY FIGURE 2.1.5 OF ACI 305R–99.

13. CHAMFER ALL EXPOSED CORNERS OF CONCRETE SLABS, WALLS, BEAMS AND COLUMNS ¾", UNLESS NOTED OTHERWISE ON DETAILS.

POST–INSTALLED ANCHORS AND REBAR:

1. POST–INSTALLED ANCHORS AND REBAR SHALL BE INSTALLED USING AN ADHESIVE UNLESS SPECIFICALLY NOTED OTHERWISE. ANCHORS SHALL CONSIST OF THE FOLLOWING ANCHOR TYPES, AS PROVIDED BY HILTI, INC.:

a) ANCHORAGE TO CONCRETE
(1) HILTI HIT–HY 200 SAFE SET SYSTEM WITH HILTI HOLLOW DRILL BIT (TE–CD OR TE–YD)
(2) STEEL ANCHOR ELEMENT SHALL BE HILTI HAS–E THREADED ROD PER ICC ESR–3187.

b) REBAR DOWELING INTO CONCRETE
(1) HILTI HIT–HY 200 SAFE SET SYSTEM WITH HILTI HOLLOW DRILL BIT (TE–CD OR TE–YD) AND CONTINUOUSLY DEFORMED REBAR PER ICC ESR–3187.

2. CONTACT HILTI AT (800) 879–8000 FOR PRODUCT RELATED QUESTIONS.

3. IF THE CONTRACTOR CHOOSES TO SUBMIT A SUBSTITUTION FOR APPROVAL, THEY MUST ATTACH CALCULATIONS SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE JURISDICTION WHERE THE PROJECT IS LOCATED SHOWING THAT THE SUBSTITUTION IS "EQUAL". THE ICC–ES EVALUATION REPORT FOR THE "EQUAL" PRODUCT MUST ALSO BE SUBMITTED FOR REVIEW. THE CONTRACTOR SHALL NOTE THAT THE ICC–REPORT MAY INDICATE ADDITIONAL SPECIAL INSPECTION REQUIREMENTS. ANY ADDITIONAL SPECIAL INSPECTION REQUIREMENTS MUST BE PERFORMED AT NO ADDITIONAL COST TO THE OWNER.

4. INSTALL ANCHORS PER THE MANUFACTURER INSTRUCTIONS, AS INCLUDED IN THE ANCHOR PACKAGING.

5. THE CONTRACTOR SHALL ARRANGE AN ANCHOR MANUFACTURER'S REPRESENTATIVE TO PROVIDE ONSITE INSTALLATION TRAINING FOR ALL OF THEIR ANCHORING PRODUCTS SPECIFIED. THE STRUCTURAL ENGINEER OF RECORD MUST RECEIVE DOCUMENTED CONFIRMATION THAT ALL OF THE CONTRACTOR'S PERSONNEL WHO INSTALL ANCHORS ARE TRAINED PRIOR TO THE COMMENCEMENT OF INSTALLING ANCHORS.

6. OVERHEAD ADHESIVE ANCHORS MUST BE INSTALLED USING THE HILTI PROFI SYSTEM.

7. ANCHOR CAPACITY IS DEPENDANT UPON SPACING BETWEEN ADJACENT ANCHORS AND PROXIMITY OF ANCHORS TO EDGE OF CONCRETE. INSTALL ANCHORS IN ACCORDANCE WITH SPACING AND EDGE CLEARANCES INDICATED ON THE DRAWINGS.

8. EXISTING REINFORCING BARS IN THE CONCRETE STRUCTURE MAY CONFLICT WITH SPECIFIC ANCHOR LOCATIONS. UNLESS NOTED ON THE DRAWINGS THAT THE BARS CAN BE CUT, THE CONTRACTOR SHALL REVIEW THE EXISTING STRUCTURAL DRAWINGS AND SHALL UNDERTAKE MEASURES TO LOCATE THE POSITION OF THE EXISTING REINFORCING BARS AT THE LOCATIONS OF THE CONCRETE ANCHORS, BY HILTI FERROSCAN, GPR, X–RAY, OR OTHER MEANS.

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8–inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as–built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	20
TOTAL SHEETS	43

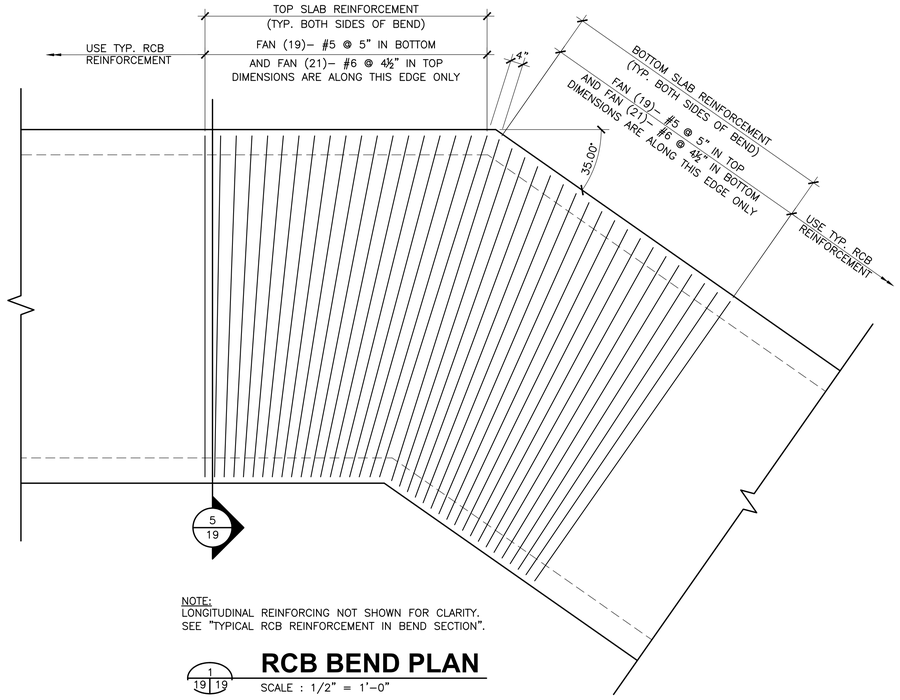
Bradley D. Burton
Professional Engineer
License No. 25862

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

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

Record Drawing

Structural General Notes

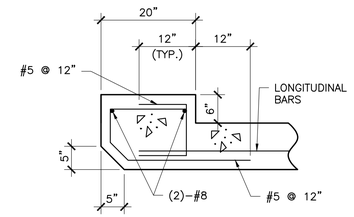


NOTE:
LONGITUDINAL REINFORCING NOT SHOWN FOR CLARITY.
SEE "TYPICAL RCB REINFORCEMENT IN BEND SECTION".

RCB BEND PLAN

1 | 19 | 19

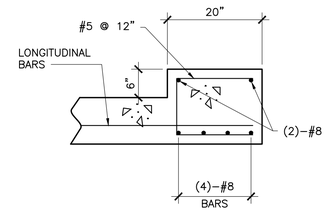
SCALE : 1/2" = 1'–0"



UPSTREAM HEADWALL REINFORCEMENT

3 | 19 | 19

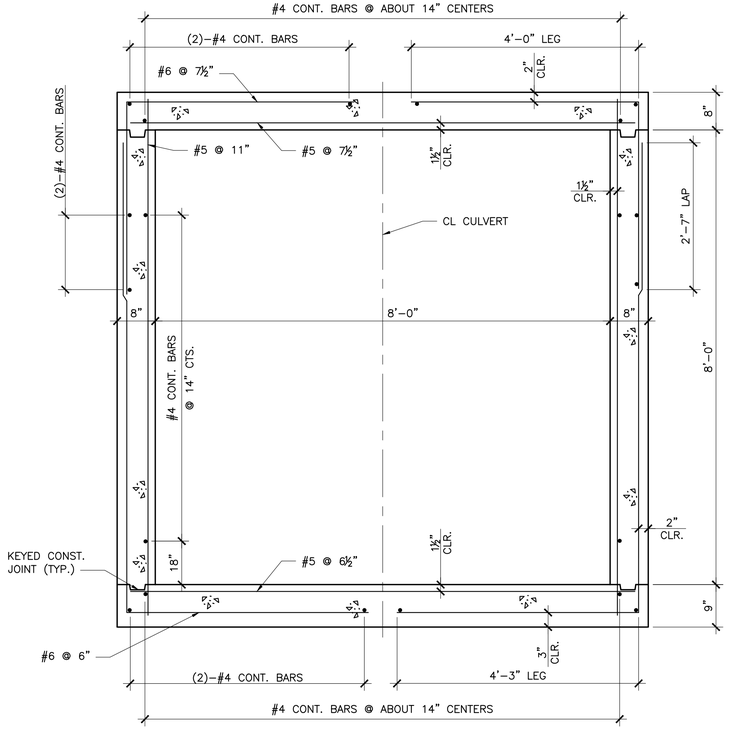
SCALE : 3/4" = 1'–0"



DOWNSTREAM HEADWALL REINFORCEMENT

4 | 19 | 19

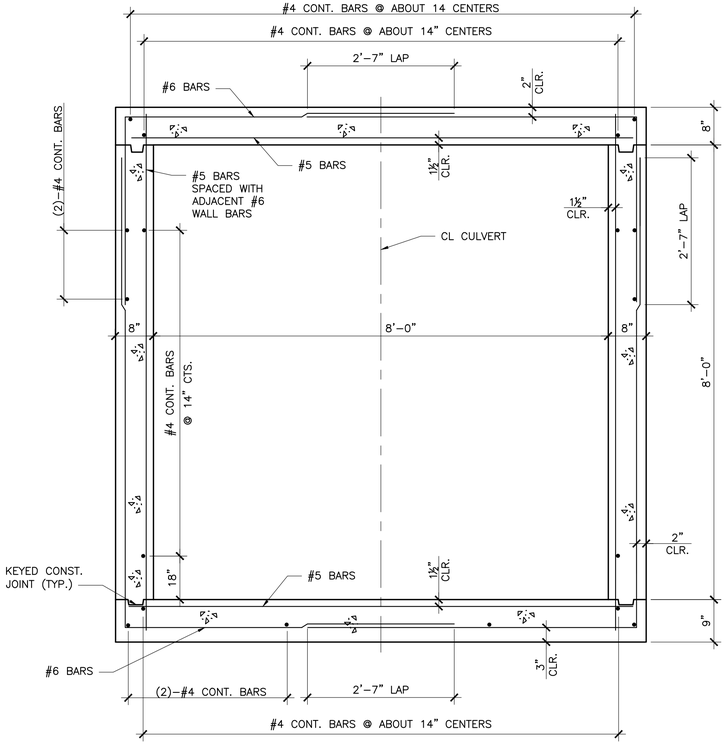
SCALE : 3/4" = 1'–0"



TYPICAL RCB REINFORCEMENT

2 | 19 | 19

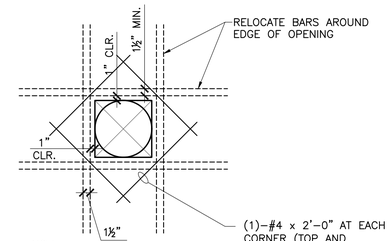
SCALE : 3/4" = 1'–0"



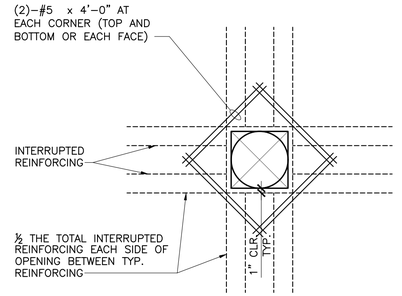
TYPICAL RCB REINFORCEMENT IN BEND SECTION

5 | 19 | 19

SCALE : 3/4" = 1'–0"



NOTE:
OCCURS AT OPENINGS SMALLER THAN TWICE (2x) THE SPACING OF REINFORCEMENT (18" MAX. OPENING)



NOTE:
OCCURS AT OPENINGS LARGER THAN TWICE (2x) THE SPACING OF REINFORCEMENT

ADDITIONAL REINF. AT OPENINGS IN WALLS AND SLABS

6 | 19 | 19

SCALE : N.T.S.

GENERAL NOTES:

1. MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1½".
2. MODOT SPECIFICATIONS SHALL APPLY TO ALL ITEMS NOT SPECIFICALLY ADDRESSED IN THESE PLANS.
3. Ssplice LENGTHS FOR #4 BARS SHALL BE 2'–0", UNLESS SPECIFICALLY SHOWN OTHERWISE.
4. CULVERT IS DESIGNED FOR HL–93 LOADING

Record Drawing

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.:	21
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

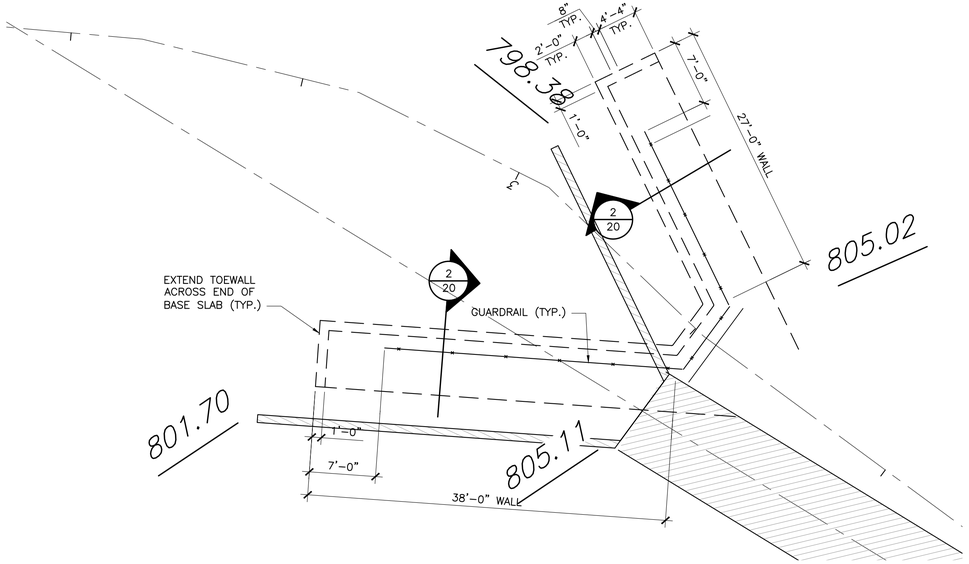
Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

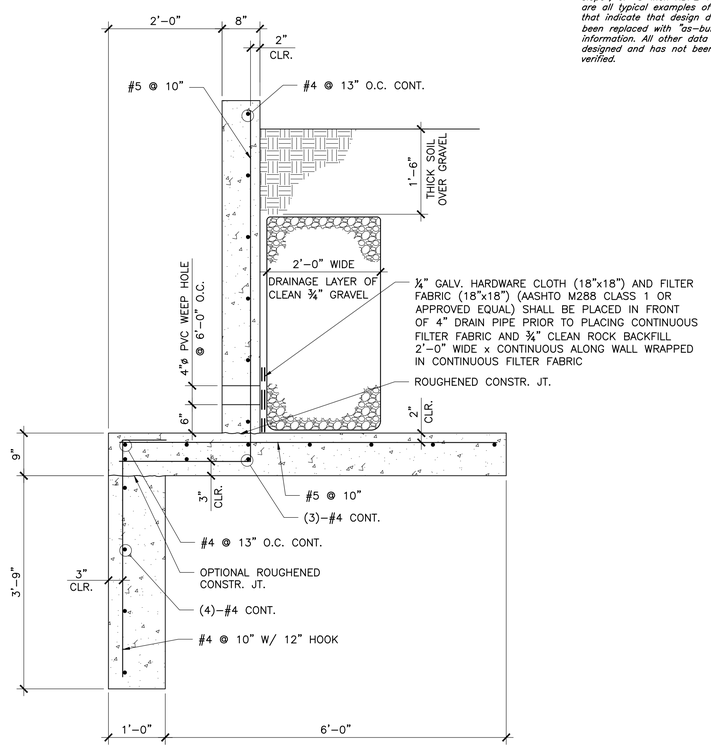
NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

RCB Details



1 20|20 **PLAN OF UPSTREAM WINGWALLS**

SCALE : 1/8" = 1'-0"



2 20|20 **SECTION**

SCALE : 3/4"" = 1'-0"

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	22
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

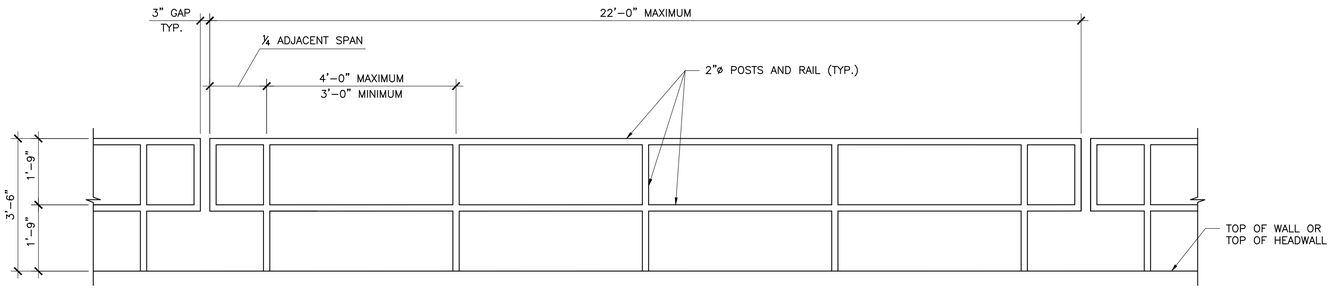
Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	~~Headwall Detail~~		

LAP LENGTH TABLE

Bar Size	Length
HORIZ. #4	24"
VERT. #4	17"

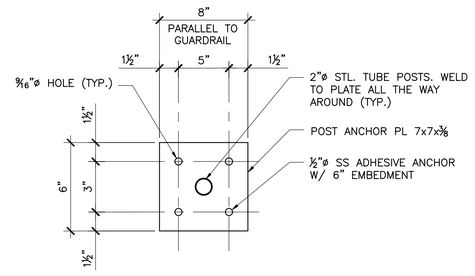


GUARDRAIL DETAIL

SCALE: N.T.S.

NOTES:

1. WINGWALLS AND HEADWALL TO BE COMPLETED BEFORE FABRICATION OF GUARDRAIL. GUARDRAIL IS TO BE INSTALLED WITH MEMBERS VERTICAL. HANDRAIL SHALL BE CONSTRUCTED IN PANELS THAT HAVE MAX. LENGTH OF 22'-0".
2. GUARDRAIL AND ANCHOR PLATES TO BE POWDER COATED BLACK.
3. ALL PIPES SHALL BE A53 GRADE B (EXTRA STRONG) AND PLATES SHALL BE A36.

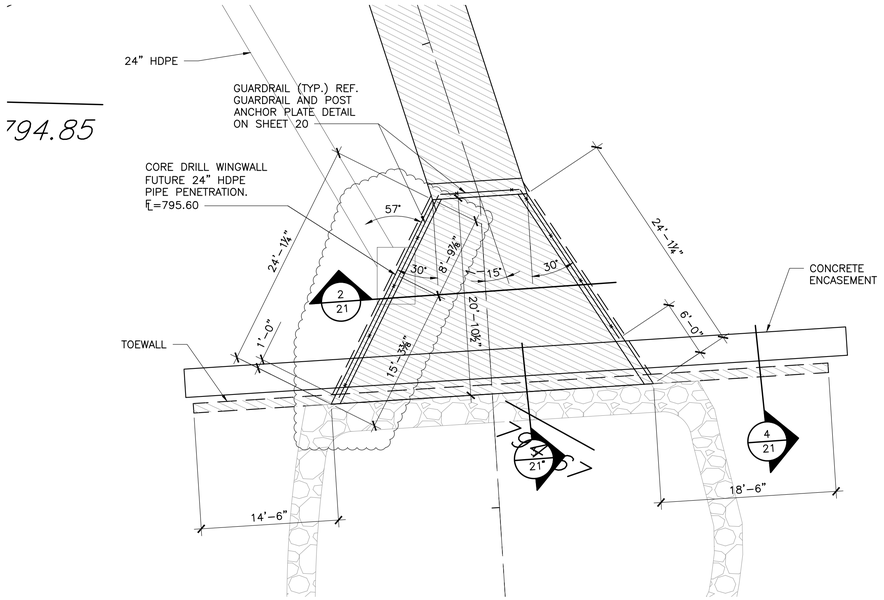


POST ANCHOR PLATE

SCALE: N.T.S.

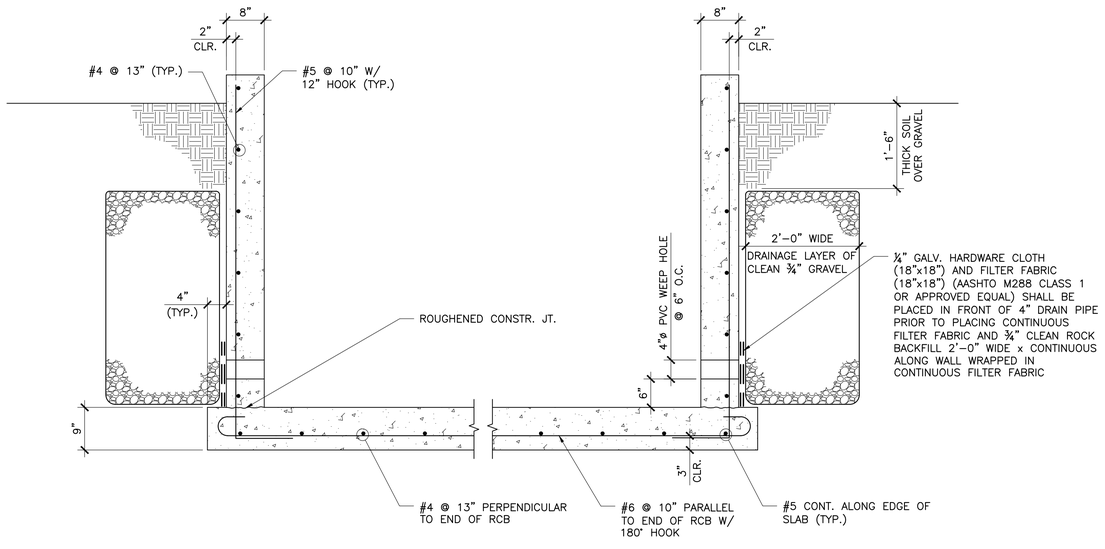
Record Drawing

RCB Details



1 21 21 **PLAN OF DOWNSTREAM WINGWALLS**

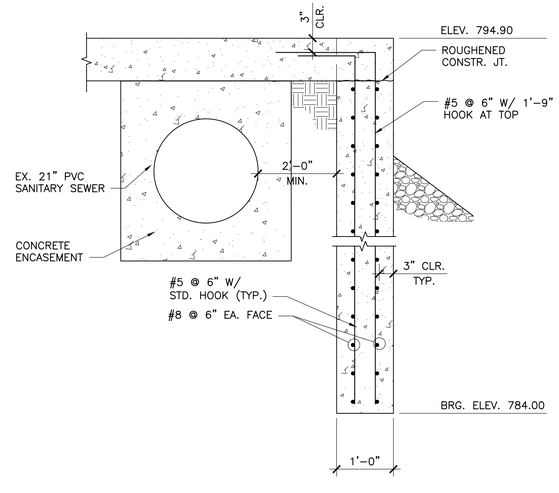
SCALE : 1/8" = 1'-0"



2 21 21 **SECTION**

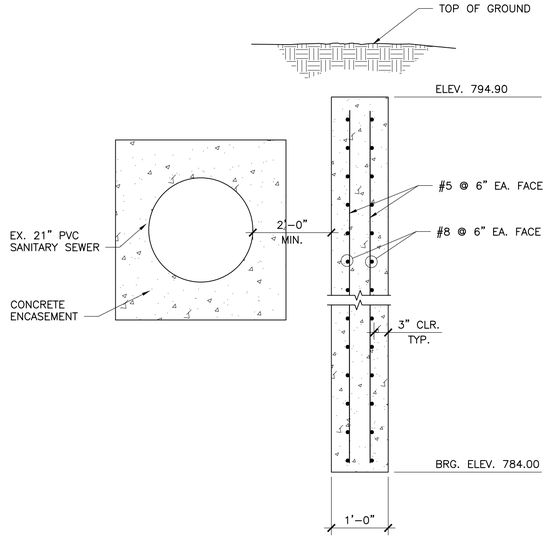
SCALE : 3/4"" = 1'-0"

Record Drawing



3 21 21 **SECTION**

SCALE : 3/4"" = 1'-0"



4 21 21 **SECTION**

SCALE : 3/4"" = 1'-0"

~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.:	23
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

RCB Details

~~"100.00"~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

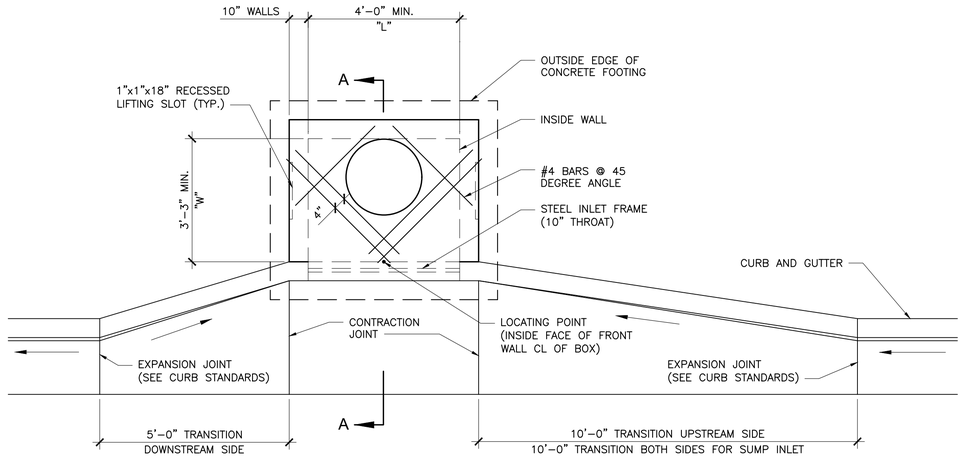
DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	24
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

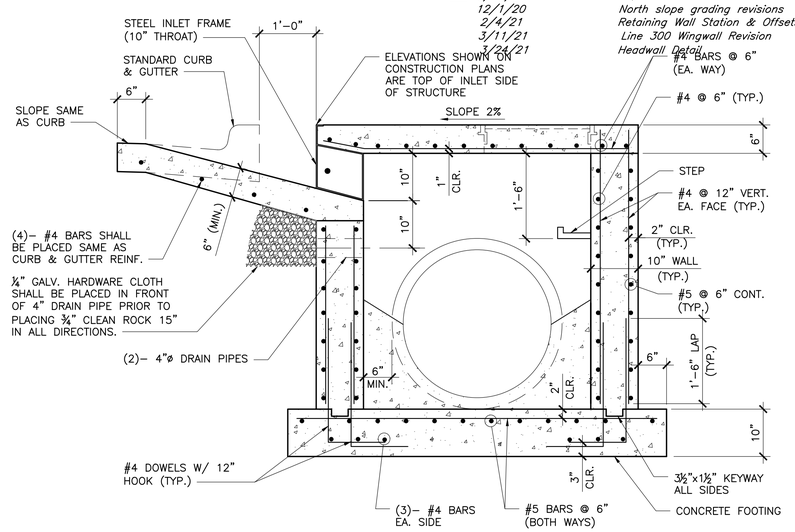
Storm Sewer Improvements and Mass Grading
Paragon Star Development
Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

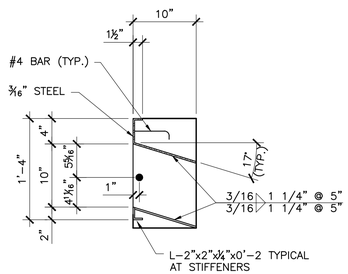
GENERAL NOTES:
1. THE FIRST DIMENSION LISTED IN THE CONSTRUCTION NOTES IS THE "L" DIMENSION. THE SECOND DIMENSION IS THE "W" DIMENSION.
2. FLOW LINES LISTED ON THE PROJECT PLANS ARE LISTED AT THE INSIDE FACE OF THE WALL.
3. FLOOR OF INLET GROUTED AND SHAPED TO MATCH PIPE INVERT TO PROVIDE SMOOTH FLOW.
4. LOCATE MH RING AND COVER ON BLANK WALL IF POSSIBLE.
5. STEPS SHALL BE SPACED AT 1'-4" O.C. VERTICALLY ON BLANK WALL IF POSSIBLE.
6. BEVEL ALL EXPOSED EDGES WITH ¾"CHAMFER OR ½" TOOLED EDGE.
7. ON-GRADE INLETS SHALL CONFORM TO THE STREET GRADE AND SUMP INLETS SHALL BE LEVEL.
8. PRECAST LIDS SHALL BE PINNED, SEALED WITH NON-SHRINKABLE GROUT AND REMOVABLE FOR FUTURE MAINTENANCE.
9. LIFTING RINGS SHALL BE REMOVED AND SEALED WITH NON-SHRINKABLE GROUT
10. FOR RING AND COVER SEE THE STORMWATER APPROVED PRODUCT LIST.



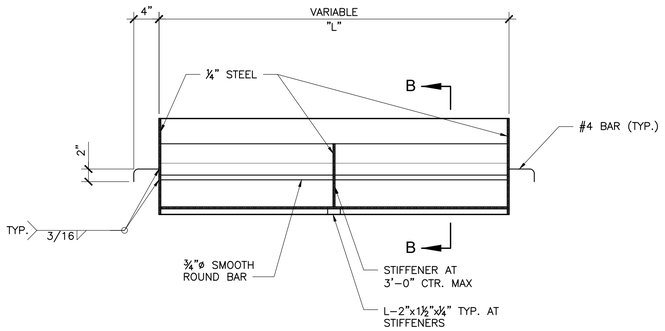
CURB INLET OR JUNCTION BOX PLAN



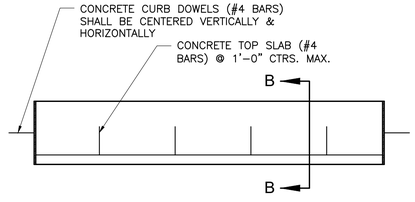
SECTION A-A



SECTION B-B



CURB INLET THROAT FRONT VIEW



TOP VIEW

Record Drawing

Special Curb Inlet and Junction Box Details (Structures exceeding 7'-0" in height)

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 on Site. Contractor to verify location and elevation of all utilities prior to commencing construction.

Legend

- Proposed Contour
- Existing Contour
- Drainage Swale
- Geotechnical Boring Location
- Erosion Control Blanket
- BMP Plan Reference Number
- Straw Wattles
- Grading Limits
- Exist. Construction Fence for Tree Protection (to be maintained)
- Tree to be saved
- Sediment Fence
- Exist. Sediment Fence (to be maintained)
- Temporary Construction Entrance
- Rock Check Dam

~~"100.00~~ 100.10", ~~"1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	25
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	5/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	2/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

Grading Limits Typ.
Existing Topsoil Stockpile
2' Easement Per Plat Bk. 6, Pg. 5
Existing 84" Little Blue Valley Sewer District Interceptor
Exist. Sediment Fence
City Limit Line
N. Line NW ¼ Sec. 34-48-32
60' Stream Buffer
100' Stream Buffer
Found ½" Rebar near MH Location
Valley Section
Proposed Floodplain
Proposed Floodway
Maintain Tree Protection Fence installed per Tree Clearing Plan
Existing 21" Sanitary Sewer
Existing 24" Sanitary Sewer
Existing 21" Sanitary Sewer
Existing R/W
Little Blue River
120' Stream Buffer
Existing Overhead Electrical Lines
E. Line NW ¼ Sec. 34-48-32
Grading Limits Typ.
Existing 84" Little Blue Valley Sewer District Interceptor
Exist. Sediment Fence
Match Line See Sht. 26
B-101 B-102 B-103 B-104 B-105 B-106 B-107 B-108 B-109 B-110 B-111 B-112 B-1 B-2 B-3 B-4 B-5 B-6 B-7 B-8 B-9 B-10 B-11

EROSION & SEDIMENT CONTROL STAGING CHART (See Sheets 25 thru 30)

Project Stage	BMP Plan Ref. No.	BMP Description	May Remove after Stage	Notes
A. Prior to Mass Grading	1	Const. Entrance & Staging Area	C	
	2	Install Orange Construction Fence	C	
	3	Perimeter Silt Fence	C	
B. Mass Grading	4	Silt Fence	C	
	5	Ditch Check	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%.

Record Drawing

100' 0' 100' 200'
SCALE : 1 INCH = 100 FEET

Pre-Construction Erosion Control-Phase 1

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 on Site. Contractor to verify location and elevation of all utilities prior to commencing construction.

Legend

Proposed Contour	Grading Limits
Existing Contour	Exist. Construction Fence for Tree Protection (to be maintained)
Drainage Swale	Tree to be saved
Geotechnical Boring Location	Sediment Fence
Erosion Control Blanket	Exist. Sediment Fence (to be maintained)
BMP Plan Reference Number	Temporary Construction Entrance
Straw Wattles	Rock Check Dam

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

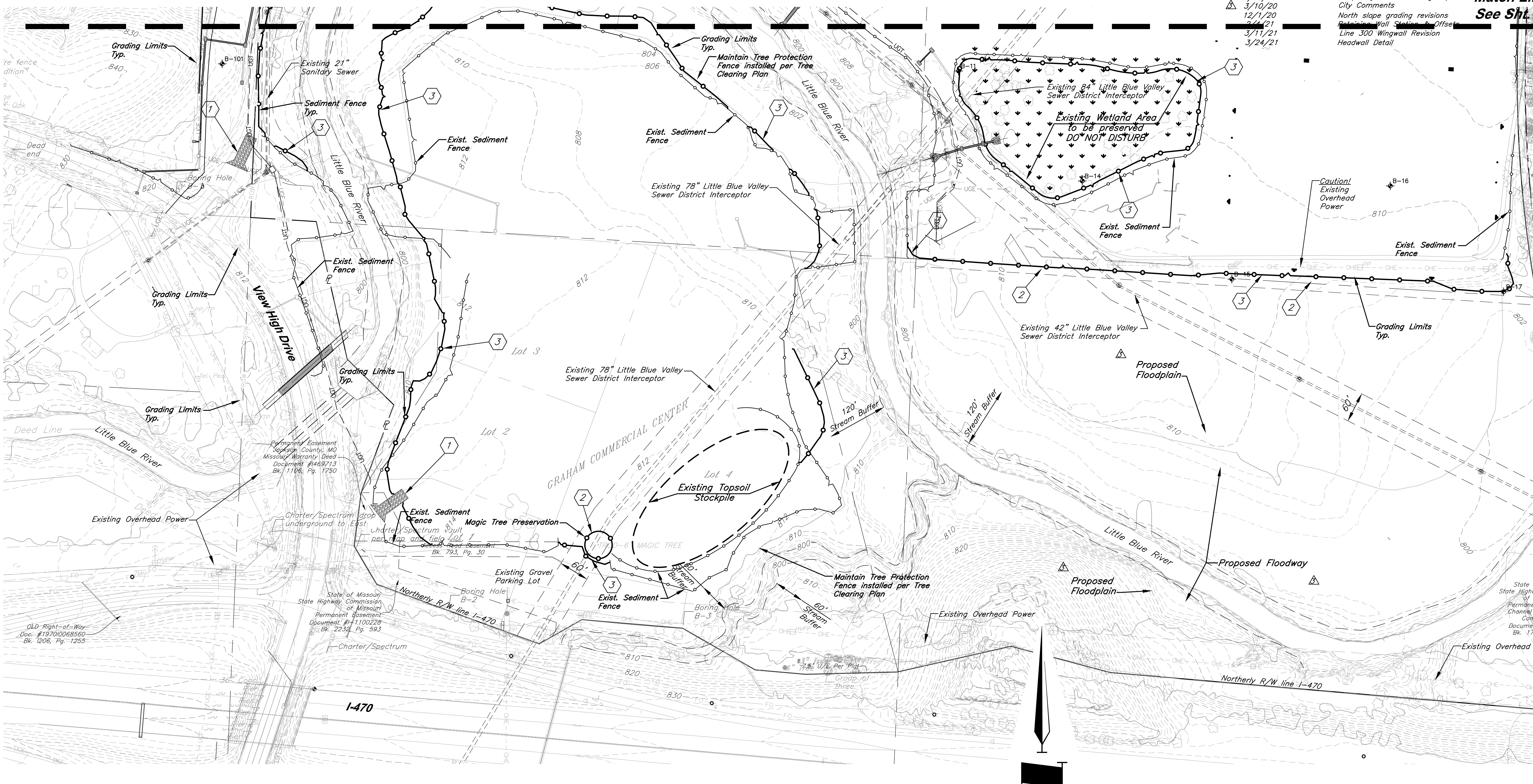
Bradley D. Burton
Professional Engineer
License No. 25862

GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	26
TOTAL SHEETS	43

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

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		



100' 0' 100' 200'
SCALE : 1 INCH = 100 FEET

Record Drawing

Pre-Construction Erosion Control-Phase 1

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	Grading Limits
810 Existing Contour	Exist. Construction Fence for Tree Protection (to be maintained)
Drainage Swale	Tree to be saved
B-1 Geotechnical Boring Location	Sediment Fence
	Exist. Sediment Fence (to be maintained)
Erosion Control Blanket	Temporary Construction Entrance
# BMP Plan Reference Number	Rock Check Dam
Straw Wattles	

CAUTION!

Numerous Utilities on Site. Contractor to verify location and elevation of all utilities prior to commencing construction.

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	27
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

Grading Limits Typ.
Grading per KCMO Land Disturbance Plans
Existing Topsoil Stockpile
Existing 84" Little Blue Valley Sewer District Interceptor
2' Easement Per Plat Bk. 6, Pg. 3
Lot
Maintain Exist. Temporary Construction Entrance installed per Tree Clearing Plans
Existing Overhead Electrical Lines
Exist. Sediment Fence
E. Line NW ¼ Sec. 34-48-32
Grading Limits Typ.
City Limit Line
N. Line NW ¼ Sec. 34-48-32
60' Stream Buffer
100' Stream Buffer
Found ½" Rebar near MH Location
Proposed Floodplain
Existing R/W
Existing 21" Sanitary Sewer
Grading Limits Typ.
Exist. Sediment Fence
Maintain Tree Protection Fence installed per Tree Clearing Plan
Little Blue River
120' Stream Buffer
Proposed Floodway
Existing 24" Sanitary Sewer
Proposed Floodway
Maintain Tree Protection Fence installed per Tree Clearing Plan
Exist. Sediment Fence
Existing 21" Sanitary Sewer
Exist. Sediment Fence
Maintain Tree Protection Fence installed per Tree Clearing Plan
Existing 84" Little Blue Valley Sewer District Interceptor
Exist. Sediment Fence
Grading Limits Typ.
Match Line See Sht. 28

100' 0' 100' 200'
SCALE : 1 INCH = 100 FEET

Record Drawing

Erosion Control-Phase 2

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

NOTE:
No fill may be placed within the existing floodway until storm line 4100 is complete.

CAUTION!

Numerous Utilities on Site. Contractor to verify location and elevation of all utilities prior to commencing construction.

Legend

Proposed Contour	Grading Limits
Existing Contour	Exist. Construction Fence for Tree Protection (to be maintained)
Drainage Swale	Tree to be saved
Geotechnical Boring Location	Sediment Fence
Erosion Control Blanket	Exist. Sediment Fence (to be maintained)
BMP Plan Reference Number	Temporary Construction Entrance
Straw Wattles	Rock Check Dam

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	TOTAL SHEETS
28	43

Bradley D. Burton
Professional Engineer
License No. 25862

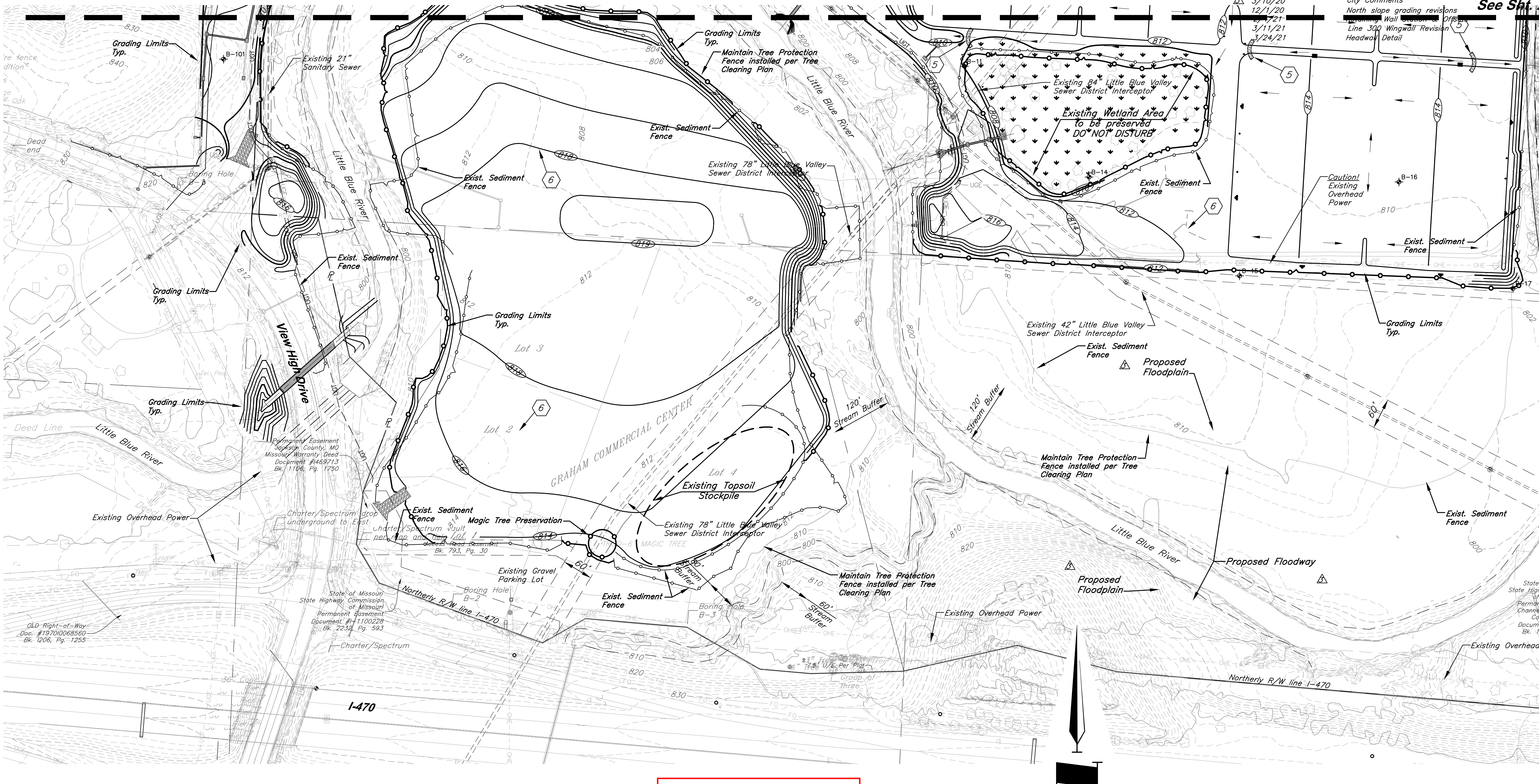
Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/[illegible]/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

Match Line See Sht. 27



SCALE : 1 INCH = 100 FEET

Record Drawing

Erosion Control-Phase 2

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

Proposed Contour	Grading Limits
Existing Contour	Exist. Construction Fence for Tree Protection (to be maintained)
Drainage Swale	Tree to be saved
Geotechnical Boring Location	Sediment Fence
	Exist. Sediment Fence (to be maintained)
Erosion Control Blanket	Temporary Construction Entrance
BMP Plan Reference Number	Rock Check Dam
Straw Wattles	

CAUTION!

Numerous Utilities on Site. Contractor to verify location and elevation of all utilities prior to commencing construction.

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	29
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

Grading Limits Typ.
Grading per KCMO Land Disturbance Plans
Existing Topsoil Stockpile
Existing 84" Little Blue Valley Sewer District Interceptor
2' Easement Per Plat Bk. 6, Pg. 3
Existing Overhead Electrical Lines
Exist. Sediment Fence
City Limit Line
N. Line NW ¼ Sec. 34-48-32
E. Line NW ¼ Sec. 34-48-32
60' Stream Buffer
100' Stream Buffer
120' Stream Buffer
Proposed Floodplain
Proposed Floodway
Maintain Tree Protection Fence installed per Tree Clearing Plan
Existing 21" Sanitary Sewer
Existing 24" Sanitary Sewer
Exist. Sediment Fence
Grading Limits Typ.
Little Blue River
Existing R/W
Found ½" Rebar near MH Location
CONC. WALL
Match Line See Sht. 30

Record Drawing

100' 0' 100' 200'
SCALE : 1 INCH = 100 FEET

Erosion Control-Phase 3

Record Drawing

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

NOTE:
No fill may be placed within the existing floodway until storm line 4100 is complete.

CAUTION!
Numerous Utilities on Site. Contractor to verify location and elevation of all utilities prior to commencing construction.

Legend

- Proposed Contour
- Existing Contour
- Drainage Swale
- Geotechnical Boring Location
- Erosion Control Blanket
- BMP Plan Reference Number
- Straw Wattles
- Grading Limits
- Exist. Construction Fence for Tree Protection (to be maintained)
- Tree to be saved
- Sediment Fence
- Exist. Sediment Fence (to be maintained)
- Temporary Construction Entrance
- Rock Check Dam

~~"100.00~~ 100.10", ~~"1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

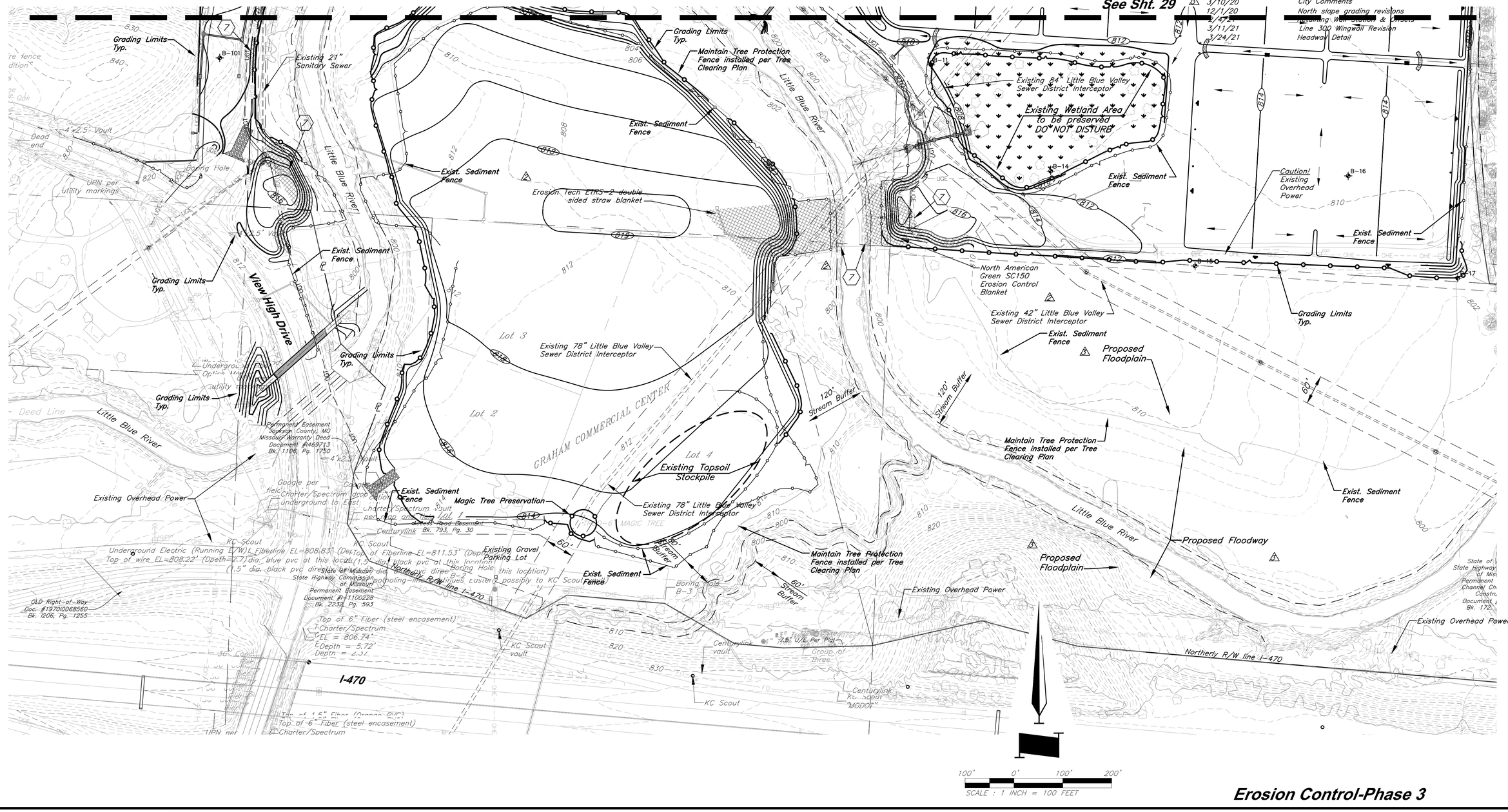
GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	30
TOTAL SHEETS	43

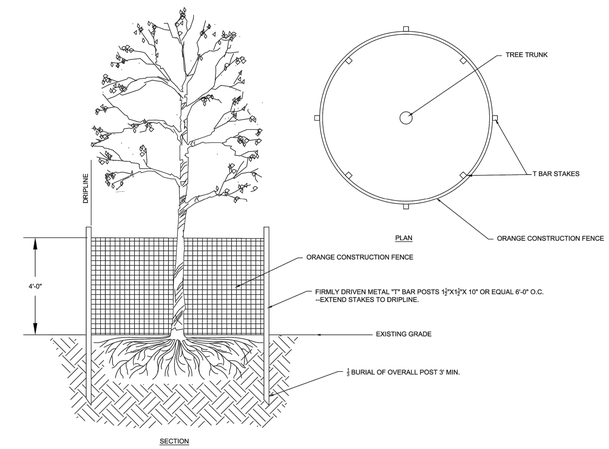
Bradley D. Burton
Professional Engineer
License No. 25862

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

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
4	12/1/20	North slope grading revisions		
5	3/11/21	Retaining Wall Number & Offsets		
6	3/24/21	Line 300 Wingwall Revision		
		Headwall Detail		



Erosion Control-Phase 3



TREE PRESERVATION

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

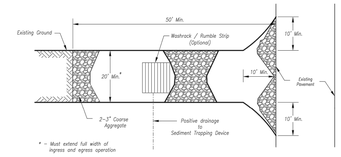
GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	TOTAL SHEETS
31	43

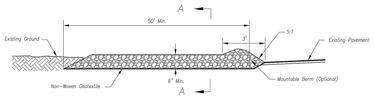
Bradley D. Burton
Professional Engineer
License No. 25862

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

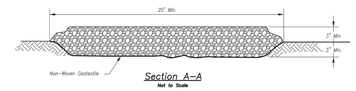
NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
2	3/10/20	City Comments		
	12/1/20	North slope grading revisions		



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 area.*
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.*

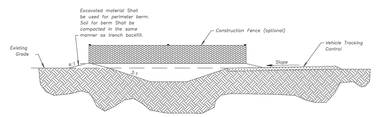
CONSTRUCTION ENTRANCE

Notes for Concrete Washout:

1. *Concrete washout areas shall be installed prior to any concrete placement on site.*
2. *Concrete washout areas shall include a flat subsurface pit sized relative to the amount of concrete to be placed on site. The slopes leading out of the subsurface pit shall be 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 in the subsurface pit shall be transported from 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.*

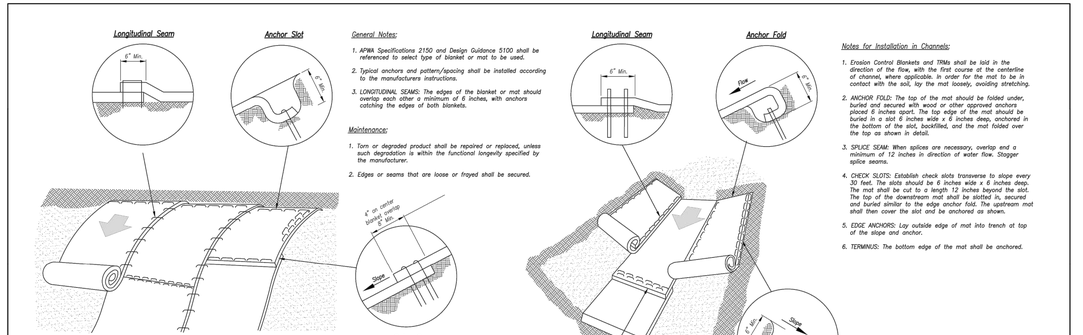


CONCRETE WASHOUT

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 APWA American Public Works Association	KANSAS CITY METRO CHAPTER
CONSTRUCTION ENTRANCE AND CONCRETE WASHOUT	STANDARD DRAWING NUMBER ESC-01
	ADOPTED: 10/24/2016

Record Drawing



Installation on Slopes

Splice Seam

Edge Anchor

General Notes:

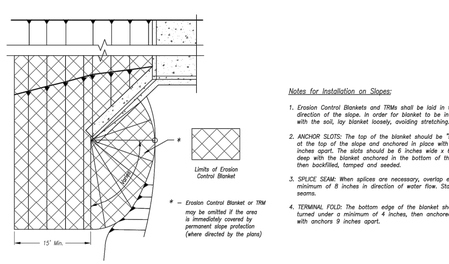
1. *APWA Specifications 2150 and Design Guidance 5100 shall be referenced to select type of blanket or mat to be used.*
2. *Typical anchors and pattern/spacing shall be installed according to the manufacturers instructions.*
3. *LONGITUDINAL SEAMS: The edges of the blanket or mat should overlap each 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.*

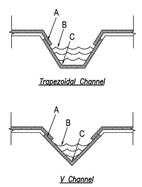
Notes for Installation in Channels:

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.*



Partial Box Culvert Plan
Not to Scale

Installation Around Culvert Slope



Critical Points:

A – Overlaps and seams;

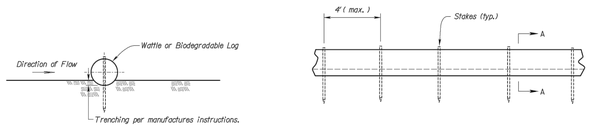
B – Projected water line;

C – Channel bottom / side slope vertices;

Installation in Channels

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

AMERICAN PUBLIC WORKS ASSOCIATION	
Kansas City Metro Chapter APWA American Public Works Association	KANSAS CITY METRO CHAPTER
EROSION CONTROL BLANKETS AND TURF REINFORMENT MATS	STANDARD DRAWING NUMBER ESC-02
	ADOPTED: 10/24/2016



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".*

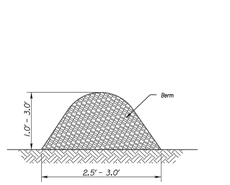


Figure 1
(Perimeter Control)

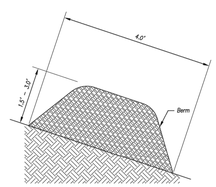


Figure 2
(Steep Slopes)

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 APWA 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

Erosion Control Details

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is solely based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	TOTAL SHEETS
32	43

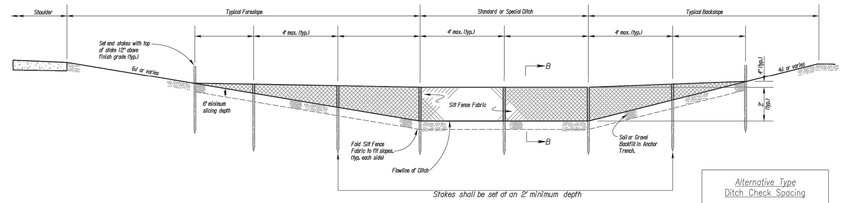
Bradley D. Burton
Professional Engineer
License No. 25862

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

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		

Notes for Silt Fence Ditch Check:

1. Stakes shall be 4' (min.) long and one of the following materials:
   a. Hardwood – 1 ¾" x 1 ¾";
   b. Southern Pine (No. 2) – 2 ⅜" x 2 ⅜";
   c. Steel U, T, L, or C Section – .95 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 at tie in points shall be a minimum of 4" higher than the center.

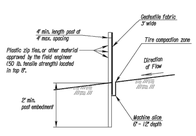


Stakes shall be set at an 2' minimum depth

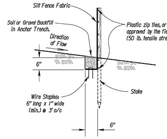
TYPICAL ELEVATION

Alternative Type Ditch Check Spacing	
Ditch Centerline Slope (%)	Spacing Interval (Feet)
1.0	200
2.0	100
3.0	65
4.0	50
5.0	40
6.0	33

Note: Use this spacing for all except Rock Ditch Checks.



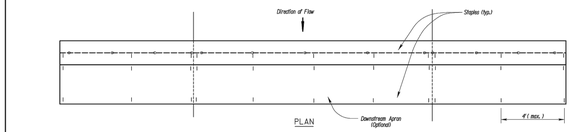
SECTION B-B



SILT FENCE DITCH CHECK
NO SCALE

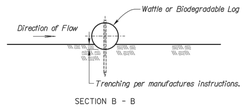
Notes for Wattles and Biodegradable Log Ditch Check:

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.



PLAN

TYPICAL ELEVATION

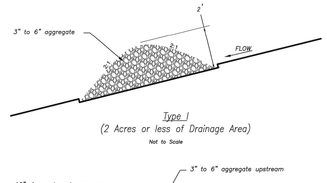


SECTION B - B

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.

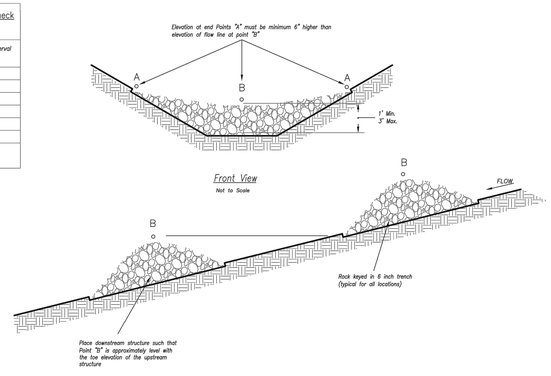
AMERICAN PUBLIC WORKS ASSOCIATION
KANSAS CITY METRO CHAPTER
SILT FENCE AND WATTLE/ BIODEGRADABLE LOG DITCH CHECKS
STANDARD DRAWING NUMBER ESC-09
ADOPTED: 10/24/2016



ROCK DITCH CHECK

Temporary Rock Ditch Check Spacing	
Ditch Centerline Slope (%)	Spacing Interval (Feet)
5.0	60
6.0	50
7.0	43
8.0	36
9.0	33
10.0	29

Note: Use this spacing only for Rock Ditch Checks.



Notes:

1. Rock check dams shall be used only for drainage areas less that 10 acres unless approved by the City Engineer.
2. Use rock checks only in situations where the ditch slope exceeds 6%.

Maintenance:

1. Remove and dispose of sediment deposits when the deposit approaches ½ the height of the ditch check.
2. Replace and reshape as necessary to maintain function and integrity of installation.

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

AMERICAN PUBLIC WORKS ASSOCIATION
KANSAS CITY METRO CHAPTER
ROCK DITCH CHECKS
STANDARD DRAWING NUMBER ESC-10
ADOPTED: 10/24/2016

Record Drawing

Erosion Control Details

~~"100.00"~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	33
TOTAL SHEETS	43

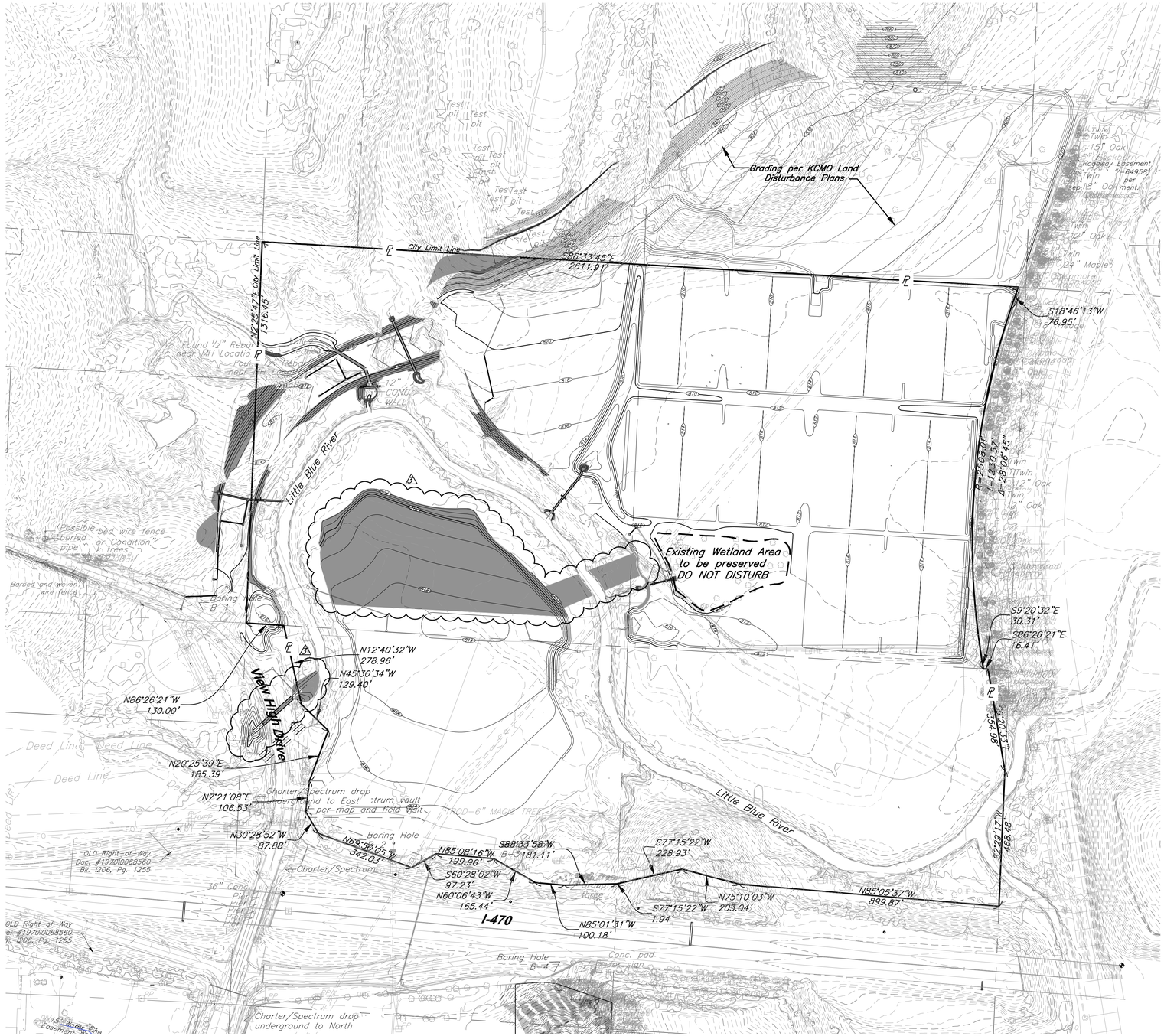
Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		



Legend

Denotes 12" of Topsoil with Permanent Seeding

NOTE:
All other disturbed areas to be temporary seeded.

Record Drawing

200' 0' 200' 400'
SCALE : 1 INCH = 200 FEET

Seeding Plan

~~"100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	TOTAL SHEETS
34	43

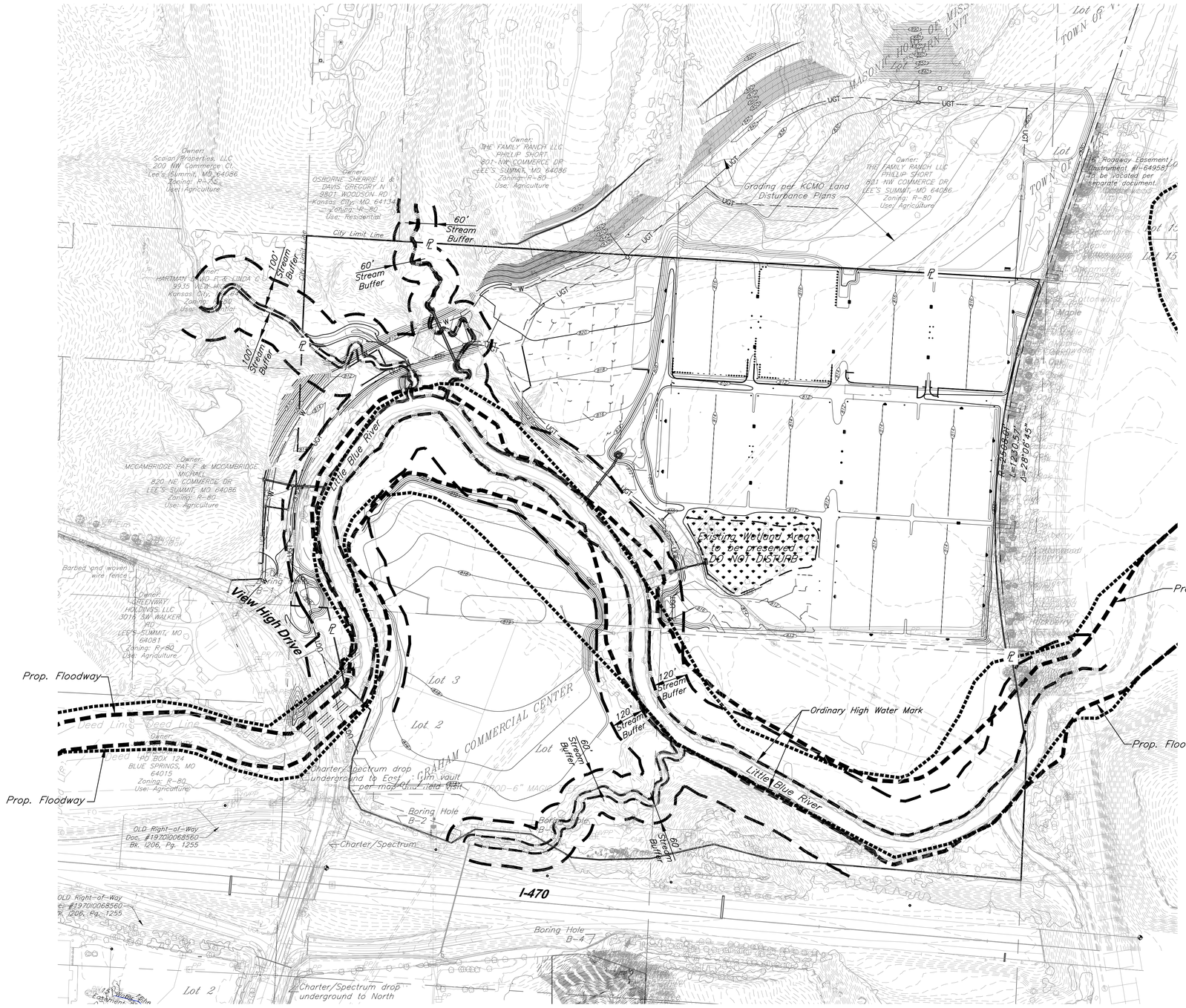
Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		



Legend

- Stream Buffer
- Existing Floodway
- Proposed Floodway
- Ordinary High Water Mark

Record Drawing

200' 0' 200' 400'
SCALE : 1 INCH = 200 FEET

Stream Buffer

~~"100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

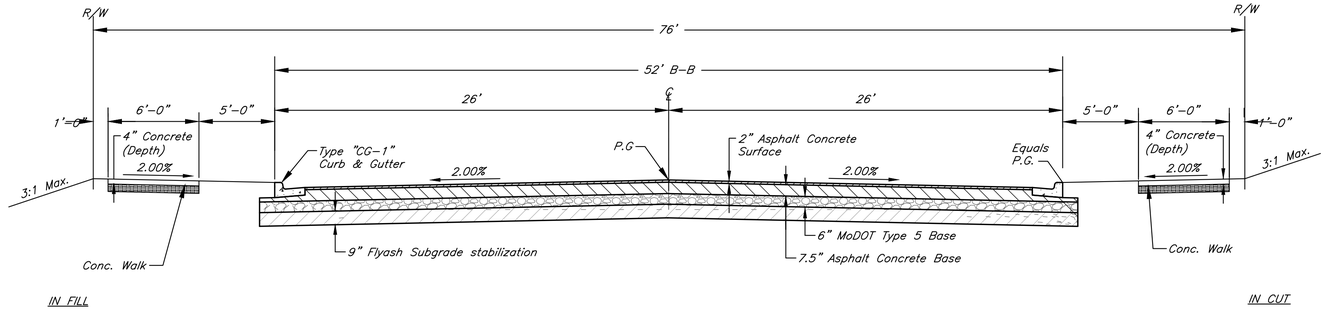
GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	TOTAL SHEETS
35	43

Bradley D. Burton
Professional Engineer
License No. 25862

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

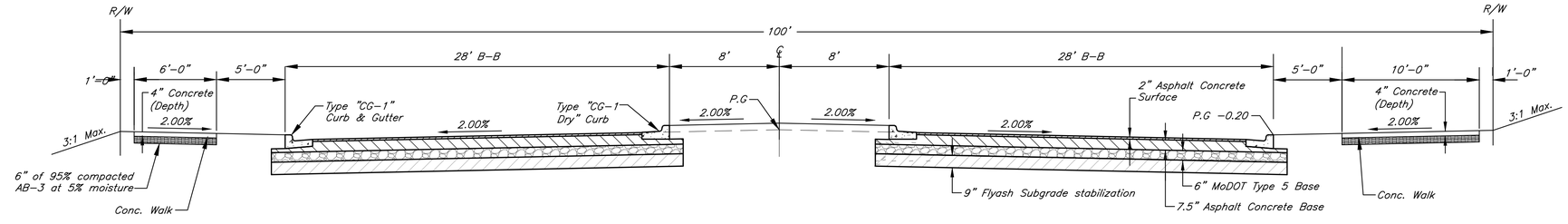
NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		



TYPICAL SECTION
VIEW HIGH DRIVE

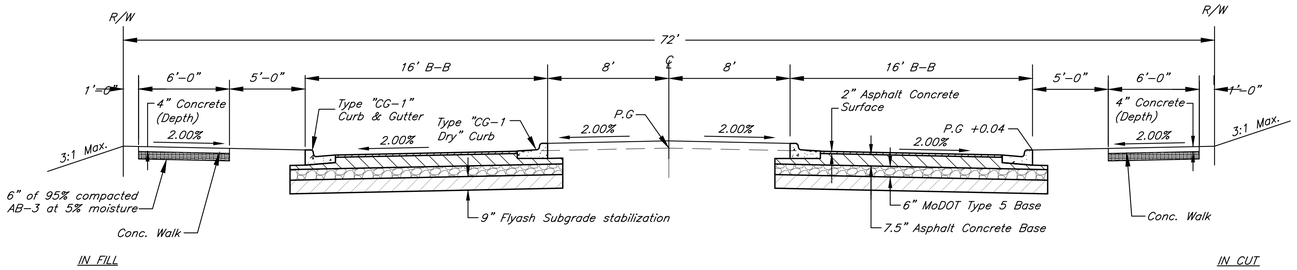
Scale: 1" = 5'

Record Drawing



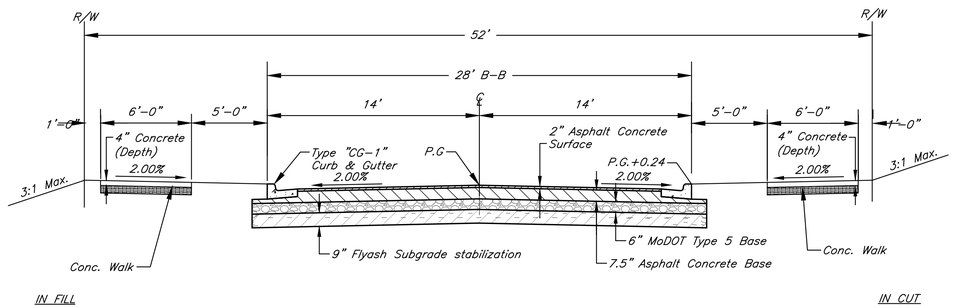
TYPICAL SECTION
VIEW HIGH PARKWAY

Scale: 1" = 5'



TYPICAL SECTION
PARAGON PARKWAY

Scale: 1" = 5'



TYPICAL SECTION
RIVER DRIVE

Scale: 1" = 5'

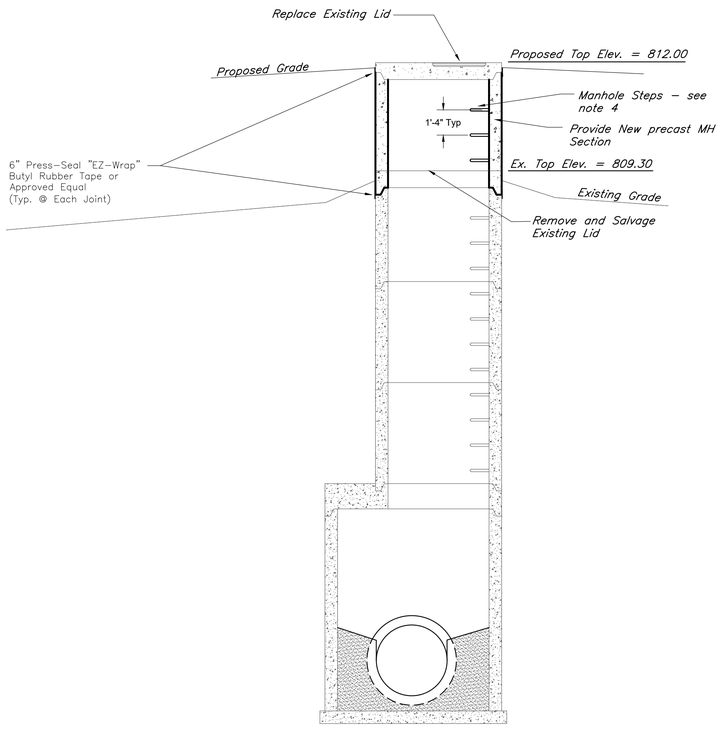
These sections provided for reference only, no street construction is proposed with this plan set

NOTE:
Road Sections shall adhere to all City of Lee's Summit, Missouri Specifications.

Typical Sections (for reference only)

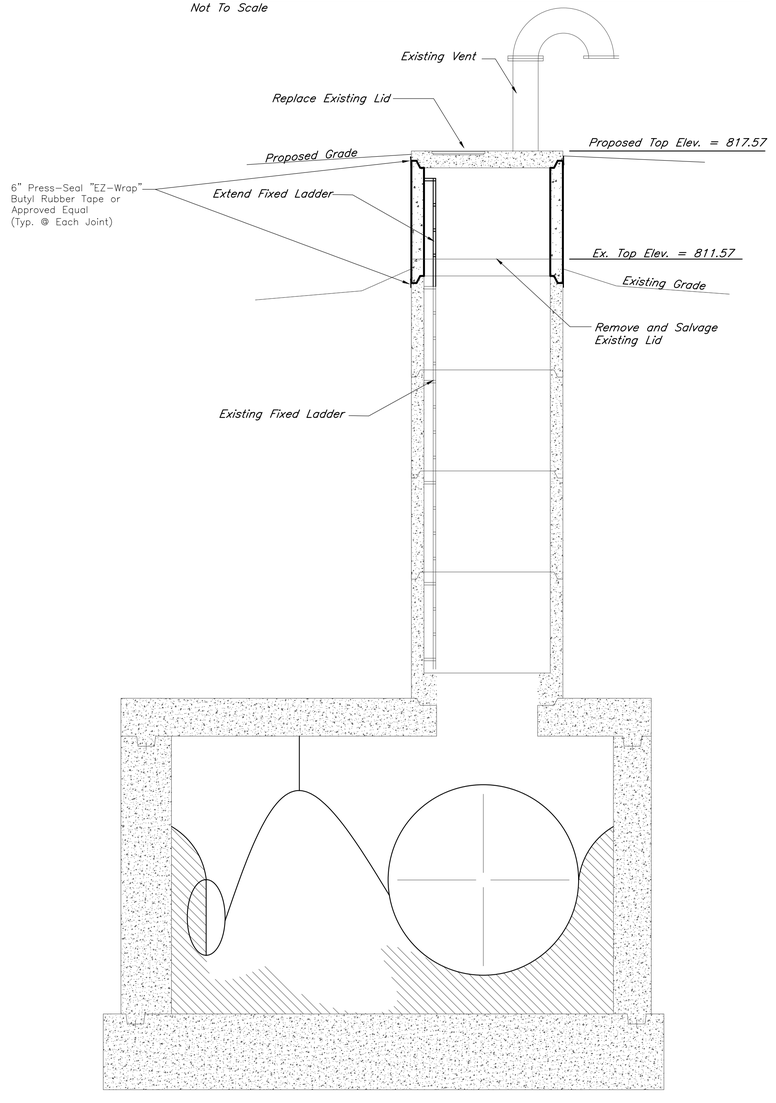
ADJUSTMENT TO EXISTING TYPE II MANHOLE (S7)

Not To Scale



ADJUSTMENT TO EXISTING JUNCTION STRUCTURE (S6)

Not To Scale



MANHOLE GENERAL NOTES:

1. All manhole rings shall be set in a minimum of two (2) rows of 3/4 to 1 inch pre-formed butyl joint sealer.
2. All manhole bases (pre-cast or poured-in-place) shallhave No. 5 reinforcing bars placed on 6" centers both ways.
3. All standard manhole rings and covers to be Deeter 1315-jcs, Neenah NF-15360009/B (frame) and NF-15360010/B (cover), or approved equal. All manhole rings and covers shown in plans to be "bolt- down" to be Clay & Bailey Manufacturing Co. No. 20140R, Neenah R-1915-F2 or approved equal. An extra payment for furnishing "bolt-down" ring and cover as shown in plans will not be made, but shall be considered as subsidiary to the item, "Standard Manhole".
4. Standard manhole steps to be steel core, plastic coated steps (M.A. Ind., Inc. No. PS1- PF, PS2-PF, or approved equal).
5. Maximum grade adjustment allowable is 8". Minimum allowable thickness for precast concrete grade adjustment ring is 4".
6. Reinforcement in all precast sections shall equal or exceed A.S.T.M. C-478 specifications.
7. Butyl material to be used at all precast sections joints. O-Rings may be used for joints below the cone section, but the cone section itself shall not have O-ring joints.
8. Concrete shall be KCMMB 4K.

~~"100.00~~ 100.10", "~~-1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CEL
DRAWN BY:	DRV
PROJECT NO.:	12720
SHEET NO.	TOTAL SHEETS
36	43

Bradley D. Burton
Professional Engineer
License No. 25862

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

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

Record Drawing

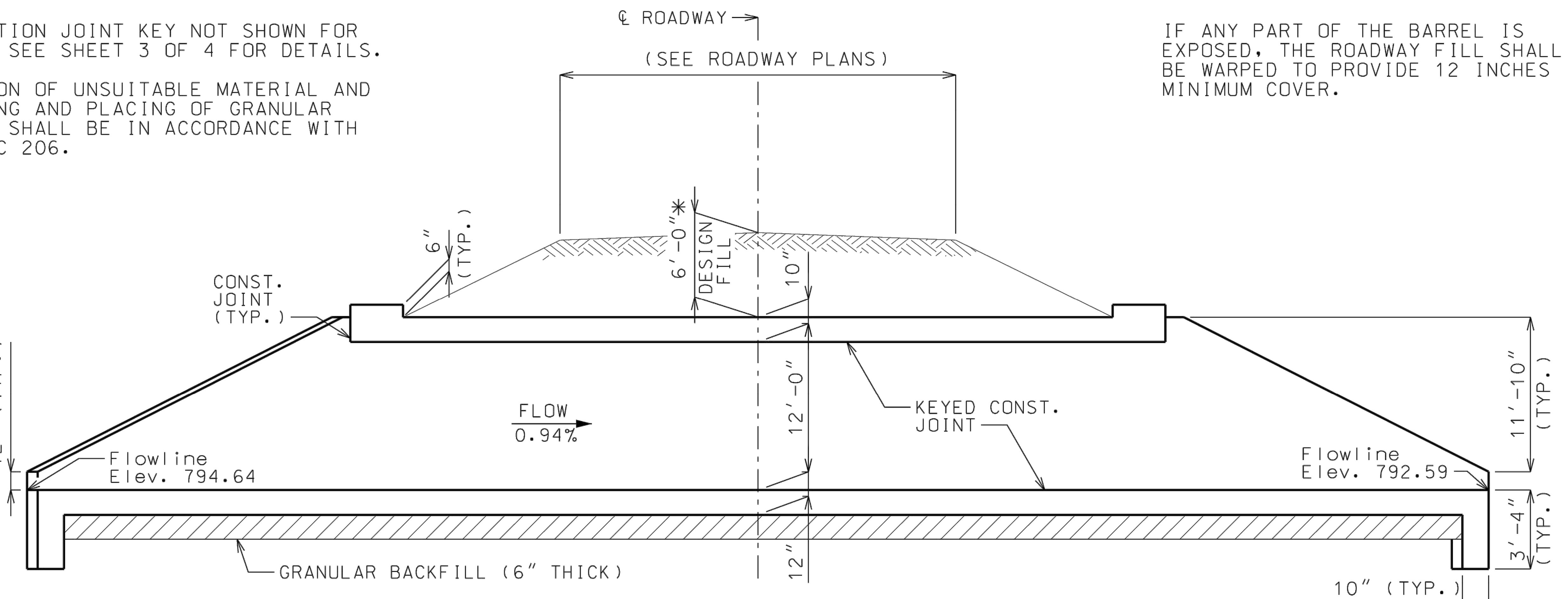
SANITARY SEWER DETAILS

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY, SEE SHEET 3 OF 4 FOR DETAILS.

EXCAVATION OF UNSUITABLE MATERIAL AND FURNISHING AND PLACING OF GRANULAR BACKFILL SHALL BE IN ACCORDANCE WITH MODOT SEC 206.

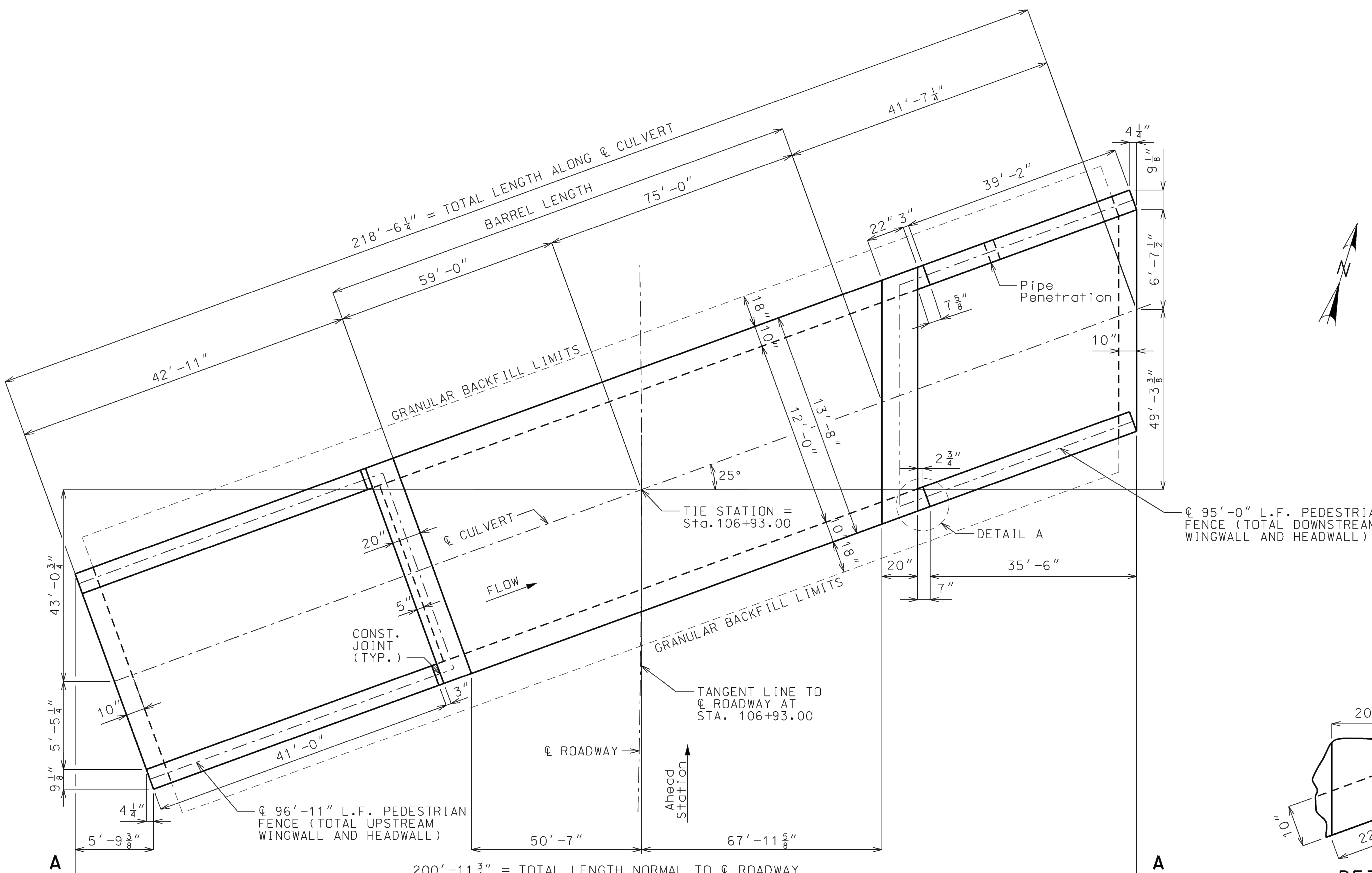
IF ANY PART OF THE BARREL IS EXPOSED, THE ROADWAY FILL SHALL BE WARPED TO PROVIDE 12 INCHES MINIMUM COVER.

∗ BOX CULVERT DESIGNED FOR 6'-0" DESIGN FILL FOR EXISTING GRADE AND 8'-0" DESIGN FILL FOR FINAL GRADE.

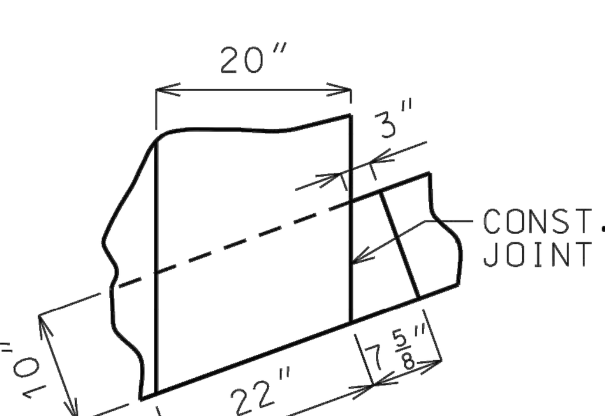


GENERAL ELEVATION A-A

CHANNEL BOTTOM SHALL BE GRADED FOR TRANSITION OF CHANNEL BED TO CULVERT OPENINGS. CHANNEL BANKS SHALL BE TAPERED TO MATCH CULVERT OPENINGS.



PLAN OF LAYOUT DIMENSIONS



DETAIL A

Record Drawing

GENERAL NOTES:

SEE MODOT SPECIFICATIONS AND STANDARD PLANS FOR ADDITIONAL INFORMATION.

DESIGN SPECIFICATIONS:
2010 AASHTO LRFD BRIDGE DESIGN SPECFICATIONS AND 2010 INTERIM REVISIONS

DESIGN LOADING:
VEHICULAR = HL-93 MINUS LANE LOAD, EARTH = 120 LB/CF
EQUIVALENT FLUID PRESSURE = 30 LB/CF (MIN.), 60 LB/CF (MAX.)

DESIGN UNIT STRESSES:
CLASS B-1 CONCRETE (BOX CULVERT) f'c = 4,000 PSI
REINFORCING STEEL (GRADE 60) fy = 60,000 PSI

MISCELLANEOUS:
FOR REINFORCEMENT DETAILS, SEE SHEET 2 OF 4. FOR SECTION DETAILS AND PIPE PENETRATION DETAILS, SEE SHEET 3 OF 4. FOR ADDITIONAL DETAILS NOT SHOWN, SEE MODOT STANDARD PLANS 703.10J AND 703.14J.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

WHEN ALTERNATE PRECAST CONCRETE BOX CULVERT SECTIONS ARE USED, THE MINIMUM DISTANCE FROM INSIDE FACE OF HEADWALLS TO PRECAST SECTIONS MEASURED ALONG THE SHORTEST WALL SHALL BE 3 FEET. REINFORCEMENT AND DIMENSIONS FOR WINGS AND HEADWALLS SHALL BE IN ACCORDANCE WITH MISSOURI STANDARD PLANS.

ALL MATERIAL, LABOR, EXCAVATION, GRANULAR BACKFILL AND EQUIPMENT REQUIRED TO CONSTRUCT THE RCB AND PEDESTRIAN FENCE SHALL BE SUBSIDIARY TO THE BID ITEM "12'x12' CONCRETE BOX CULVERT", LINEAR FOOT.

CONCRETE SINGLE 12'X12' BOX CULVERT

SHEET 1 OF 4

Note: This drawing is not to scale. Follow dimensions.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.
Date: 4/7/23
Certified by: Bradley D. Burton
Title: Senior Associate
Firm: GBA

HOLLY A. LEHMKUHL NUMBER PE-2009032976 — STATE OF MISSOURI — PROFESSIONAL ENGINEER — 02/26/20

GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	02-25-20
DESIGN BY:	HAL
DRAWN BY:	GMH
PROJECT NO.:	12720
SHEET NO.	37
TOTAL SHEETS	43

Holly A. Lehmkuhl
Professional Engineer
License No. 200932976

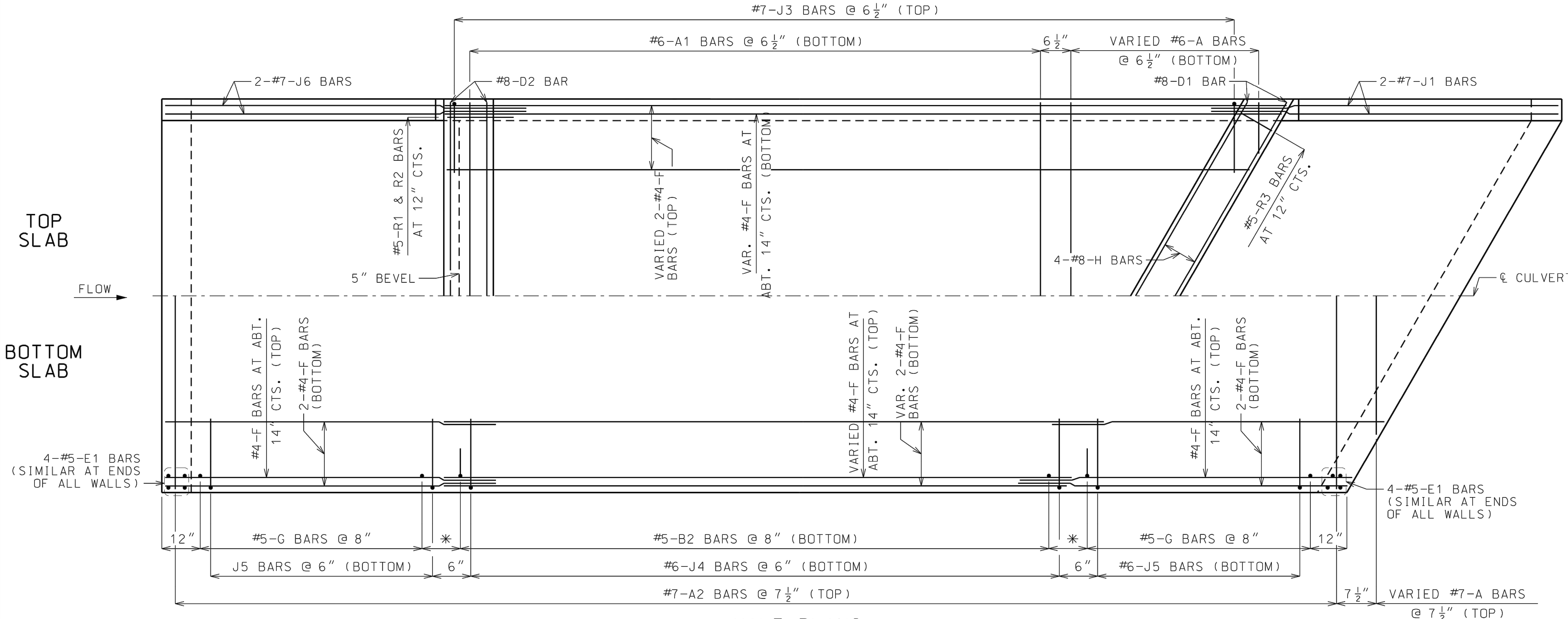
Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

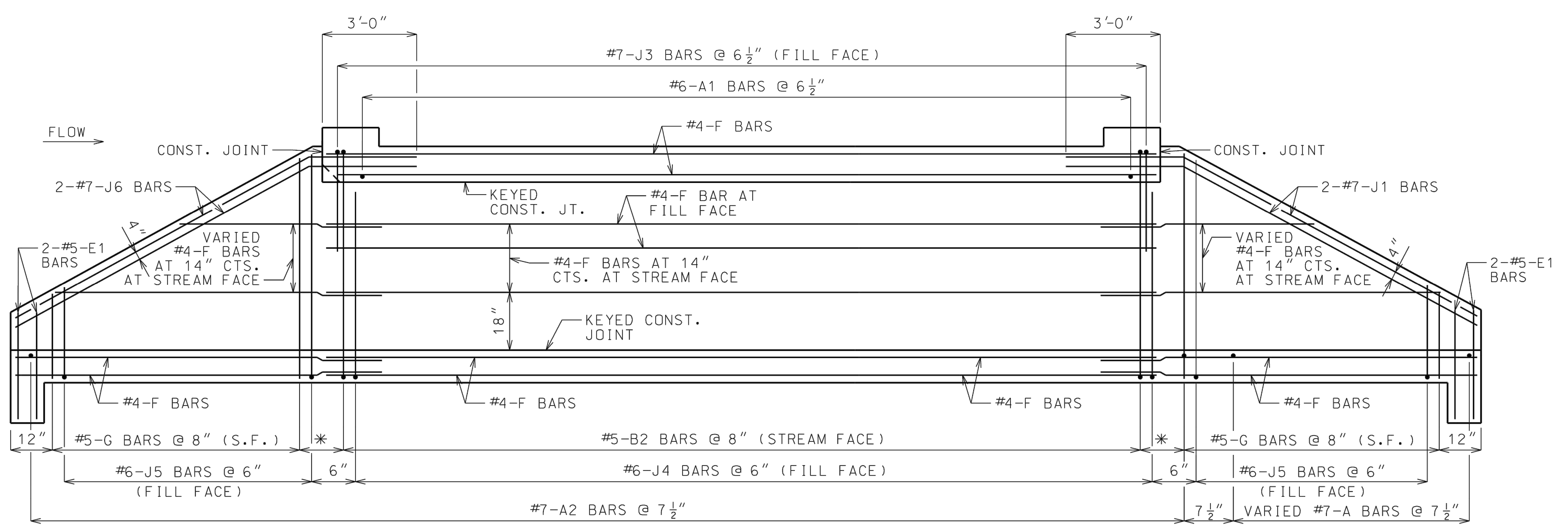
NO.	DATE	REVISIONS	BY	APPROVED
	9/2/20	City Comments		
	11/23/20	Utility Updates		
1	1/27/21	Revised Structure Size		
2	2/4/21	Retaining Wall Station & Offsets		
	2/26/21	RFI 11		
3	3/11/21	RFI 12		
4	3/11/21	Revised Line 400		
5	4/8/21	Utility Updates		
6	5/25/21	Paver Revision		
7	6/15/21	Grading Updates		
8	6/24/21	Wiring Diagram Updates		
9	9/30/21	RFI 15—Irrigation Sleeves		
10	9/30/22	Record Drawings		
11	4/7/23	Record Drawings		

As—Built: "~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8—inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as—built" information. All other data is as designed and has not been field verified.



HALF PLANS

HALF PLANS ARE SYMMETRICAL ABOUT ℄ CULVERT.



ELEVATION

J1 AND J6 BARS MAY BE BENT IN FIELD OR SHOP.

✳ VARIES. 12" MAX

Note: This drawing is not to scale. Follow dimensions.

Record Drawing

GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 4. FOR INFORMATION NOT SHOWN, SEE MODOT STANDARD PLAN 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN HALF PLANS AND ELEVATION. SEE SHEET 3 OF 4 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1½".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.
Date: 4/7/23
Certified by: Bradley D. Burton
Title: Senior Associate
Firm: GBA

STATE OF MISSOURI — HOLLY A. LEHMKUHL — NUMBER PE-2009032976 — PROFESSIONAL ENGINEER — 02/26/20

GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

Holly A. Lehmkuhl
Professional Engineer
License No. 200932976

DATE:	02-25-20
DESIGN BY:	HAL
DRAWN BY:	GMH
PROJECT NO.:	12720
SHEET NO.	38
TOTAL SHEETS	43

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

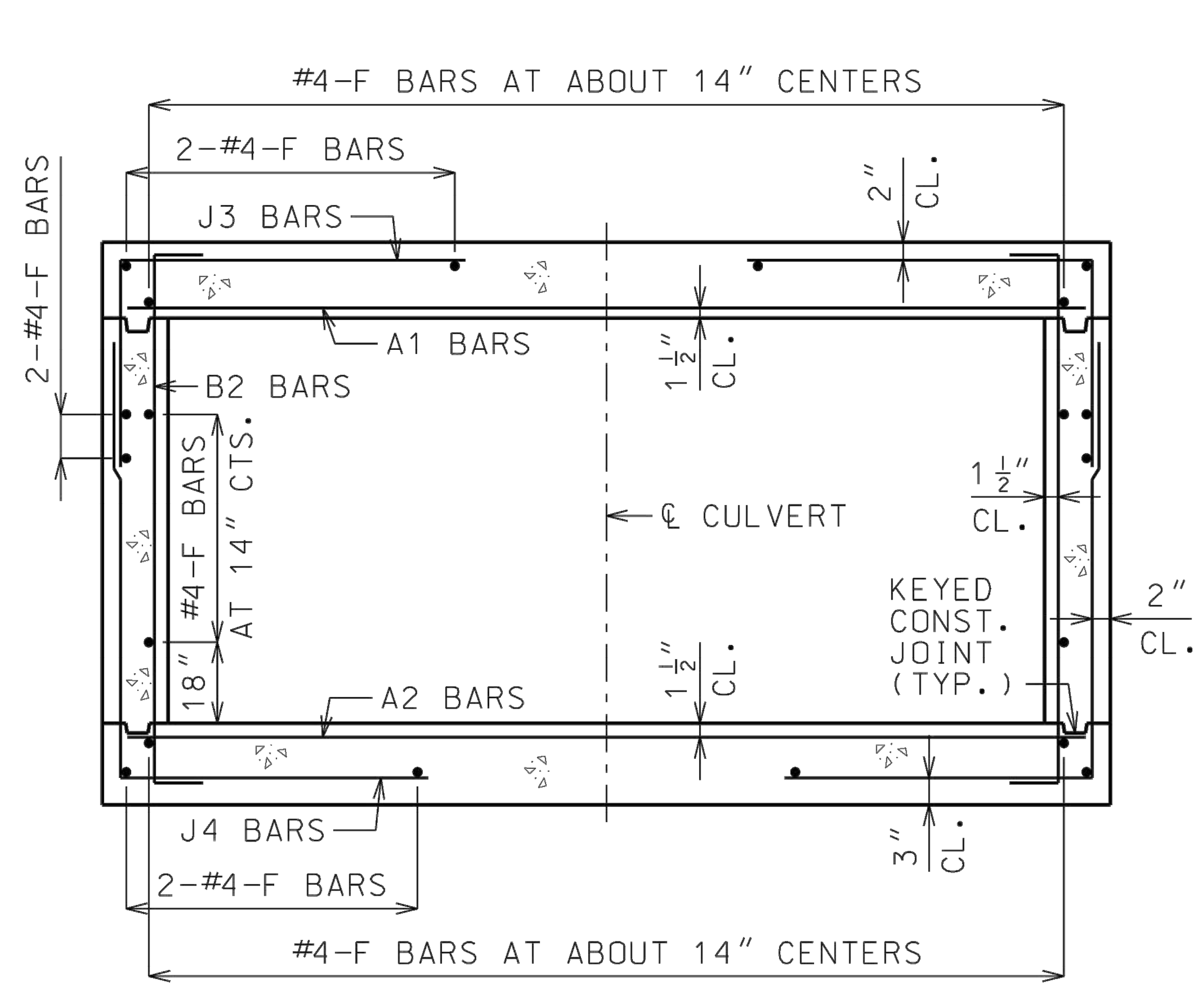
NO.	DATE	REVISIONS	BY	APPROVED
	9/2/20	City Comments		
	11/23/20	Utility Updates		
1	1/27/21	Revised Structure Size		
2	2/4/21	Retaining Wall Station & Offsets		
	2/26/21	RFI 11		
3	3/11/21	RFI 12		
4	3/11/21	Revised Line 400		
5	4/8/21	Utility Updates		
6	5/25/21	Paver Revision		
7	6/15/21	Grading Updates		
8	6/24/21	Wiring Diagram Updates		
9	9/30/21	RFI 15-Irrigation Sleeves		
10	9/30/22	Record Drawings		
11	4/7/23	Record Drawings		

As-Built: "~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

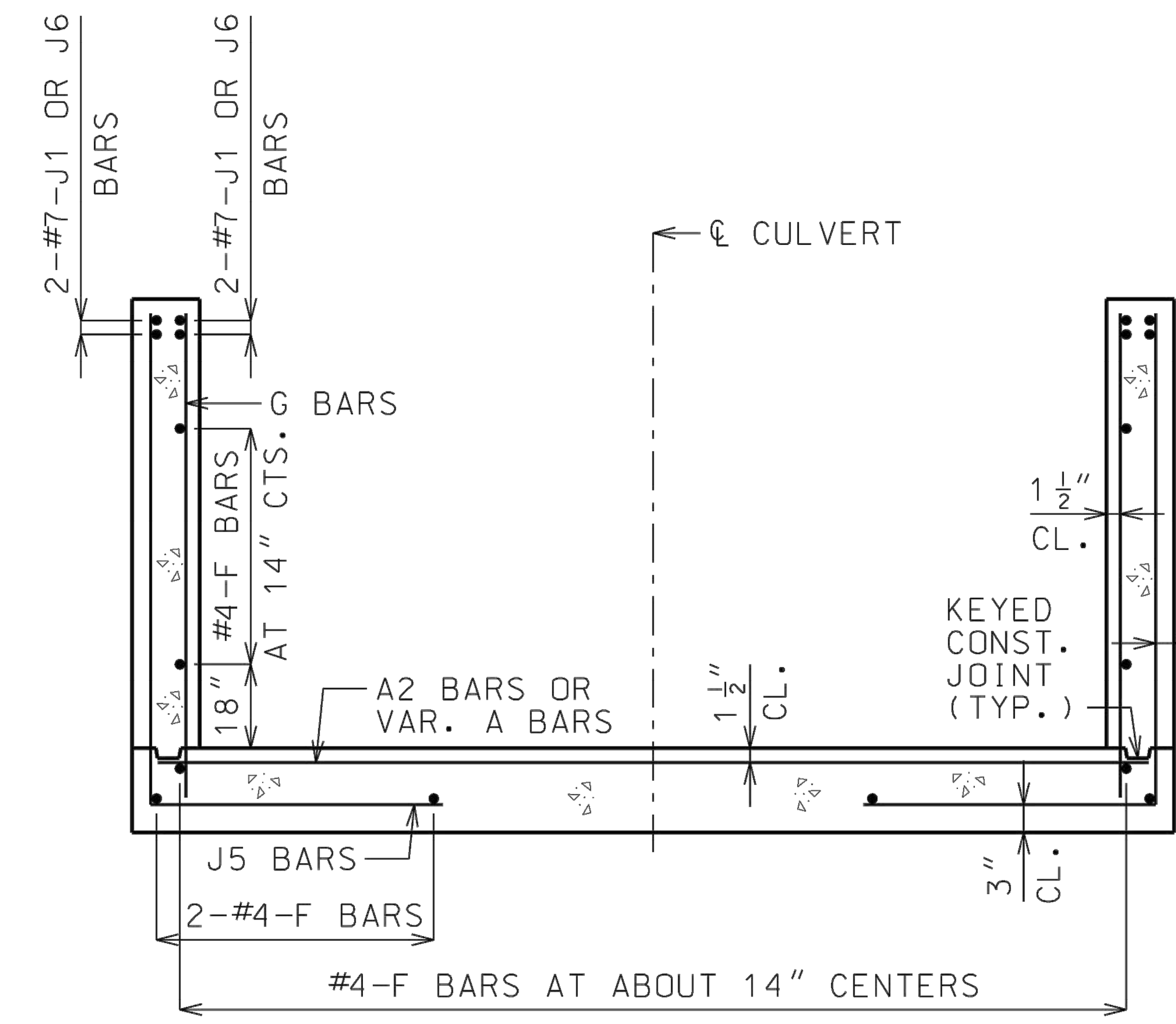
CONCRETE SINGLE 12'X12' BOX CULVERT

SHEET 2 OF 4

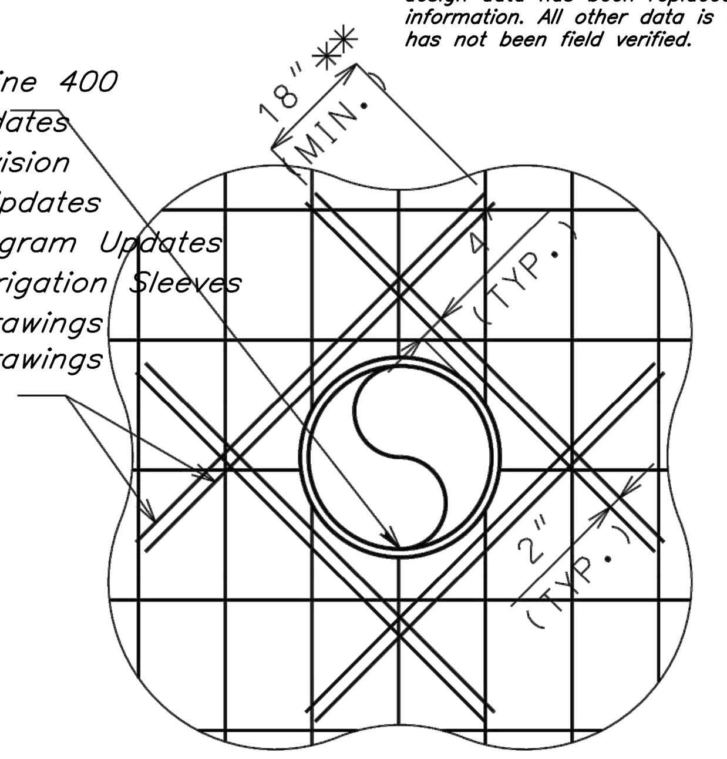
Record Drawing



BARREL REINFORCEMENT
SYMMETRICAL ABOUT AND NORMAL TO ℄ CULVERT



UPSTREAM AND DOWNSTREAM WINGS REINFORCEMENT



ADDITIONAL REINFORCING FOR PIPE PENETRATIONS INTO RCB WINGWALL

Note:
CUT HORIZ. & VERT. REINF. TO ALLOW FOR PIPE OPENING.

INSTALL TREATED PLYWOOD BOARD OVER 18" END SECTION UPON COMPLETION OF RCB CONSTRUCTION.

** FIELD BEND AS NECESSARY TO MAINTAIN 1½" CLEAR.

PIPE PENETRATION LOCATION	
STATION	107+34.41
FLOWLINE	El. 798.5
OFFSET	82.93' Rt.
PIPE SIZE	18"

GENERAL NOTES:

J5 BARS ARE #6 @ 6"

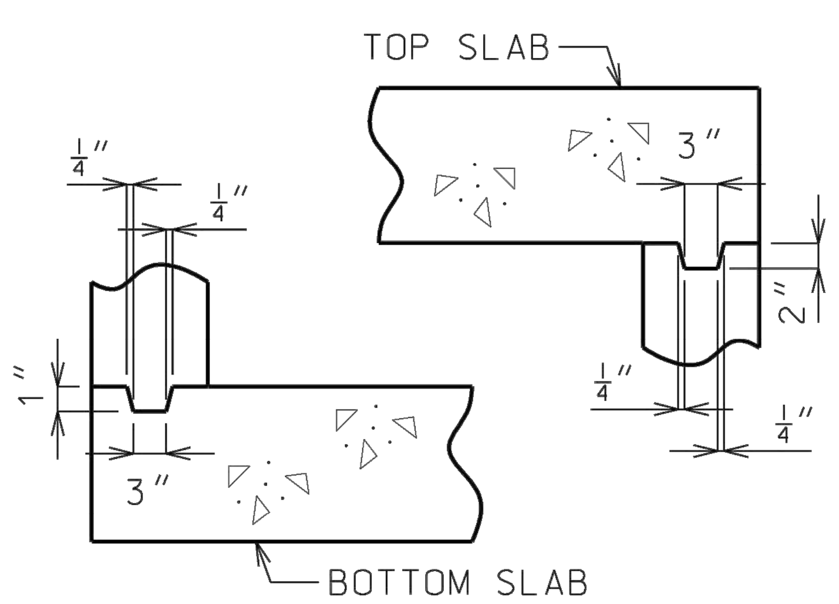
BARREL AND WINGS SECTIONS ARE SYMMETRICAL ABOUT AND NORMAL TO ℄ CULVERT, EXCEPT AS SHOWN. HEADWALL SECTIONS ARE NORMAL TO LONG DIRECTION OF HEADWALL.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

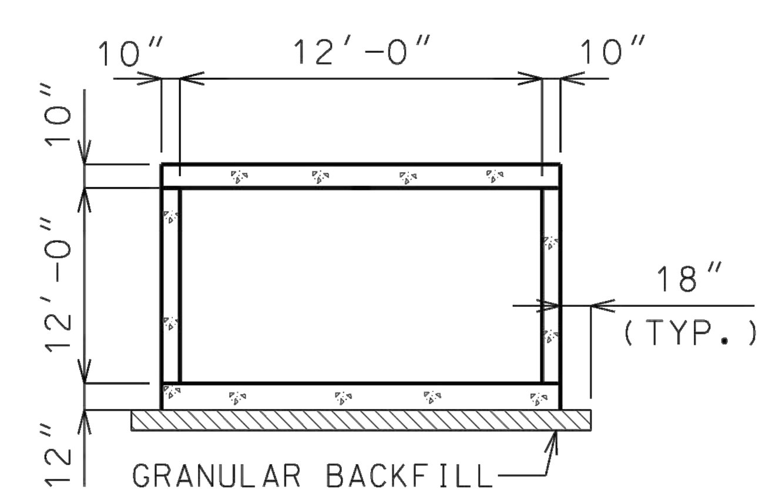
MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1½".

SEE MODOT STANDARD PLAN 703.17 FOR REINFORCEMENT LENGTHS USING 12'X12' BOX CULVERT DIMENSIONS WITH A DESIGN FILL OF 6'-0".

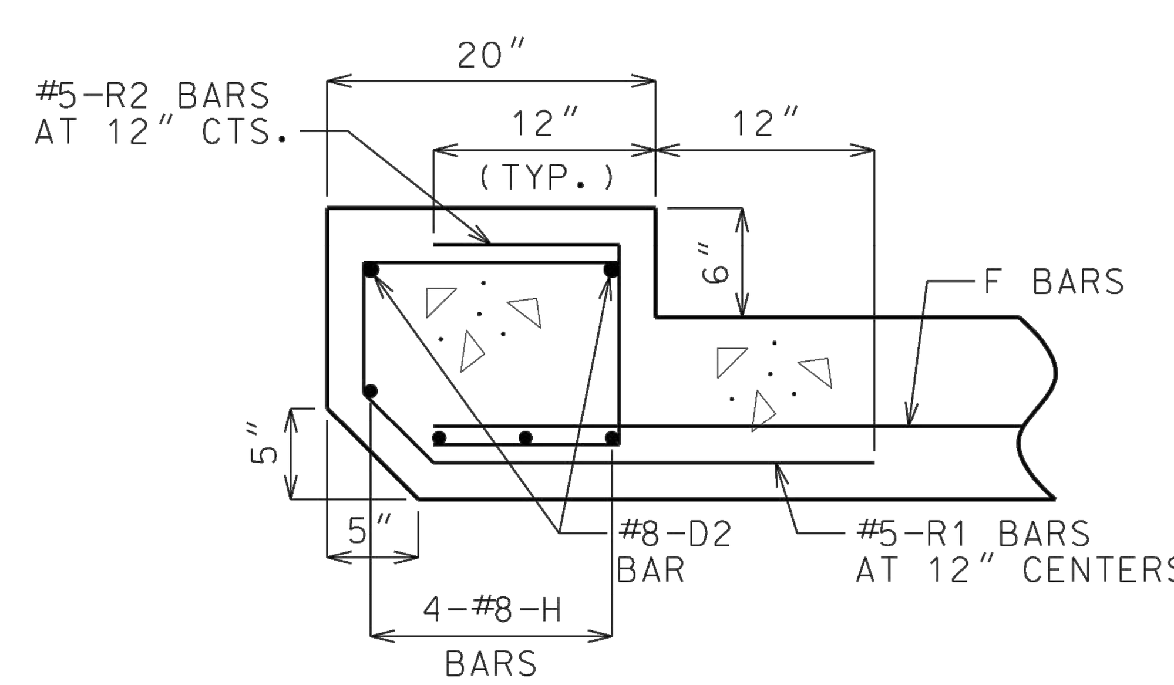
ALL MATERIAL, LABOR, EXCAVATION AND EQUIPMENT REQUIRED TO CONSTRUCT THE PIPE PENETRATION SHALL BE SUBSIDIARY TO THE BID ITEM "12'X12' CONCRETE BOX CULVERT", LINEAR FOOT.



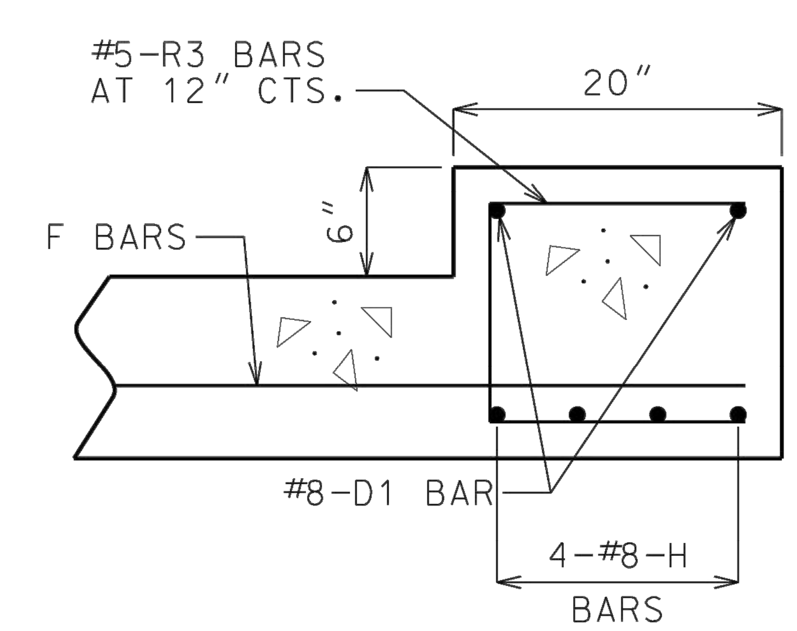
KEYED CONSTRUCTION JOINT



GRANULAR BACKFILL LIMITS AND MEMBER DIMENSIONS



UPSTREAM HEADWALL REINFORCEMENT



DOWNSTREAM HEADWALL REINFORCEMENT

Note: This drawing is not to scale. Follow dimensions.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.
Date: 4/7/23
Certified by: Bradley D. Burton
Title: Senior Associate
Firm: GBA

STATE OF MISSOURI — HOLLY A. LEHMKUHL — NUMBER PE-2009032976 — PROFESSIONAL ENGINEER — 02/26/20

Holly A. Lehmkuhl
Professional Engineer
License No. 200932976

GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	02-25-20
DESIGN BY:	HAL
DRAWN BY:	GMH
PROJECT NO.:	12720
SHEET NO.	TOTAL SHEETS
39	43

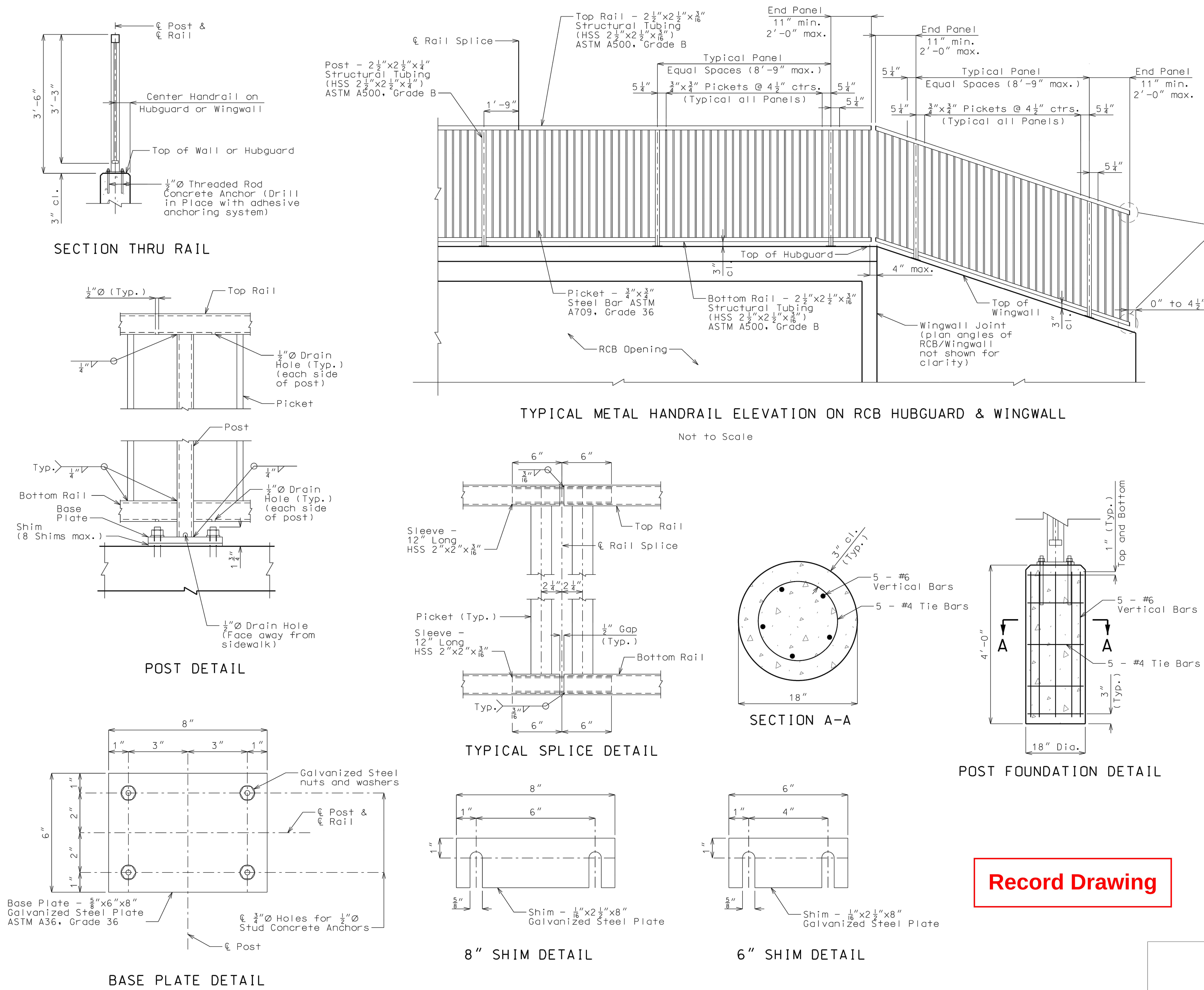
Storm Sewer Improvements and Mass Grading
Paragon Star Development
Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	9/2/20	City Comments		
	11/23/20	Utility Updates		
1	1/27/21	Revised Structure Size		
2	2/4/21	Retaining Wall Station & Offsets		
	2/26/21	RFI 11		
3	3/11/21	RFI 12		
4	3/11/21	Revised Line 400		
5	4/8/21	Utility Updates		
6	5/25/21	Paver Revision		
7	6/15/21	Grading Updates		
8	6/24/21	Wiring Diagram Updates		
9	9/30/21	RFI 15-Irrigation Sleeves		
10	9/30/22	Record Drawings		
11	4/7/23	Record Drawings		

As-Built: "~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

CONCRETE SINGLE 12'X12' BOX CULVERT

SHEET 3 OF 4



PEDESTRIAN FENCE DETAILS

Note: This drawing is not to scale. Follow dimensions.

HANDRAIL NOTES:

Construction shall be per 2019 Missouri Standard Specifications for Highway Construction.

Galvanize all rail, rail splice, posts, pickets, shims and base plates after fabrication in accordance with the requirements of ASTM A123. No field galvanizing will be allowed. Handrails shall be protected from any damage to the galvanized surfaces. Handrails delivered to the job site with damaged galvanizing shall be returned to the manufacturer to be re-galvanized.

Set rails parallel to the top of the wall. Set posts and pickets vertical in both planes of the handrail. Top of handrail elevations to match at hubguard - wingwall interface. Shims may be used between concrete and base plate of steel posts (½" max. shim without prior City approval).

Grind smooth all top and bottom rail-to-post welded connections.

Field welding is not permitted.

The Contractor shall submit shop drawings to the Engineer for approval prior to fabrication of the handrail. Field verify as-built dimensions and elevations of hubguards or wingwalls prior to fabrication of handrail. Post spacing will be reviewed during the shop drawing review period.

Fabricate handrail in units to include a minimum of one and a maximum of three panels. The maximum length of an individual handrail unit shall be 30'-0"

Attach top rail members to at least two posts. Locate center of rail splices 1'-9" from centerline of post unless shown otherwise.

The threaded rod concrete anchors shall be galvanized and provide a minimum pullout strength of 8,000 pounds on 4,000 psi concrete. Length of embedment into concrete shall conform to manufacturer's recommendations. After the holes are drilled, remove all loose material by using a wire brush to free the dust from the side of the hole and then vacuuming to remove material and dust. Place epoxy capsule system in the hole and insert the threaded rod in accordance with the manufacturer's directions.

All tools, materials, labor and incidentals necessary to complete the work for the handrail are subsidiary to the bid item "Reinforced Concrete Box Culvert (12'x12')", lump sum.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/7/23

Certified by: Bradley D. Burton

Title: Senior Associate

Firm: GBA

HOLLY A. LEHMKUHL NUMBER PE-2009032976 — STATE OF MISSOURI PROFESSIONAL ENGINEER — 02/26/20

Holly A. Lehmkuhl
Professional Engineer
License No. 200932976

GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	02-25-20
DESIGN BY:	HAL
DRAWN BY:	GMH
PROJECT NO.:	12720
SHEET NO.	TOTAL SHEETS
40	43

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	9/2/20	City Comments		
	11/23/20	Utility Updates		
1	1/27/21	Revised Structure Size		
2	2/4/21	Retaining Wall Station & Offsets		
	2/26/21	RFI 11		
3	3/11/21	RFI 12		
4	3/11/21	Revised Line 400		
5	4/8/21	Utility Updates		
6	5/25/21	Paver Revision		
7	6/15/21	Grading Updates		
8	6/24/21	Wiring Diagram Updates		
9	9/30/21	RFI 15-Irrigation Sleeves		
10	9/30/22	Record Drawings		
11	4/7/23	Record Drawings		

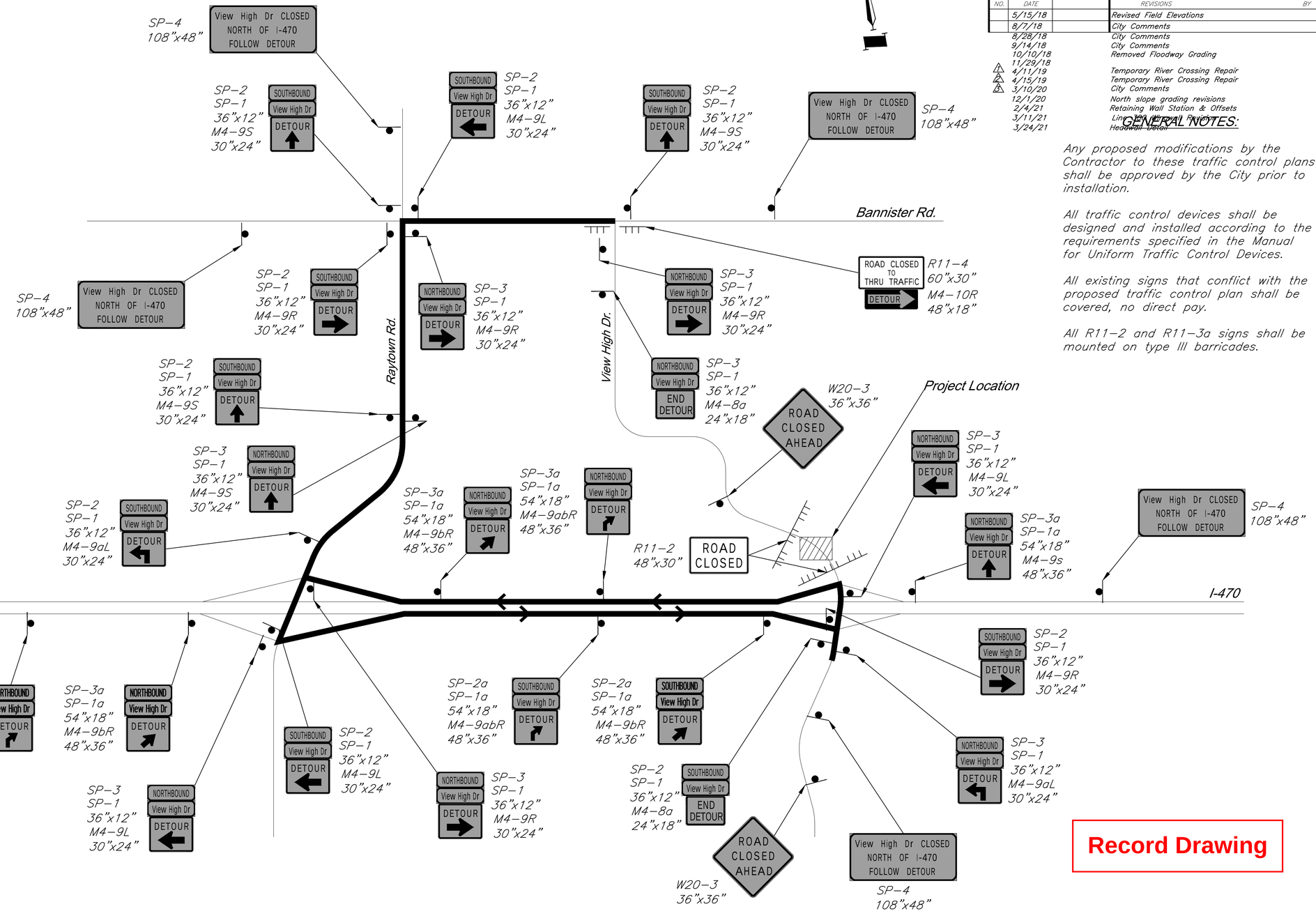
As-Built: "~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

CONCRETE SINGLE 12'X12' BOX CULVERT

SHEET 4 OF 4

LEGEND

- Construction Area
- Temporary Construction Sign
- Type III Barricade
- ADA–Compliant Type II Barricade
- Channelizer
- Arrow Display



Record Drawing

Traffic Control Detour

"~~100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CMN
DRAWN BY:	CMN
PROJECT NO.:	12720
SHEET NO.	41
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

Paragon Star Development

Lee's Summit, Missouri

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Limits of Mass Grading		
	3/24/21	Hedgewall Detail		

GENERAL NOTES:

Any proposed modifications by the Contractor to these traffic control plans shall be approved by the City prior to installation.

All traffic control devices shall be designed and installed according to the requirements specified in the Manual for Uniform Traffic Control Devices.

All existing signs that conflict with the proposed traffic control plan shall be covered, no direct pay.

All R11–2 and R11–3a signs shall be mounted on type III barricades.

~~"100.00~~ 100.10", ~~"1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is soley based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CMN
DRAWN BY:	CMN
PROJECT NO.:	12720
SHEET NO.	42
TOTAL SHEETS	43

Bradley D. Burton
Professional Engineer
License No. 25862

Storm Sewer Improvements and Mass Grading

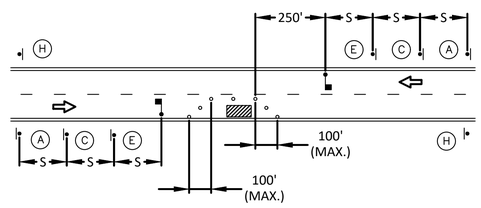
Paragon Star Development

Lee's Summit, Missouri

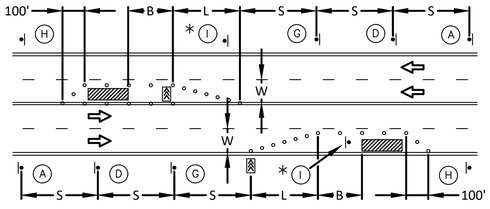
NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

SYMBOL LEGEND

- WORK AREA
- SIGN
- BARRICADE
- DIRECTION OF TRAVEL
- CHANNELIZER
- ARROW PANEL
- FLAGGER

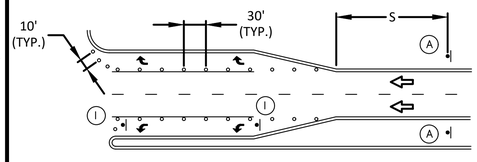


LANE CLOSURE - TWO LANE STREET



LANE CLOSURE - FOUR LANE STREET

* INSTALL SIGNS EVERY 200 FEET THROUGHOUT THE CLOSED LANE OR AS NEEDED



TURN LANE CLOSURE

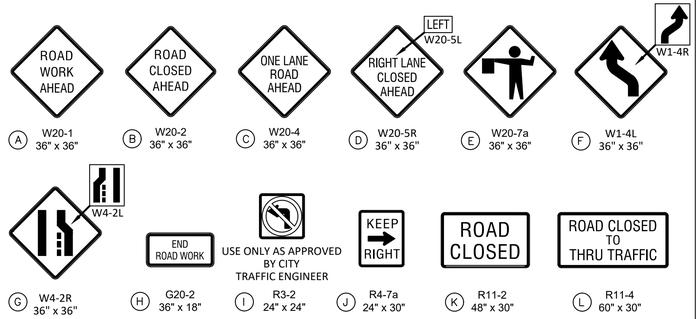
SIGN SPACING "S"	
SPEED LIMIT (MPH)	SPACING (FEET)
25	100
30-35	250
≥ 40	350

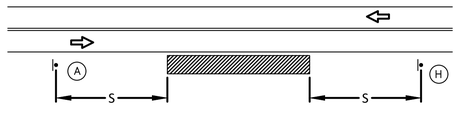
TAPER DIMENSIONS (FEET)				
SPEED LIMIT (MPH)	MINIMUM TAPER LENGTH "L", PER LANE WIDTH "W"			MINIMUM NUMBER OF CHANNELIZERS
	10	11	12	
25	105	115	125	6
30	150	165	180	7
35	205	225	245	8
40	270	295	320	9
45	450	495	540	13

GUIDELINES FOR LENGTH OF LONGITUDINAL BUFFER SPACE "B"	
SPEED LIMIT (MPH)	LENGTH (FEET)
25	35
30	55
35	85
40	120
45	170

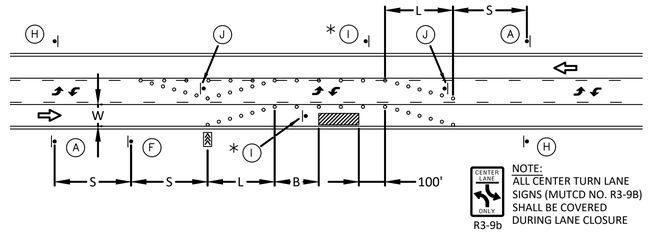
MAXIMUM CHANNELIZER SPACING		
SPEED LIMIT (MPH)	WITHIN TAPER (FEET)	OUTSIDE TAPER (FEET)
25	25	50
30	30	60
35	35	70
40	40	80
45	45	90

SIGN LEGEND





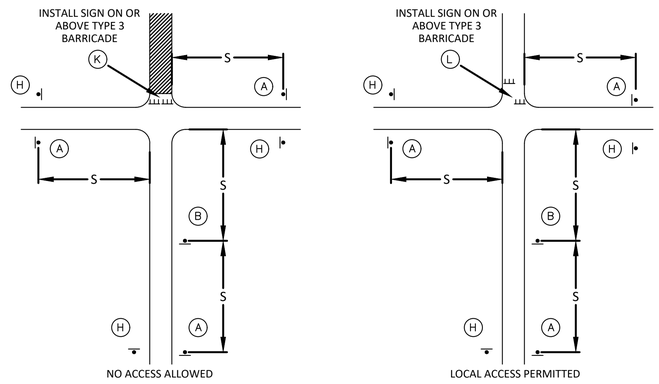
TYPICAL SIGNING FOR WORK ADJACENT TO THE STREET



NOTE:
ALL CENTER TURN LANE SIGNS (MUTCD NO. R3-9B) SHALL BE COVERED DURING LANE CLOSURE

LANE CLOSURE - THREE LANE STREET

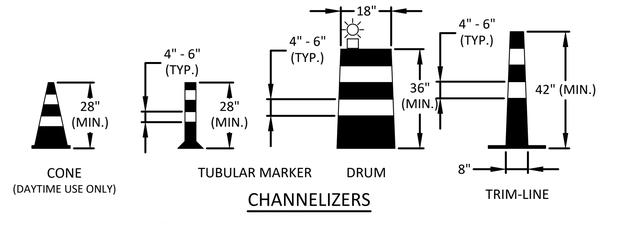
* INSTALL SIGNS EVERY 200 FEET THROUGHOUT THE CLOSED LANE OR AS NEEDED



TYPICAL STREET CLOSURE

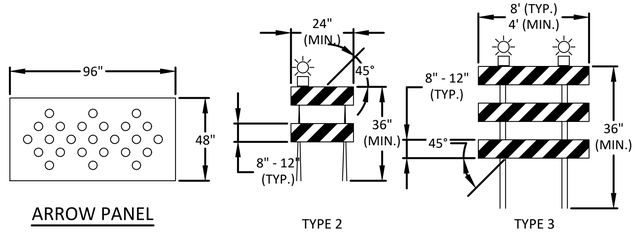
GENERAL NOTES:

1. ALL SIGNS, BARRICADES, CHANNELIZERS, MARKINGS AND OTHER TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
2. ALL TRAFFIC CONTROL DEVICES SHALL BE STANDARD IN SIZE, SHAPE, COLOR, AND MESSAGE, IN GOOD CONDITION, AND RETRO-REFLECTORIZED. ALL SIGNS SHALL BE SECURELY MOUNTED WITH HEIGHT AND LATERAL LOCATION AS DESCRIBED IN THE MUTCD.
3. WARNING LIGHTS SHALL BE USED ON BARRICADES IN PLACE AT NIGHT AND ON WARNING SIGNS WHICH ALERT DRIVERS ABOUT A CHANGE IN ALIGNMENT, TRAFFIC CONTROL, LANE CLOSURE, OR ROAD CLOSURE.
4. FLAGGERS SHALL BE USED WHERE INDICATED ON THE PLANS, WHERE CONSTRUCTION VEHICLES INTERACT WITH NORMAL TRAFFIC, OR WHERE CONSTRUCTION ACTIVITIES IMPOSE A RESTRICTION ON TRAFFIC, AS DIRECTED BY THE CITY TRAFFIC ENGINEER. WHERE FLAGGERS ARE USED, ADVANCE SIGNING SHALL BE ERECTED AS SHOWN IN THE DETAILS OR AS SPECIFIED IN THE MUTCD. FLAGGERS SHALL MEET THE REQUIREMENTS IN THE MUTCD IN REGARD TO CHARACTER, TRAINING, ATTIRE, AND BEHAVIOR.
5. TRIM-LINES ARE THE CITY'S PREFERRED CHANNELIZING DEVICE. CONES MAY NOT BE USED AT NIGHTTIME.
6. TRAFFIC CONTROL DEVICES NOT IN USE OR NOT APPLICABLE SHALL BE EITHER COVERED OR REMOVED FROM THE WORK AREA.
7. THE CONTRACTOR SHALL USE BARRICADES, STREET PLATES, OR FENCING AS NEEDED TO EFFECTIVELY SHIELD PEDESTRIAN AND VEHICULAR TRAFFIC FROM EXPOSED OBJECTS, EXCAVATIONS, AND CONSTRUCTION ACTIVITIES.
8. ACCESS SHALL BE MAINTAINED TO ALL DRIVEWAYS AND SIDE STREETS UNLESS NOTED OTHERWISE ON THE PLANS.
9. NO STREET SHALL BE CLOSED WITHOUT THE APPROVAL OF THE CITY TRAFFIC ENGINEER. THE CONTRACTOR SHALL NOTIFY THE CITY TRAFFIC ENGINEER AT LEAST 7 DAYS IN ADVANCE OF ANY STREET CLOSURE. IF A DETOUR ROUTE AROUND THE CLOSURE IS TO BE PROVIDED, ALL DETOUR SIGNING SHALL BE AS SHOWN ON A PLAN APPROVED BY THE CITY TRAFFIC ENGINEER.
10. CONSTRUCTION VEHICLES PARKED ALONG STREETS SHALL BE LOCATED WITHIN THE WORK AREA (TRAFFIC CONTROL) OR WHERE OTHERWISE NORMALLY PERMITTED. CONSTRUCTION MATERIALS, INCLUDING TRAFFIC CONTROL AND VEHICLES SHALL NOT RESTRICT SIGHT DISTANCE FOR VEHICLES EXITING AT STREETS OR DRIVES.
11. CONSTRUCTION MATERIALS SHALL BE KEPT OFF OF SIDEWALKS, CONSOLIDATED IN ONE LOCATION WITHIN CITY RIGHT-OF-WAY, AND REMOVED DAILY UNLESS OTHERWISE APPROVED BY THE INSPECTOR. DIRT, MUD, AND OTHER CONSTRUCTION DEBRIS ON STREETS AND SIDEWALKS SHALL BE REMOVED IMMEDIATELY.
12. THE CONTRACTOR SHALL NOT PERFORM ANY WORK THAT WILL RESTRICT VEHICULAR TRAFFIC IN ANY WAY BETWEEN THE HOURS OF 7:00 A.M. AND 9:00 A.M. OR 4:00 P.M. AND 6:00 P.M. MONDAY THROUGH FRIDAY UNLESS OTHERWISE INDICATED IN THE SPECIFICATIONS.
13. ALL TRAVEL LANES SHOULD BE AT LEAST 11 FEET WIDE UNLESS OTHERWISE AUTHORIZED BY THE CITY TRAFFIC ENGINEER. A "NARROW LANES" SIGN SHALL BE INSTALLED IN ADVANCE OF A LANE WIDTH REDUCTION TO LESS THAN 11 FEET.
14. ALL EDGE DROP-OFFS OF MORE THAN 2 INCHES AND LESS THAN 4 INCHES SHOULD BE PROTECTED BY A WEDGE OR BARRIER AND ALL EDGE DROP-OFFS GREATER THAN 4 INCHES SHALL HAVE EDGE PROTECTION (SEE TRAFFIC CONTROL SPECIFICATIONS FOR EDGE TREATMENT REQUIREMENTS).
15. THE "WORKERS" SYMBOLIC SIGN (MUTCD NO. W21-1A) MAY BE USED INSTEAD OF THE "ROAD WORK AHEAD" SIGN FOR WORK WITH A DURATION OF 12 HOURS OR LESS. THE "END ROAD WORK" SIGN IS NOT REQUIRED TO BE INSTALLED AFTER THE "WORKERS" SIGN.
16. NO TRAFFIC SIGNAL SHALL BE ALTERED OR MODIFIED IN ANY WAY WITHOUT A PLAN APPROVED BY THE CITY TRAFFIC ENGINEER.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL TRAFFIC CONTROL DEVICES ON AN AROUND-THE-CLOCK BASIS, WHETHER OR NOT WORK IS ACTIVELY BEING PURSUED AND ANY DEFICIENCIES NOTED SHALL BE CORRECTED IMMEDIATELY.
18. THE TRAFFIC CONTROL REQUIREMENTS SHOWN ON THESE PLANS ARE MINIMUM REQUIREMENTS ONLY AND DO NOT ATTEMPT TO ADDRESS IN DEPTH THE VARIETY OF SITUATIONS THAT MAY OCCUR ONCE CONSTRUCTION HAS STARTED. IN NO WAY DO THE REQUIREMENTS SHOWN ON THESE PLANS RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY FOR SELECTING THE PROPER TRAFFIC CONTROL DEVICES AND IMPLEMENTATION PROCEDURES THAT WILL ASSURE THE SAFETY OF DRIVERS, PEDESTRIANS, AND WORKERS AT ALL TIMES.
19. SHOULD THE CONTRACTOR FAIL TO ENFORCE THE TRAFFIC CONTROL PLAN OR FAIL TO CLEAN, REPLACE OR OTHERWISE MAINTAIN THE TRAFFIC CONTROL DEVICES WHEN DIRECTED TO DO SO BY THE CITY TRAFFIC ENGINEER OR REPRESENTATIVE, THE CITY MAY TAKE ONE OR MORE OF THE FOLLOWING ACTIONS:
    A. EMPLOY ANOTHER AGENCY TO CORRECT DEFICIENCIES IN TRAFFIC CONTROL DEVICES AND DEDUCT THE COST FROM THE CONTRACTOR'S PAY ESTIMATE.
    B. STOP THE WORK UNTIL DEFICIENCIES ARE CORRECTED.
    C. SUSPEND ALL PAY ESTIMATES UNTIL DEFICIENCIES ARE CORRECTED, OR
    D. PLACE THE CONTRACTOR IN DEFAULT.



CHANNELIZERS

NOTE:
WHITE BANDS ON BARRICADES AND CHANNELIZERS SHALL BE MADE FROM HIGH INTENSITY SHEETING MATERIAL.



BARRICADES

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

Project: *TRAFFIC STANDARD DETAILS CITY OF LEE'S SUMMIT, MO CITY OF LEE'S SUMMIT, JACKSON COUNTY, MO*

Sheet Name: *TRF-1 TRAFFIC CONTROL DETAILS*

Drawn By: TWS
Checked By: .
Date: 6/2016
Proj. #: .

TRF-1

Record Drawing

Traffic Control Details

~~"100.00~~ 100.10", "~~1.00%~~ 1.15% slope", or "8-inch ~~HDPE~~ PVC pipe" are all typical examples of revisions that indicate that design data has been replaced with "as-built" information. All other data is as designed and has not been field verified.

The information provided on this drawing conforms to construction records; it is not intended for construction, implementation or recording purposes; and it is solely based on information obtained by GBA.

Date: 4/11/23

Certified by: Bradley D. Burton

Title: Senior Associate
Firm: GBA

GBA
architects
engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

DATE:	4/15/19
DESIGN BY:	CMN
DRAWN BY:	CMN
PROJECT NO.:	12720
SHEET NO.:	43
TOTAL SHEETS	43

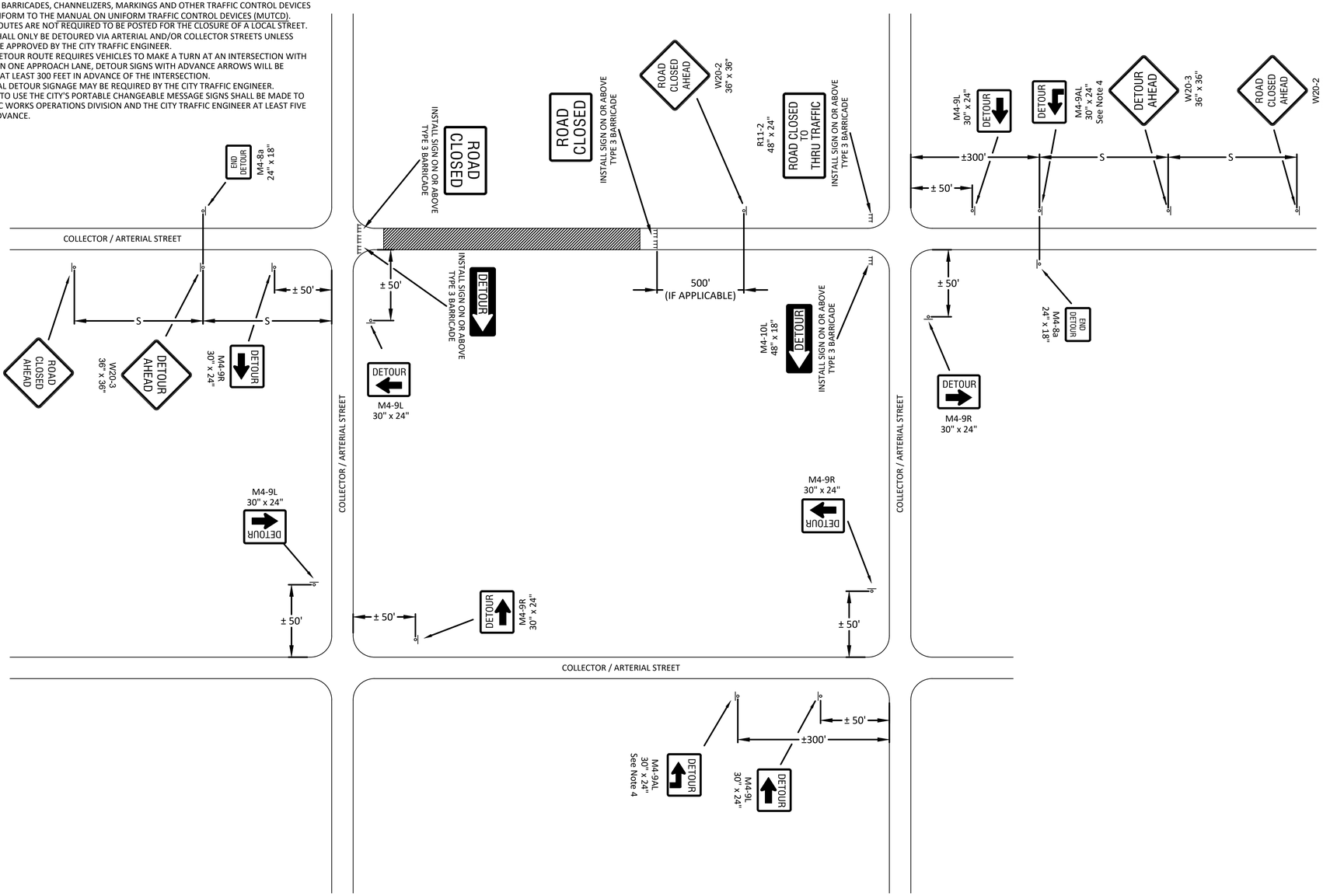
Bradley D. Burton
Professional Engineer
License No. 25862

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

NO.	DATE	REVISIONS	BY	APPROVED
	5/15/18	Revised Field Elevations		
	8/7/18	City Comments		
	8/28/18	City Comments		
	9/14/18	City Comments		
	10/10/18	Removed Floodway Grading		
	11/29/18			
1	4/11/19	Temporary River Crossing Repair		
2	4/15/19	Temporary River Crossing Repair		
3	3/10/20	City Comments		
	12/1/20	North slope grading revisions		
	2/4/21	Retaining Wall Station & Offsets		
	3/11/21	Line 300 Wingwall Revision		
	3/24/21	Headwall Detail		

DETOUR GENERAL NOTES:

1. ALL SIGNS, BARRICADES, CHANNELIZERS, MARKINGS AND OTHER TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
2. DETOUR ROUTES ARE NOT REQUIRED TO BE POSTED FOR THE CLOSURE OF A LOCAL STREET.
3. TRAFFIC SHALL ONLY BE DETOURED VIA ARTERIAL AND/OR COLLECTOR STREETS UNLESS OTHERWISE APPROVED BY THE CITY TRAFFIC ENGINEER.
4. WHEN A DETOUR ROUTE REQUIRES VEHICLES TO MAKE A TURN AT AN INTERSECTION WITH MORE THAN ONE APPROACH LANE, DETOUR SIGNS WITH ADVANCE ARROWS WILL BE REQUIRED AT LEAST 300 FEET IN ADVANCE OF THE INTERSECTION.
5. ADDITIONAL DETOUR SIGNAGE MAY BE REQUIRED BY THE CITY TRAFFIC ENGINEER.
6. REQUESTS TO USE THE CITY'S PORTABLE CHANGEABLE MESSAGE SIGNS SHALL BE MADE TO THE PUBLIC WORKS OPERATIONS DIVISION AND THE CITY TRAFFIC ENGINEER AT LEAST FIVE DAYS IN ADVANCE.



Project:
TRAFFIC STANDARD DETAILS
CITY OF LEE'S SUMMIT, MO
CITY OF LEE'S SUMMIT, JACKSON COUNTY, MO

Sheet Name:
TRF-2 TYPICAL DETOUR DETAIL

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

Drawn By: TWS
Checked By: .
Date: 6/2016
Proj. #: .

TRF-2

Record Drawing

Traffic Control Details