
Final Development Plan Report – Comments Responses

For: *The Eastside Development and Hangar 2 at*
LEE'S SUMMIT MUNICIPAL AIRPORT
LEE'S SUMMIT, MO



Prepared By:



CRAWFORD, MURPHY, & TILLY, INC.
ENGINEERS & CONSULTANTS
1627 Main St. Suite 600
Kansas City, MO 64108

February 5, 2024

CMT Responses to Planning and Development Review Comments

On December 5 City of Lee's Summit Planning and Development completed reviews of the final development plan application. On December 27 Supplemental Comments were provided. The comments can be found in Appendix A. CMT's responses to these comments provided are as follows:

Planning Review

1. PARKING CALCULATIONS. The required standard and ADA parking space fields in the Site Data Table on Sheet C102 were left blank. Populate the fields with the required space calculations referenced in the comment response letter.

Response: Required parking fields have been updated.

Engineering Review

1. Please see previous applicant letter. Separate plans for the public sanitary sewer and public water line were requested. No such plans were provided. Please provide separate plans for the sanitary sewer and public water main. Without the separation of plans, Water Utilities staff cannot conduct a review on the plans. Please be aware that previous general comments were only intended as a cursory review. No further review of the public water main or public sanitary sewer main was conducted.

Response: Separate public watermain plans have been created.

2. The SWPPP shall be a separate standalone document. In addition, there appeared to be missing sheets within the SWPPP, with the words "insert attachment here". Please revise and submit a separate SWPPP as a standalone.

Response: The SWPPP is revised and separated. SWPPP Is attached as **Appendix D**

3. Please refer to previous applicant letter. I am not seeing any grading details on the 12 inch PVC pipe connecting the flow control assembly to the outlet structure on the isometric view of Sheet C108. Although the "Structure Profile View" appears to show grading along the 12 inch PVC pipe on Sheet C108, the isometric view does not show any grading. Suggest referencing the "Structure Profile View" on the isometric view so there is no confusion in the field. Please revise as appropriate.

Response: Note added to reference structure profile view for grading.

4. The available storage for the clogged condition is shown on Sheet C108, but is irrelevant. Please remove the clogged condition storage from this sheet.

Response: Clogged condition water surface elevation has been removed from Sheet C108.

5. Separate Engineer's Estimate of Probable Construction Cost are required for" 1) the Final Development Plan, 2) the water line plans, and 3) the sanitary sewer plan. It appears the estimate included all within one document. Please separate.

Response: Separate Engineer's Estimates are attached as **Appendix B**

6. Hydraulic grade line is shown on the private stormwater profile views, but it does not appear the design storm was noted. Please note the design storm corresponding to the HGL shown on the profile view.

Response: Design storm is labeled for the displayed hydraulic grade line.

7. Recommended notes be provided where there are private sanitary sewer stubs or private domestic connections, referencing the separate public water main and separate public sanitary sewer plans. Please revise all sheets as appropriate.

Response: Public/Private Labels have been added to Sanitary and Water profiles.

8. For purposes of delineating the public versus private sanitary sewer and water, any sanitary sewer shown with a diameter of 8 inches and larger should be shown as a public line on the public sanitary sewer plans. Any water main greater than or equal to 10 inches should be part of the public water main plans. Again, both of these plans should be submitted separately since these are public infrastructure plans, and shall require an as-built Record Drawing after completion.

Response: Public/Private Labels have been added to Sanitary and Water profiles.

9. In regard to the separate water main plans, it is likely that a Design Criteria Modification Request (i.e., waiver) shall be required for the excess depth shown on the water main beneath the 30 inch transmission main. This waiver must be signed by Water Utilities and the City Engineer and shall be submitted on forms provided by the City, along with documentation supporting the requested waiver, and exhibit(s) showing the location of the excessive depth.

Response: Waiver is attached as **Appendix C**

10. It appears a private 8 inch fire line is being shown with an unlabeled reducer to the 10 inch public water main. This fire line should be installed with a tee into the public water main, and not a reducer as shown. The design of the "end of line" for the 10 inch public water main will therefore need to be modified. Once we have the separate plans for the public water main, Water Utilities will provide further guidance. For the private fire line serving the terminal building, however, this shall be shown as a private fire line with a tee connection to the public main.

Response: Fire line has been adjusted to connect to the water main with a tee.

11. In regard to the above comment related to the private fire line, a backflow vault appears warranted. This backflow vault and backflow preventer should be installed as close to the 10 inch water main as possible. Recommend this backflow vault to be installed on north side of the drive. A gate valve is required immediately prior to the backflow vault.

Response: Backflow prevention vault has been added to the 8" fire line.

12. In regard to the excessive water main depth for the public water main, this issue will be discussed with Water Utilities following the submittal of separate plans for the public water main. As a general comment, however, why was the private storm line depth for the 36 inch storm line shallow as shown on Sheet C118? It appears this shallow depth of the 36 inch line presents a conflict to the installation of the water main. It would appear additional evaluation and/or revision should be performed on the storm system so conflicts are minimized, and therefore, water mains will be shallower. Please evaluate and revise the private stormwater lines as appropriate.

Response: Storm sewer has been lowered to allow watermain to be shallower.

13. Please label all storm lines as "PRIVATE".

Response: All storm lines have been noted as private.

14. Provide the size of the domestic water meter on the utility plans.

Response: Water meter size is now called out on Sheet C113

Fire Review

2. IFC 506.1 - Where access to or within a structure or an area is restricted because of secured openings or where immediate access is necessary for life-saving or fire-fighting purposes, the fire code official is authorized to require a key box to be installed in an approved location. The key box shall be of an approved type listed in accordance with UL 1037, and shall contain keys to gain necessary access as required by the fire code official. 506.1.1 Locks. An approved lock shall be installed on gates or similar barriers when required by the fire code official.
Knox key switches shall be provided on the gates.

11/20/2023- Provide Knox key switches the operators of the sliding gates. DO NOT place Knox boxes on the gates. Do provide a Knox box 6' AFF over the FDC.

Response: Added note on C113 to provide Knox box over FDC.

4. IFC 903.3.7 - Fire department connections. The location of fire department connections shall be approved by the fire code official. Connections shall be a 4 inch Storz type fitting and located within 100 feet of a fire hydrant, or as approved by the code official.

Show the location of the FDC.

11/20/2023- The distance to the hydrant exceeds 100' and is obstructed by the dumpster. Consider moving the hydrant to the south side of the lane near the entrance to the gate and move the FDC on the building closer to the riser.

Response: Hydrant has been relocated to the south side of the drive. The notation for FDC was added to plan C113.

Supplemental Review (12/27/23)

1. On the general layout sheet (see above Sheet C113), please provide markups of all manholes to aid the contractor and inspector. I have marked this up, but you will need to do this on the resubmittal.

Response: Sanitary manholes have been labeled on sheet C113.

2. Please add sufficient notes on the profile view of sanitary sewer adding the new requirement that flowable backfill be provided for all sanitary sewer manholes.

Response: Note has been added on sanitary profiles noting the requirement for flowable backfill.

3. Sheet C114 – They only show a 0.07 drop at MH 1. A minimum drop of 0.20 feet is required.

Response: Adjusted drop across MH-1.

4. Sheet C114A – For MH 3, they call it out as existing in the plan view. This appears to be a new manhole, not an existing manhole. Please revise.

Response: Corrected label for proposed MH-3.

5. Please see the attached plans (above) for markups on the water main. Bends will be needed because the pipe cannot be bent to the extent shown. Please show the locations of these bends, including the magnitude of the bend.

Response: Bend joints have been added and labeled for the watermain.

6. Please see the attached plans (above) for markups on the water main. In particular, Sheet C116 and C118. There are excessive depth issues that need to be addressed. Please be aware the City will allow the installation of the pipe beneath Hagan Rd. via open-cut, and this may help in the re-design. We will not, however, support a waiver to the depth issue to the extent shown. Seven (7) feet of depth is the maximum allowed for a water main, and there are instances where the water line is shown as deep as 15 feet. Please provide a re-design which addresses the depth issue to the maximum extent possible, including a re-design of storm lines if necessary.

Response: Waterline has been adjusted to minimize excessive depth

7. Please add the note “PUBLIC” on the profile view of all water mains and sanitary sewer lines to be public.

Response: Public/Private Labels have been added to Sanitary and Water profiles.

8. Please refer to comments 10 and 11 in the applicant letter dated Dec. 5, 2023. These comments relate to the 8 inch line in the northwest corner of the building. The termination of the public portion of the line in the northwest corner of the project should also be terminated with a fire hydrant near the northwest corner (either inline or offset), and the private 8 inch line serving the building should be installed via a tee to this line. A backflow vault also appears warranted outside the building. Please see the markup of Sheet C118 for a possible solution.

Response: A fire hydrant has been added in the northwest corner of the waterline, and a backflow vault has been added prior to building connection.

9. Looking at the Airport Master Plan, the north side of Hanger #3 looks to be about 500 feet north of Hanger #2. Hanger #3 appears to be 40,000 SF in area according to the map. Using Type 5B construction with a fire suppression system looks like it has a fire flow requirement of 2,750 gpm. Jim Eden should confirm the fire flow for these future buildings. A dead end 12-inch main should supply this fire flow. The water velocity will be too high if the flow is over 3,530 gpm. I assume the future 12” main will connect to the 12-inch main and not a 10-inch main. The 10-inch mains are dead ends. If this extension will be in the near future, the engineer might want to install a 12” cross

instead of a tee. Some water demand will be needed to keep the chlorine residual in the water if a 12-inch dead end water main is installed. I see a green area labeled 20 year development to the north of Hanger #3. I don't know if extending the 12-inch main into this green region is being considered. If yes, the water main may need to be looped to the Hagan 16-inch water main.

Response: 12" waterline has been extended and a valve has been added.

APPENDIX A – Planning and Development Review Comments

DEVELOPMENT SERVICES

**Commercial Final Development Plan
Applicant's Letter**

Date: Tuesday, December 05, 2023

To:

Property Owner: CITY OF LEE'S SUMMIT Email:
MISSOURI

Applicant: CMT ENGINEERING Email:

Review Contact: Tyler Horn Email: thorn@cmtengr.com

Engineer/Surveyor: CMT ENGINEERING Email:

From: Mike Weisenborn, Project Manager

Re:

Application Number: PL2023269

Application Type: Commercial Final Development Plan

Application Name: LEE'S SUMMIT AIRPORT EASTSIDE DEVELOPMENT AND HANGAR 2

Location: 2740 NE HAGAN RD, LEES SUMMIT, MO 64064

Electronic Plans for Resubmittal

All Planning application and development engineering plan resubmittals shall include an electronic copy of the documents as well as the required number of paper copies.

Electronic copies shall be provided in the following formats:

- Plats – All plats shall be provided in multi-page Portable Document Format (PDF).
- Engineered Civil Plans – All engineered civil plans shall be provided in multipage Portable Document Format (PDF).
- Architectural and other plan drawings – Architectural and other plan drawings, such as site electrical and landscaping, shall be provided in multi-page Portable Document Format (PDF).
- Studies – Studies, such as stormwater and traffic, shall be provided in Portable Document Format (PDF).

Please contact Staff with any questions or concerns.

Excise Tax

On April 1, 1998, an excise tax on new development for road construction went into effect. This tax is levied based on the type of development and trips generated. If you require additional information about this development cost,

as well as other permit costs and related fees, please contact the Development Services Department at (816) 969-1200.

Review Status:

Revisions Required: One or more departments have unresolved issues regarding this development application. See comments below to determine the required revisions and resubmit to the Development Services Department. Resubmit one (1) digital copy following the electronic plan submittal guides as stated above. Revised plans will be reviewed within five (5) business days of the date received.

Required Corrections:

Planning Review	Hector Soto Jr. (816) 969-1238	Senior Planner Hector.Soto@cityofls.net	Corrections
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1. PARKING CALCULATIONS. The required standard and ADA parking space fields in the Site Data Table on Sheet C102 were left blank. Populate the fields with the required space calculations referenced in the comment response letter.

Engineering Review	Gene Williams, P.E. (816) 969-1223	Senior Staff Engineer Gene.Williams@cityofls.net	Corrections
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1. Please see previous applicant letter. Separate plans for the public sanitary sewer and public water line were requested. No such plans were provided. Please provide separate plans for the sanitary sewer and public water main. Without the separation of plans, Water Utilities staff cannot conduct a review on the plans. Please be aware that previous general comments were only intended as a cursory review. No further review of the public water main or public sanitary sewer main was conducted.

2. The SWPPP shall be a separate standalone document. In addition, there appeared to be missing sheets within the SWPPP, with the words "insert attachment here". Please revise and submit a separate SWPPP as a standalone document.

3. Please refer to previous applicant letter. I am not seeing any grading details on the 12 inch PVC pipe connecting the flow control assembly to the outlet structure on the isometric view of Sheet C108. Although the "Structure Profile View" appears to show grading along the 12 inch PVC pipe on Sheet C108, the isometric view does not show any grading. Suggest referencing the "Structure Profile View" on the isometric view so there is no confusion in the field. Please revise as appropriate.

4. The available storage for the clogged condition is shown on Sheet C108, but is irrelevant. Please remove the clogged condition storage from this sheet.

5. Separate Engineer's Estimate of Probable Construction Costs are required for: 1) the Final Development Plan, 2) the water line plans, and 3) the sanitary sewer plans. It appears the estimate included all within one document. Please separate.

6. Hydraulic grade line is shown on the private stormwater profile views, but it does not appear the design storm was noted. Please note the design storm corresponding to the HGL shown on the profile view.

7. Recommend notes be provided where there are private sanitary sewer stubs or private domestic connections, referencing the separate public water main and separate public sanitary sewer plans. Please revise all sheets as appropriate.
8. For purposes of delineating the public versus private sanitary sewer and water, any sanitary sewer shown with a diameter of 8 inches and larger should be shown as a public line on the public sanitary sewer plans. Any water main greater than or equal to 10 inches should be part of the public water main plans. Again, both of these plans should be submitted separately since these are public infrastructure plans, and shall require an as-built Record Drawing after completion.
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10. It appears a private 8 inch fire line is being shown with an unlabeled reducer to the 10 inch public water main. This fire line should be installed with a tee into the public water main, and not a reducer as shown. The design of the "end of line" for the 10 inch public water main will therefore need to be modified. Once we have the separate plans for the public water main, Water Utilities will provide further guidance. For the private fire line serving the terminal building, however, this shall be shown as a private fire line with a tee connection to the public main.
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12. In regard to the excessive water main depth for the public water main, this issue will be discussed with Water Utilities following the submittal of separate plans for the public water main. As a general comment, however, why was the private storm line depth for the 36 inch storm line shallow as shown on Sheet C118? It appears this shallow depth of the 36 inch line presents a conflict to the installation of the water main. It would appear additional evaluation and/or revision should be performed on the storm system so conflicts are minimized, and therefore, water mains will be shallower. Please evaluate and revise the private stormwater lines as appropriate.
13. Please label all storm lines as "PRIVATE".
14. Provide the size of the domestic water meter on the utility plans.

Fire Review	Jim Eden (816) 969-1303	Assistant Chief Jim.Eden@cityofls.net	Corrections
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2. IFC 506.1 - Where access to or within a structure or an area is restricted because of secured openings or where immediate access is necessary for life-saving or fire-fighting purposes, the fire code official is authorized to require a key box to be installed in an approved location. The key box shall be of an approved type listed in accordance with UL 1037, and shall contain keys to gain necessary access as required by the fire code official. 506.1.1 Locks. An approved lock shall be installed on gates or similar barriers when required by the fire code official.

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Show the location of the FDC.

11/20/2023- The distance to the hydrant exceeds 100' and is obstructed by the dumpster. Consider moving the hydrant to the south side of the lane near the entrance to the gate and move the FDC on the building closer to the riser.

Traffic Review	Erin Ralovo	Erin.Ravolo@cityofls.net	No Comments
Building Codes Review	Joe Frogge (816) 969-1241	Plans Examiner Joe.Frogge@cityofls.net	No Comments

Tyler Horn

From: Gene Williams <Gene.Williams@cityofpls.net>
Sent: Wednesday, December 27, 2023 3:45 PM
To: Tyler Horn
Cc: Amanda Bagwell; Kevin York; Mike Weisenborn
Subject: PL2023269 Lee's Summit Airport Eastside Development and Hangar 2- Public Sanitary and Public Water Line Contained Within the FDP
Attachments: Pages from 47732472 FDP Plans LXT Eastside Development_V2 11_13_23 (002).pdf

External Message: This email was sent from someone outside of CMT. Please use caution with links and attachments from unknown senders or receiving unexpected emails.

Hello Mike,

Here are the supplemental comments to the Dec. 5, 2023 applicant letter. These comments relate to the public sanitary and public water main plans that were extracted from your Final Development Plan set. I have attached a marked-up copy of this extracted plan set above for references:

1. On the general layout sheet (see above Sheet C113), please provide markups of all manholes to aid the contractor and inspector. I have marked this up, but you will need to do this on the resubmittal.
2. Please add sufficient notes on the profile view of sanitary sewer adding the new requirement that flowable backfill be provided for all sanitary sewer manholes.
3. Sheet C114 – They only show a 0.07 drop at MH 1. A minimum drop of 0.20 feet is required.
4. Sheet C114A – For MH 3, they call it out as existing in the plan view. This appears to be a new manhole, not an existing manhole. Please revise.
5. Please see the attached plans (above) for markups on the water main. Bends will be needed because the pipe cannot be bent to the extent shown. Please show the locations of these bends, including the magnitude of the bend.
6. Please see the attached plans (above) for markups on the water main. In particular, Sheet C116 and C118. There are excessive depth issues that need to be addressed. Please be aware the City will allow the installation of the pipe beneath Hagan Rd. via open-cut, and this may help in the re-design. We will not, however, support a waiver to the depth issue to the extent shown. Seven (7) feet of depth is the maximum allowed for a water main, and there are instances where the water line is shown as deep as 15 feet. Please provide a re-design which addresses the depth issue to the maximum extent possible, including a re-design of storm lines if necessary.
7. Please add the note “PUBLIC” on the profile view of all water mains and sanitary sewer lines to be public.
8. Please refer to comments 10 and 11 in the applicant letter dated Dec. 5, 2023. These comments relate to the 8 inch line in the northwest corner of the building. The termination of the public portion of the line in the northwest corner of the project should also be terminated with a fire hydrant near the northwest corner (either inline or offset), and the private 8 inch line serving the building should be installed via a tee to this line. A backflow vault also appears warranted outside the building. Please see the markup of Sheet C118 for a possible solution.
9. Looking at the Airport Master Plan, the north side of Hanger #3 looks to be about 500 feet north of Hanger #2. Hanger #3 appears to be 40,000 SF in area according to the map. Using Type 5B construction with a fire suppression system looks like it has a fire flow requirement of 2,750 gpm. Jim Eden should confirm the fire flow for these future buildings. A dead end 12-inch main should supply this fire flow. The water velocity will be too high if the flow is over 3,530 gpm. I assume the future 12” main will connect to the 12-inch main and not a 10-inch main. The 10-inch mains are dead ends. If this extension will be in the near future, the engineer might want to install a 12” cross instead of a tee. Some water demand will be needed to keep the chlorine residual in

the water if a 12-inch dead end water main is installed. I see a green area labeled 20 year development to the north of Hanger #3. I don't know if extending the 12-inch main into this green region is being considered. If yes, the water main may need to be looped to the Hagan 16-inch water main.

Please let me know if there are any questions, or if you need to request a Zoom meeting to discuss. We want to ensure what is installed now is sufficient to meet the future needs of this subdivision.



Gene Williams, P.E., CFM | Senior Staff Engineer
220 SE Green Street | Lee's Summit, MO 64063
816.969.1223 | cityofLS.net | Gene.Williams@cityofls.net



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APPENDIX B – Engineer’s Estimates of Probable Construction Costs

LEE'S SUMMIT MUNICIPAL AIRPORT

ENGINEER'S OPINION OF PROBABLE COST Eastside Development - Infrastructure Only

FINAL DEVELOPMENT PLAN - 2/5/2024

Bid Item	Item Description	Unit	Quantity	Unit Price	Amount
1	Mobilization	LS	1	\$97,160.00	\$97,160.00
2	Temporary Traffic Control	LS	1	\$2,971.00	\$2,971.00
3	Removal of Concrete Curb and Gutter	LF	211	\$5.33	\$1,124.63
4	Removal of Chain Link Fence	LF	761	\$10.61	\$8,074.21
5	12" Filter Sock	LF	1,345	\$6.53	\$8,782.85
6	Inlet Protection	EA	31	\$79.24	\$2,456.44
7	Erosion Control Blanket	SY	23,138	\$2.07	\$47,895.66
8	Turf Reinforcement Mat (Basin Emergency Spillway)	SY	500	\$8.49	\$4,245.00
9	Rip Rap	SY	86	\$59.89	\$5,150.54
10	Excavation - Aggregate or Soil Material Recycled On-Site	CY	36,751	\$7.10	\$260,932.10
11	8' Black Vinyl Chain Link Fence with Barbed Wire	LF	1,600	\$62.32	\$99,712.00
12	32' Electric Black Vinyl Bi-Directional Rolling Gate System	LS	1	\$39,210.00	\$39,210.00
13	18' Electric Black Vinyl Bi-Directional Rolling Gate System	LS	1	\$32,316.00	\$32,316.00
14	Cement (Soil Stabilization)	TON	382	\$228.12	\$87,141.84
15	12" 6% Cement-Treated Subgrade	SY	16,057	\$4.31	\$69,205.67
16	4" Compacted Aggregate Base Course	SY	11,520	\$7.69	\$88,588.80
17	6" Compacted Aggregate Base Course	SY	5,674	\$9.81	\$55,661.94
18	8" Portland Cement Concrete Pavement	SY	10,375	\$88.94	\$922,752.50
19	11" Portland Cement Concrete Pavement	SY	1,022	\$115.20	\$117,734.40
20	4" Portland Cement Concrete Sidewalk	SY	1,146	\$66.84	\$76,598.64
21	Type CG-1 Concrete Curb and Gutter	LF	3,937	\$22.28	\$87,716.36
22	ADA Curb Ramp	EA	9	\$2,652.50	\$23,872.50
23	Concrete Wheel Stops	EA	4	\$132.63	\$530.52
24	4" Double Yellow Centerline Waterborne Markings	LF	1,083	\$2.55	\$2,761.65
25	4" Yellow Parking Stall Waterborne Markings	LF	1,300	\$1.27	\$1,651.00
26	Yellow Parking Stall Hatch Waterborne Markings	LF	390	\$1.27	\$495.30
27	Thermoplastic White 24" Crosswalk Markings	LF	274	\$22.28	\$6,104.72
28	Thermoplastic White Stop Bar Markings	EA	8	\$445.62	\$3,564.96
29	Thermoplastic ADA Accessible Parking Symbol Markings	EA	4	\$265.25	\$1,061.00
30	Waterborne Fire Lane Pavement Markings	EA	2	\$148.54	\$297.08
31	8" PVC Storm Line	LF	590	\$56.00	\$33,040.00
32	15" PVC Storm Line	LF	93	\$110.44	\$10,270.92
33	18" Inline Drain With Standard Grate	EA	1	\$5,305.00	\$5,305.00
34	15" Reinforced Concrete Pipe (Class IV)	LF	113	\$82.89	\$9,366.57
35	18" Reinforced Concrete Pipe (Class IV)	LF	949	\$89.12	\$84,574.88
36	24" Reinforced Concrete Pipe (Class IV)	LF	697	\$117.77	\$82,085.69
37	30" Reinforced Concrete Pipe (Class IV)	LF	492	\$133.69	\$65,775.48
38	42" Reinforced Concrete Pipe (Class IV)	LF	572	\$176.13	\$100,746.36
39	Flared End Section For Stormwater Basin	EA	1	\$2,694.94	\$2,694.94
40	42" Flared End Section	EA	1	\$3,183.00	\$3,183.00
41	New Junction Structure	EA	1	\$13,877.88	\$13,877.88
42	New Curb Inlets	EA	27	\$6,826.47	\$184,314.69
43	New Turf Inlet	EA	3	\$6,779.79	\$20,339.37
44	Stormwater Basin Outlet Structures	EA	2	\$13,952.15	\$27,904.30
45	Accessible Parking Stall Sign and Post	EA	4	\$901.85	\$3,607.40
46	Roadway Sign with Post and Mow Pad	EA	11	\$397.88	\$4,376.68
47	Seeding	AC	8.5	\$2,408.47	\$20,472.00
48	Topsolling (6")	SY	64,404	\$0.75	\$48,303.00
49	Mulching	AC	8.5	\$2,493.35	\$21,193.48
50	2 x #6 XLP-USE, #12 GND in 1" Conduit (New Street Lighting Circuit)	LF	1,860	\$35.04	\$65,174.40
51	2 x #4 XLP-USE, 1 x #6 GND in 1" Conduit (New Apron Lighting Circuit)	LF	380	\$22.62	\$8,595.60
52	Electrical Demolition	LS	1	\$3,298.00	\$3,298.00
53	6" PVC Sanitary Sewer	LF	441	\$48.84	\$21,538.44
54	8" PVC Sanitary Sewer	LF	1,491	\$93.35	\$139,184.85
55	Sanitary Sewer Cleanouts	EA	4	\$557.03	\$2,228.12
56	Sanitary Sewer Manholes	EA	6	\$10,413.72	\$62,482.32
57	Proposed Oil Interceptor	LS	1	\$33,614.60	\$33,614.60
58	2" Domestic Water Line Installation	LF	207	\$39.53	\$8,182.71
59	8" Water Main Installation	LF	352	\$42.44	\$14,938.88
60	10" Water Main Installation	LF	253	\$58.36	\$14,765.08
61	12" Water Main Installation	LF	1,641	\$74.32	\$121,959.12
62	Fire Hydrant Assembly (with New Hydrant)	EA	9	\$8,063.60	\$72,572.40
63	Water Line Bends with Thrust Blocking	EA	16	\$1,548.00	\$24,768.00
64	Water Line Tees with Thrust Blocking	EA	5	\$1,548.00	\$7,740.00
65	Water Line Valves	EA	13	\$8,930.44	\$116,095.72
66	Domestic Water Line Connection with Curb Stop	EA	1	\$1,856.75	\$1,856.75
67	Water Meter Installation	EA	1	\$795.75	\$795.75
68	Backflow Prevention Vault	LS	1	\$20,690.00	\$20,690.00
69	Landscaping Improvements	LS	1	\$132,625.00	\$132,625.00
72	New Luminaire With Mast Arm on Light Pole	EA	16	\$2,101.84	\$33,629.44
73	48" Reinforced Concrete Pipe (Class IV)	LF	140	\$241.91	\$33,867.40
74	48" Flared End Section	EA	2	\$3,713.50	\$7,427.00
	SUBTOTAL				\$3,845,230.52

LEE'S SUMMIT MUNICIPAL AIRPORT

ENGINEER'S OPINION OF PROBABLE COST Eastside Development - Infrastructure Only

WATER LINE PLANS ONLY - 2/5/2024

Bid Item	Item Description	Unit	Quantity	Unit Price	Amount
58	2" Domestic Water Line Installation	LF	207	\$39.53	\$8,182.71
59	8" Water Main Installation	LF	352	\$42.44	\$14,938.88
60	10" Water Main Installation	LF	253	\$58.36	\$14,765.08
61	12" Water Main Installation	LF	1,641	\$74.32	\$121,959.12
62	Fire Hydrant Assembly (with New Hydrant)	EA	9	\$8,063.60	\$72,572.40
63	Water Line Bends with Thrust Blocking	EA	16	\$1,548.00	\$24,768.00
64	Water Line Tees with Thrust Blocking	EA	5	\$1,548.00	\$7,740.00
65	Water Line Valves	EA	13	\$8,930.44	\$116,095.72
66	Domestic Water Line Connection with Curb Stop	EA	1	\$1,856.75	\$1,856.75
67	Water Meter Installation	EA	1	\$795.75	\$795.75
68	Backflow Prevention Vault	LS	1	\$20,690.00	\$20,690.00
	SUBTOTAL				\$404,364.41

LEE'S SUMMIT MUNICIPAL AIRPORT

ENGINEER'S OPINION OF PROBABLE COST Eastside Development - Infrastructure Only

SANITARY SEWER PLAN ONLY - 2/5/2024

Bid Item	Item Description	Unit	Quantity	Unit Price	Amount
53	6" PVC Sanitary Sewer	LF	441	\$48.84	\$21,538.44
54	8" PVC Sanitary Sewer	LF	1,491	\$93.35	\$139,184.85
55	Sanitary Sewer Cleanouts	EA	4	\$557.03	\$2,228.12
56	Sanitary Sewer Manholes	EA	6	\$10,413.72	\$62,482.32
57	Proposed Oil Interceptor	LS	1	\$33,614.60	\$33,614.60
	SUBTOTAL				\$259,048.33

APPENDIX C – Design Criteria Modification Request – Water Main



LEE'S SUMMIT
MISSOURI

CODE MODIFICATION REQUEST

BUILDING/STRUCTURE NAME: Hangar 2, Lee's Summit Airport

PREMISE ADDRESS: 2751 NE Douglas St., Lee's Summit, MO 64064

PERMIT NUMBER (if applicable): PL2023269

OWNER'S NAME: City of Lee's Summit, MO

TO: Director of Development Services:

In accordance with the Lee's Summit Building Code, I wish to apply for a modification to one or more provisions of the code as I feel that the spirit and intent of the Lee's Summit Building Code are observed the public health, welfare and safety are assured. The following articulates my request for your review and action. (NOTE: ATTACH ANY ADDITIONAL INFORMATION NECESSARY)

Type of Request: (x) Design () Construction

-
1. Excess depth of proposed public 12" C900 water mains beneath the 30 inch transmission main: 7-feet is the maximum depth allowed for a water main. Two proposed 12" watermains designed for this project must be installed to cross an existing 30" transmission main. This was directly discussed between design team and City of LS Water which concluded that installation of the proposed waterlines beneath the existing 30" Transmission main is the City's preference. Both watermains are designed to the shallowest depth as practically possible beneath the 30" transmission main which amounts to 8-9ft depth beneath final grades.

SUBMITTED BY:

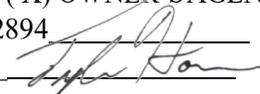
NAME: Tyler Horn, Crawford, Murphy & Tilly, Inc.____

() OWNER (X) OWNER'S AGENT

ADDRESS: 1627 Main St. Suite 600_____

Tel.# 816.853.2894

CITY, STATE, ZIP: Kansas City, MO 64108

SIGNATURE: 

Plan Review / Inspections Manager:

() APPROVAL

() DENIAL

SIGNATURE: _____ DATE: _____

Director of Development Services:

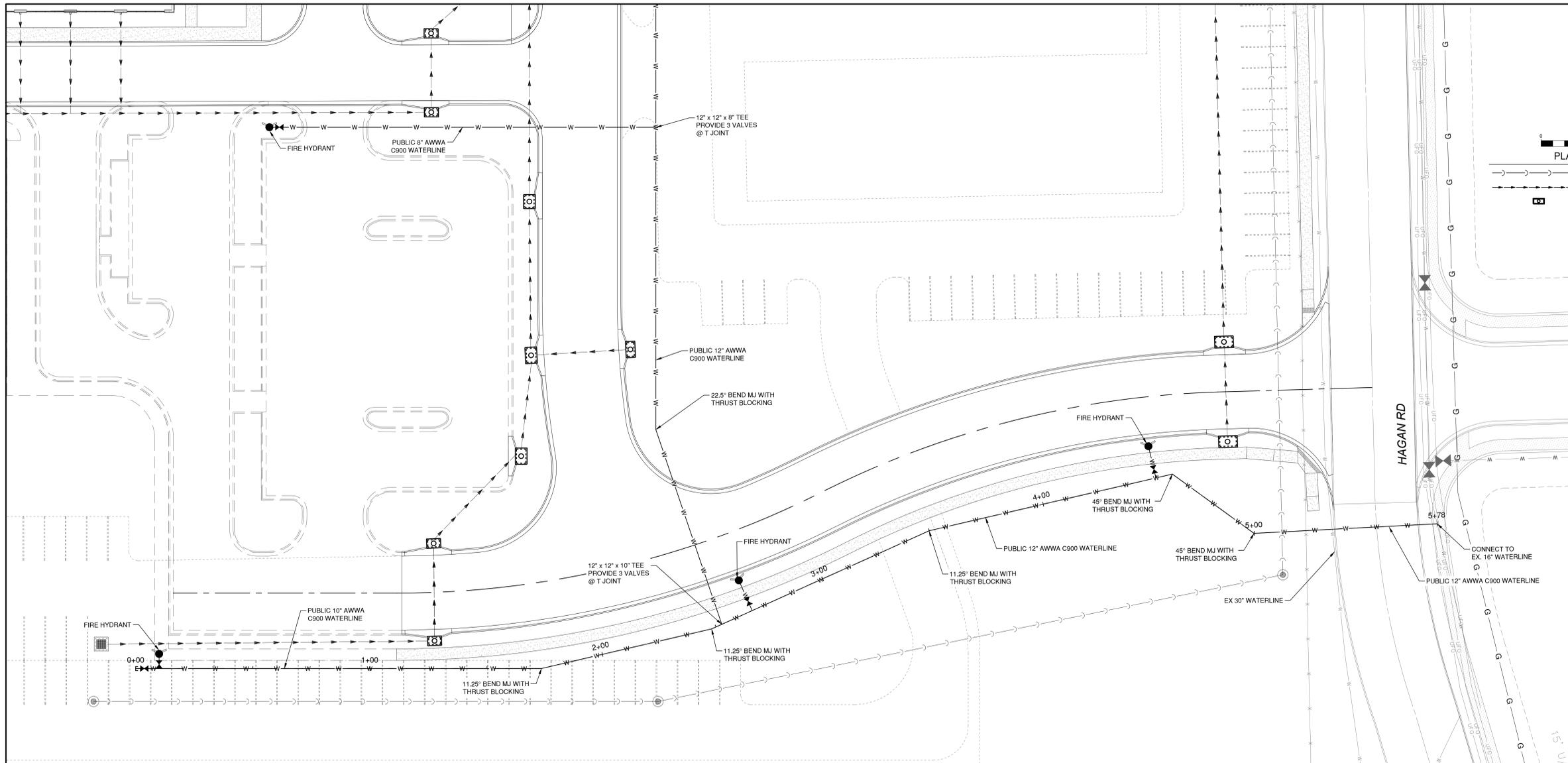
() APPROVED

() DENIED

SIGNATURE: _____ DATE: _____

COMMENTS _____

A COPY MUST BE ATTACHED TO THE APPROVED PLANS ON THE JOB SITE



1627 MAIN STREET, SUITE 600
KANSAS CITY, MO 64108



1627 MAIN STREET, #100
KANSAS CITY, MO 64108

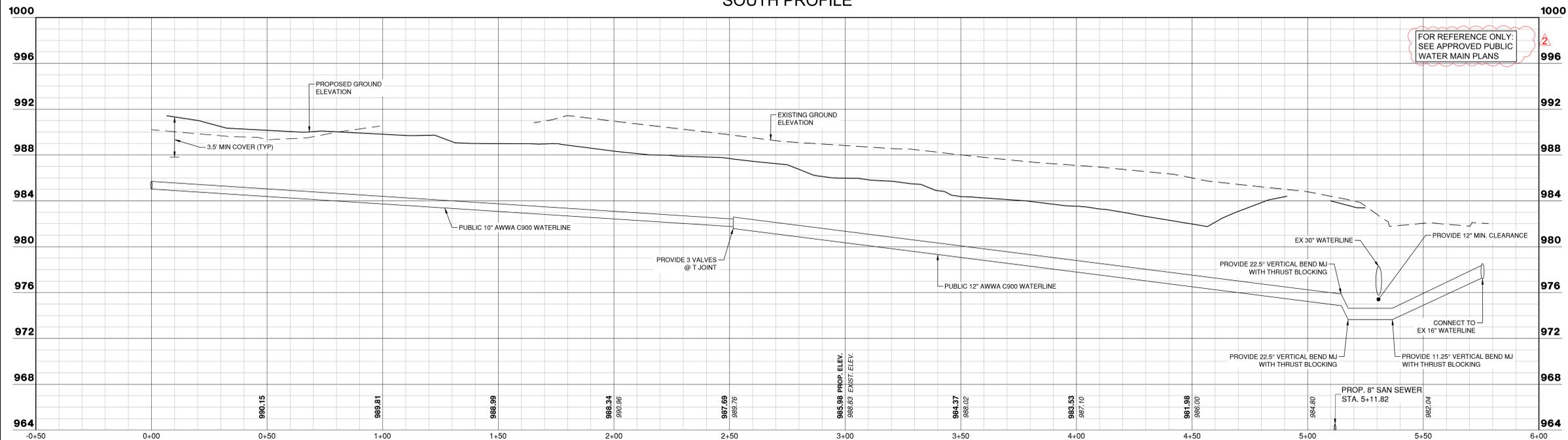


1301 BURLINGTON STREET
NORTH KANSAS CITY, MO 64116

LEE'S SUMMIT MUNICIPAL AIRPORT
LEE'S SUMMIT, MISSOURI

EASTSIDE DEVELOPMENT
CITY PROJECT NO. - 47732472

SOUTH PROFILE



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Date: Wednesday, January 3, 2024 12:24:27



SEALED DIGITALLY
JANUARY 4, 2024

LEE'S SUMMIT MUNICIPAL AIRPORT
LEE'S SUMMIT, MO

MARK	DATE	DESCRIPTION

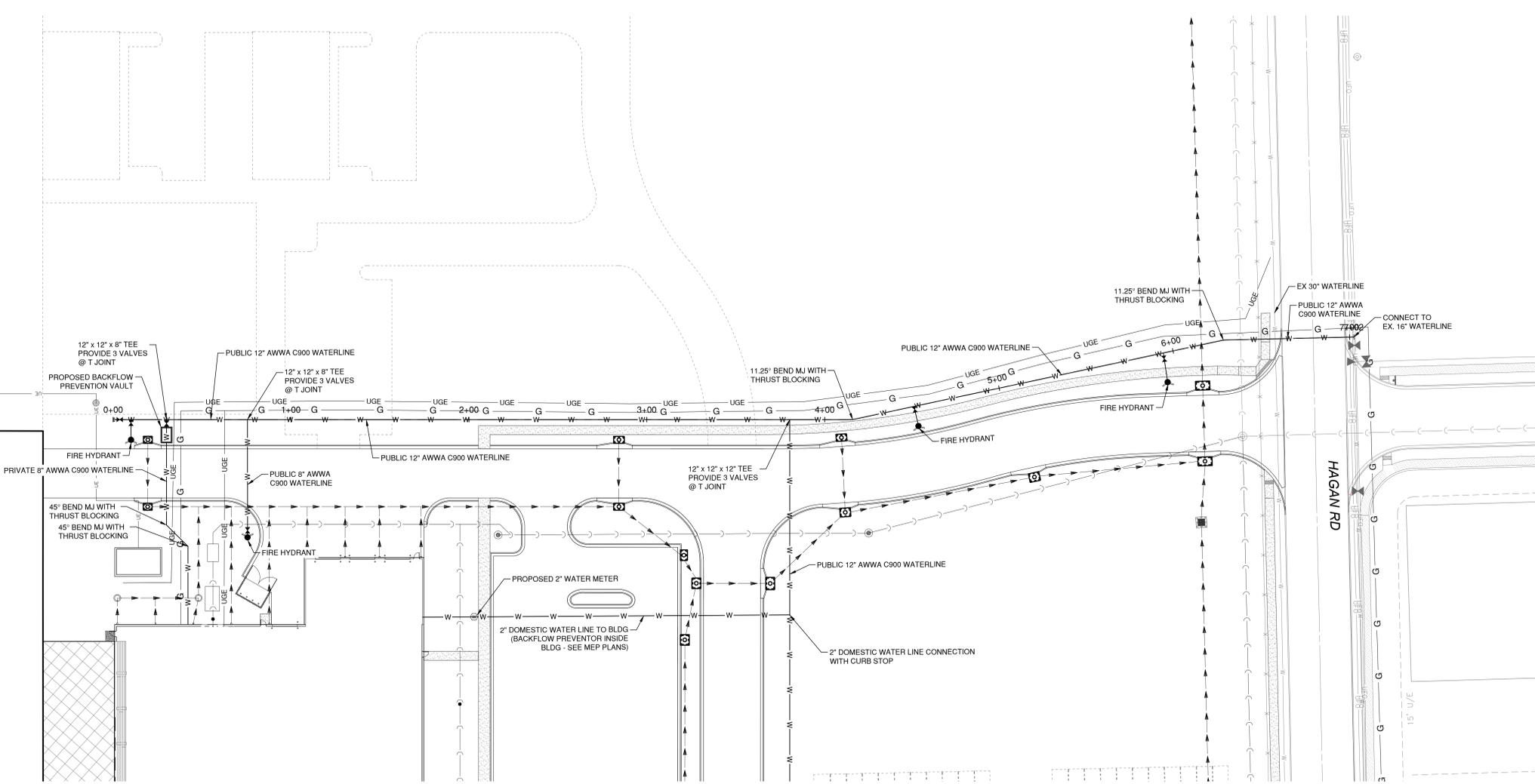
PROJECT NO: 47732472
CAD DWG FILE: WATER LINE PLAN & PROFILE - SHEET 3
DESIGNED BY: WLC
DRAWN BY: WLC
CHECKED BY: JRC
APPROVED BY: TGH
COPYRIGHT

SHEET TITLE
WATER LINE PLAN & PROFILE - SHEET 1
C116
SHEET 027 OF 131

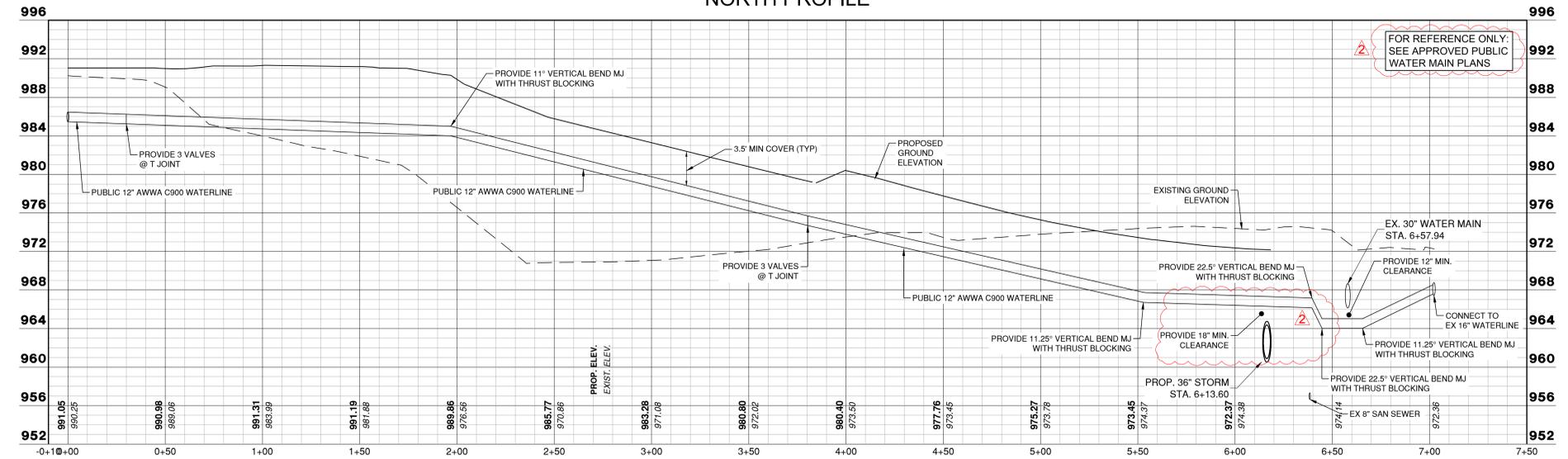
**LEE'S SUMMIT MUNICIPAL AIRPORT
LEE'S SUMMIT, MISSOURI
EASTSIDE DEVELOPMENT
CITY PROJECT NO. - 47732472**



PLAN LEGEND



NORTH PROFILE



SEALED DIGITALLY
JANUARY 4, 2024

LEE'S SUMMIT MUNICIPAL AIRPORT
LEE'S SUMMIT, MO

MARK	DATE	DESCRIPTION

WATER LINE PLAN & PROFILE - SHEET 3

C118
SHEET 029 OF 131

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Date: Wednesday, January 3, 2024 12:24:34

APPENDIX D – SWPPP

City of Lee's Summit, Missouri
Lee's Summit Municipal Airport

Storm Water Pollution Prevention Plan for
Storm Water Discharge Associated with

LXT EASTSIDE DEVELOPMENT

Originally Prepared: November 01, 2023

Prepared by
Crawford, Murphy & Tilly, Inc.
1627 Main St. Suite 600
Kansas City, MO 64108

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11. Field Inspection and Maintenance Checklist14

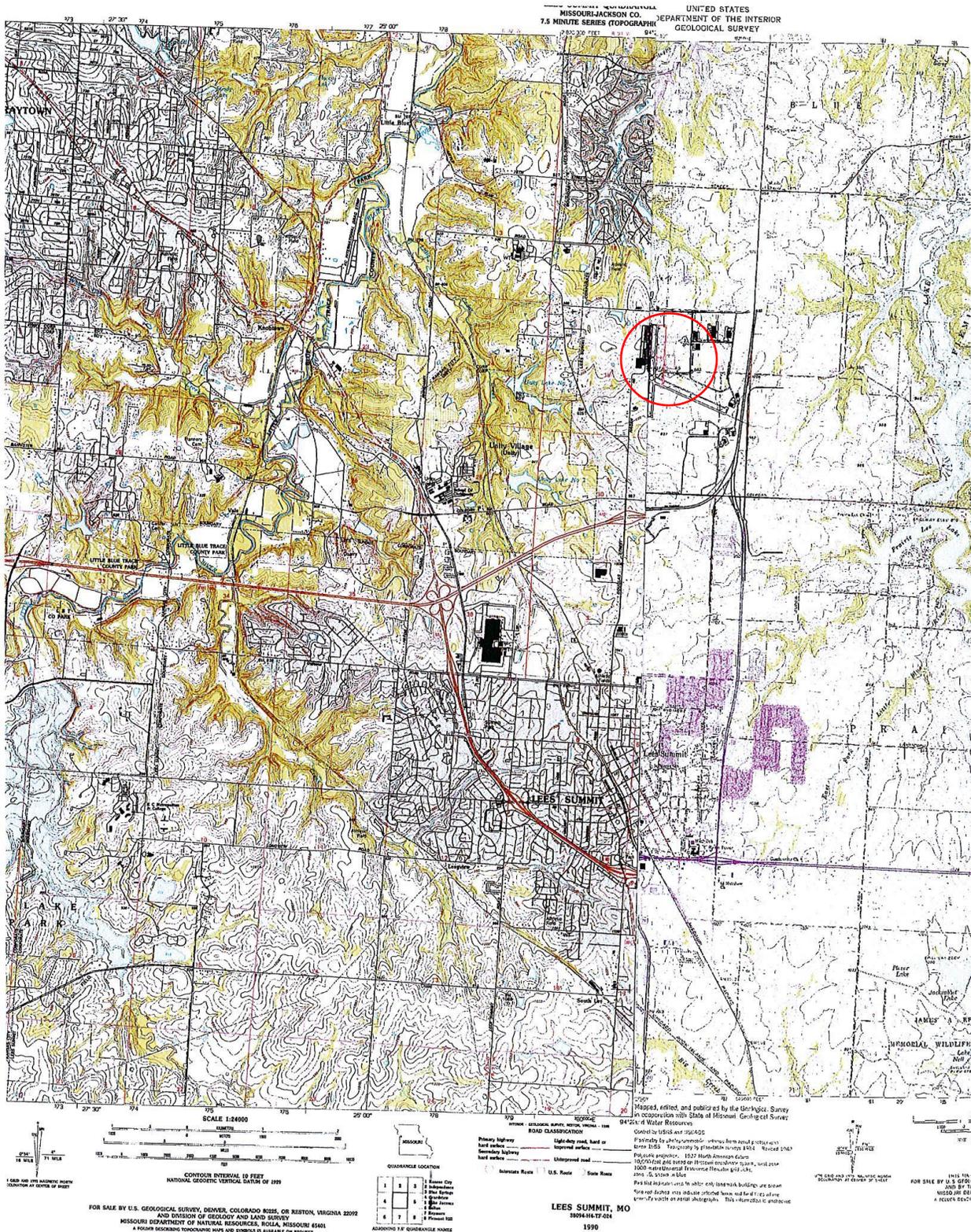
Appendix A Specifications.....17

1. Site Description

The facility to be affected by construction activities is the Lee's Summit Municipal Airport located at 2751 NE Douglas; Lee's Summit, Missouri 64064. This is in Section 20, Township 48 north, Range 31 west, Jackson County, Missouri. The project site drains to an existing low area to the north which then is received by an unnamed tributary to Lakewood Lakes. Figure 1-1 shows the airport's location on a combined USGS map.

Construction activities at the site will include the construction of a new hangar building, site grading, drainage improvements, paving, utilities, pavement marking, and other associated improvements east of the airport along NE Hagan Rd.

Figure 1-1



2. Drainage Areas

Any areas where changes to a defined drainage area are to occur, shall not be disturbed until all materials and equipment necessary to protect and complete the drainage change are on site. Changes to defined drainage areas shall be completed as quickly as possible once the work has been initiated. Any areas impacted by the land disturbance of a drainage course change are to be protected from erosion as soon as possible. This shall include installation of BMPs prior to the start of disturbance activity at the downstream end and within 14 days of completion of disturbance activities within the disturbance area.

3. Description of Best Management Practices

The following Best Management Practices (BMPs) shall be used as methods to control the storm water runoff during the construction of this project. Specifications Item P-156 – Erosion and Sediment Control, Item T-901 – Seeding, and Item T-908 – Mulching provide additional information and are included in Appendix A. Figure 3-1 thru 3-2 shows the locations of the BMPs and Figure 3-3 shows the installation details.

- A. Stabilized Construction Entrance
- B. Silt Sock
- C. Silt Dike Ditch Check
- D. Concrete Washout Pit
- E. Temporary Seeding and Mulching
- F. Erosion Control Blanket
- G. Rip Rap
- H. Inlet Protection
- I. Permanent Seeding and Mulching

Figure 3-1

Figure 3-2

Figure 3-3

4. Disturbed Areas

The contractor shall apply temporary seeding and mulching in any disturbed area where grading activities will remain idle for more than 14 days but will require additional grading. For areas where final grading has been achieved, permanent seeding and mulching shall be applied within 14 days of the completion of the grading operations.

5. Installation

All BMPs shall be installed in accordance with the specifications in Appendix A and the details shown on Figure 3-3.

6. Temporary and Permanent Non-Structural BMPs

The non-structural BMPs to be used on this project are temporary and permanent seeding and mulching. They shall be installed within 14 days of the completion or stoppage of grading activities. A temporary stabilized construction entrance shall be installed as specified to reduce material from public roadways. However, the contractor shall still monitor the entrance and exit points of the public roads, keep the area as clean as practical and route the construction traffic in a way that will reduce trackout. A water truck will be available to clean the pavement.

7. Temporary and Permanent Structural BMPs

The structural BMPs to be used on this project are silt filter socks, silt ditch checks, sedimentation basin, rip rap, inlet protect and erosion control blanket. The silt filter sock shall be installed at the locations specified by the engineer within 48 hours of completing clearing and grubbing operations in that area. Where practical, silt sock will be installed prior to initial disturbance of the ground.

Structural BMPs shall be maintained in proper working condition until final acceptance of the project for permanent BMPs and establishment of turf for temporary BMPs.

8. Routine Monitoring and Reporting of Site Conditions

The contractor shall be responsible for performing routine inspections of the project site in order to evaluate, document, and report the effectiveness of the erosion control measures that are in place at the project site. The purpose of these inspections is to monitor the site in order to facilitate implementation of appropriate modifications and maintenance activities in order to minimize and/or eliminate loss of sediment from the site.

The contractor shall make routine inspections at least once every seven (7) calendar days. If a rainfall causes storm water runoff to occur on site, the BMPs must be inspected within a reasonable time period (not to exceed 48 hours).

The contractor shall provide the Engineer a record of each site inspection using the form provided in this SWPPP. The contractor shall indicate on the form the name of the individual performing the inspection and the date that the inspection occurred. The individual performing the inspection shall sign the form. The contractor shall provide four copies of each report to the Engineer within 3 days of the inspection.

The contractor shall notify the Engineer immediately of any indications of loss of sediment from the project site.

9. Additional Site Management BMPs

The contractor shall exercise best management practices throughout the life of the project to control water pollution. Pollutants such as chemicals, fuels, lubricants, bitumen, raw sewage or other harmful material shall not be discharged from the project. Temporary pollution control measures shall be coordinated with permanent erosion control features specified in the contract to ensure economical, effective and continuous erosion control.

Temporary control may include work outside the construction limits such as borrow pit operations, equipment and material storage sites, waste areas, and temporary plant sites.

Trash containers and portable toilets shall be provided by the contractor for his/her employees. The trash containers and portable toilets shall be maintained by the contractor as needed in accordance with all local, state, and federal laws.

10. Permanent Storm Water Management

The contractor shall maintain all permanent seeding and mulching areas until final acceptance of the project. Upon final acceptance of the project, the City of Lee's Summit will inspect the area once a month and will take action as needed.

Stormwater Construction Site Inspection Report

General Information			
Project Name	LXT Eastside Development		
Permit No.		Location	Lee's Summit Municipal Airport
Date of Inspection		Start/End Time	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Inspector's Qualifications			
Describe present phase of construction			
Type of Inspection:			
<input type="checkbox"/> Regular <input type="checkbox"/> Pre-storm event <input type="checkbox"/> During storm event <input type="checkbox"/> Post-storm event			
Weather Information			
Has there been a storm event since the last inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No			
If yes, provide:			
Storm Start Date & Time:	Storm Duration (hrs):	Approximate Amount of Precipitation (in):	
Weather at time of this inspection?			
<input type="checkbox"/> Clear <input type="checkbox"/> Cloudy <input type="checkbox"/> Rain <input type="checkbox"/> Sleet <input type="checkbox"/> Fog <input type="checkbox"/> Snowing <input type="checkbox"/> High Winds			
<input type="checkbox"/> Other: _____ Temperature: _____			
Have any discharges occurred since the last inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No			
If yes, describe:			
Are there any discharges at the time of inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No			
If yes, describe:			

Site-specific BMPs

- *Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.*
- *Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.*

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
1		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
9		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
10		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
12		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
13		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
14		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
15		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
16		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
17		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
18		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
19		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
20		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Overall Site Issues

Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4	Are discharge points and receiving waters free of any sediment deposits?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5	Are storm drain inlets properly protected?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6	Is the construction exit preventing sediment from being tracked into the street?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7	Is trash/litter from work areas collected and placed in covered dumpsters?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10	Are materials that are potential stormwater contaminants stored inside or under cover?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
12	(Other)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Non-Compliance

Describe any incidents of non-compliance not described above:

CERTIFICATION STATEMENT

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

Print name and title: _____

Signature: _____ **Date:** _____

Appendix A: Specifications

ITEM P-156 TEMPORARY AIR AND WATER POLLUTION, SOIL EROSION, AND SILTATION CONTROL

DESCRIPTION

156-1.1 This item shall consist of temporary and permanent control measures as shown on the plans or as ordered by the Engineer during the life of a contract to control water pollution, soil erosion, and siltation through the use of silt fences, berms, dikes, dams, sediment basins, fiber mats, gravel, mulches, grasses, slope drains, and other erosion control devices or methods.

The temporary erosion control measures contained herein shall be coordinated with the permanent erosion control measures specified as part of this contract to the extent practical to assure economical, effective, and continuous erosion control throughout the construction period. As a minimum the contractor shall erect and maintain silt fence along existing ditches and around drainage structures in the grading areas or in the vicinity of grading areas that receive runoff from graded areas. The contractor shall exercise best management practices throughout the life of the project to control water pollution. Pollutants such as chemicals, fuels, lubricants, bitumen, raw sewage or other harmful material shall not be discharged from the project.

Temporary control may include work outside the construction limits such as borrow pit operations, equipment and material storage sites, waste areas, and temporary plant sites.

Temporary control measures shall be designed, installed and maintained to minimize the creation of wildlife attractants that have the potential to attract hazardous wildlife on or near public-use airports.

Inlet Protection shall consist of constructing inlet protection basins in accordance with the details in the plans for the purpose of preventing infiltration of silt into the inlets.

The Contractor shall follow the requirements of the Storm Water Pollution Prevention Plan (SWPPP) and shall perform erosion control inspections as outlined in the SWPPP until final acceptance of the project. Erosion control inspection shall not be measured for payment but shall be considered incidental to the contract. The SWPPP is included in the appendix and is considered part of the contract. Any requirements of the SWPPP that do not have a specified pay item are considered incidental to the contract and shall be performed by the Contractor at no additional cost to the Contract. The Contractor shall update the SWPPP during construction as needed to comply with Missouri Department of Natural Resources (MoDNR) requirements.

The Contractor shall be responsible for meeting the requirements of the City's Missouri State Operating Permit, Permit No. MOR 100089 from the time of the issuance of the Notice to Proceed (NTP) until final project acceptance. Any fines issued by MoDNR for noncompliance of the permit related to the Construction of this project between the NTP and final project acceptance shall be paid by the Contractor

MATERIALS

PROOF OF BUY AMERICAN NOTICE: All tier contractors and subcontractors shall provide proof of Buy American compliance for all manufactured products in accordance with statutes established under Title 49 U.S.C. Section 50101. The AIP Buy American preference does not recognize US trade agreements such as NAFTA. If, upon submittal sufficient information to confirm compliance is not included, the submittal will be returned with no action.

156-2.1 Grass. Grass that will not compete with the grasses sown later for permanent cover per Item T-901 shall be a quick-growing species (such as ryegrass or Italian ryegrass) suitable to the area providing a temporary cover. Selected grass species shall not create a wildlife attractant.

156-2.2 Mulches. Mulches shall be reasonably clean and free of noxious weeds and deleterious materials per Item T-908. Mulches shall not create a wildlife attractant.

156-2.3 Fertilizer. Fertilizer shall be a standard commercial grade and shall conform to all Federal and state regulations and to the standards of the Association of Official Agricultural Chemists.

156-2.4 Slope drains. NOT USED.

156-2.5 Silt fence. The silt fence shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life. Silt fence shall meet the requirements of ASTM D6461.

156-2.6 Other. All other materials shall meet commercial grade standards and shall be approved by the Engineer before being incorporated into the project.

CONSTRUCTION REQUIREMENTS

156-3.1 General. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply.

The Engineer shall be responsible for assuring compliance to the extent that construction practices, construction operations, and construction work are involved.

156-3.2 Schedule. Prior to the start of construction, the Contractor shall submit schedules for accomplishment of temporary and permanent erosion control work for clearing and grubbing; grading; construction; paving; and structures at watercourses. The Contractor shall also submit a proposed method of erosion and dust control on haul roads and borrow pits and a plan for disposal of waste materials. Work shall not be started until the erosion control schedules and methods of operation for the applicable construction have been accepted by the Engineer.

During construction operations, dust shall be controlled to the satisfaction of the Engineer.

156-3.3 Construction details. The Contractor will be required to incorporate all permanent erosion control features into the project at the earliest practicable time as outlined in the accepted schedule. Except where future construction operations will damage slopes, the Contractor shall perform the permanent seeding and mulching and other specified slope protection work in stages, as soon as substantial areas of exposed slopes can be made available, but no later than 14 days after the completion of final grading activities unless temporary seeding is applied.. Temporary erosion and pollution control measures will be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of permanent control features; or that are needed temporarily to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.

Where erosion may be a problem, clearing and grubbing operations should be scheduled and performed so that grading operations and permanent erosion control features can follow immediately if project conditions permit; otherwise, temporary erosion control measures may be required.

The Engineer shall limit the area of clearing and grubbing, excavation, borrow, and embankment operations in progress, commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seeding, and other such permanent control measures current with the accepted

schedule. If seasonal limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible and justified as directed by the Engineer.

The Contractor shall provide immediate permanent or temporary pollution control measures to minimize contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment as directed by the Engineer. If temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled or directed by the Engineer, the work shall be performed by the Contractor and the cost shall be incidental to this item.

The Engineer may increase or decrease the area of erodible earth material that can be exposed at any time based on an analysis of project conditions.

The erosion control features installed by the Contractor shall be acceptably maintained by the Contractor during the construction period.

Whenever construction equipment must cross watercourses at frequent intervals, temporary structures should be provided.

Pollutants such as fuels, lubricants, bitumen, raw sewage, wash water from concrete mixing operations, and other harmful materials shall not be discharged into any waterways, impoundments or into natural or manmade channels.

156-3.4 Installation, maintenance and removal of silt fences. Silt fences shall extend a minimum of 16 inches (41 cm) and a maximum of 34 inches (86 cm) above the ground surface. Posts shall be set no more than 10 feet (3 m) on center. Filter fabric shall be cut from a continuous roll to the length required minimizing joints where possible. When joints are necessary, the fabric shall be spliced at a support post with a minimum 12-inch (300-mm) overlap and securely sealed. A trench shall be excavated approximately 4 inches (100 mm) deep by 4 inches (100 mm) wide on the upslope side of the silt fence. The trench shall be backfilled and the soil compacted over the silt fence fabric. The Contractor shall remove and dispose of silt that accumulates during construction and prior to establishment of permanent erosion control. The fence shall be maintained in good working condition until permanent erosion control is established. Silt fence shall be removed upon approval of the Engineer.

156-3.5 Erosion Control Maintenance. The temporary erosion control systems installed by the Contractor shall be properly repaired and maintained as directed by the Engineer to control siltation at all times during the life of the contract. If the Contractor fails to maintain the temporary erosion control systems as required to limit the erosion from the site, payment for the noted pay items in this section can be withheld or fines assessed

156-3.6 Removal Of Erosion Control. The Contractor shall remove and dispose of any of the sediment control items installed at the direction of the Engineer. The cost of this removal shall be incidental to this item.

156-3.7 Inlet Protection. The contractor shall construct inlet protection reservoirs around inlets on the project in accordance with the details shown in the plans. The contractor shall inspect, clean and properly maintain the excavated inlet protection basin after every storm until the contributing drainage basin has been permanently stabilized. The Contractor shall remove sediment when the volume of the basin has been reduced by one-half. The excavated material shall be spread evenly over the surrounding ground or placed in an area which still needs stabilized. Once the drainage basin has been stabilized, the basin shall be backfilled in accordance with Item P-152 and stabilized.

156-3.8 STABILIZED CONSTRUCTION ENTRANCE. A temporary, stabilized construction entrance shall be constructed at all entrance/exit to the project site for heavy construction traffic to/from public roads. The entrance shall serve as a durable entrance, as well as a dirt and sediment trap for

vehicles leaving the project site. The entrance shall consist of 12" of an ASTM C33, Size 2 or 3 crushed coarse aggregate on a geotextile separation fabric. The entrance shall be of a width adequate to accommodate full ingress and egress operations.

ASTM Size No.	Amounts finer than each laboratory sieve, mass percent passing						
	3 in.	2-1/2 in.	2 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.
2	100	90 to 100	35 to 70	0 to 15	--	0 to 5	--
3	--	100	90 to 100	35 to 70	0 to 15	--	0 to 5

The stabilized construction entrance shall be removed at project completion, and the disturbed area returned to its original condition or better.

The construction and removal of the stabilized construction entrance including all labor, materials, equipment, tools, and other effort necessary to meet the requirements of this section shall be considered incidental to the cost of the project and no separate measurement or payment will be made for this work.

156-3.6 PERMITS. The project is being constructed under a U.S. Army Corps of Engineers, Kansas City District, 404 Permit and Missouri Department of Natural Resources 401 Water Quality Certification. The contractor shall adhere to requirements regarding erosion and sediment control specified in the permit. A copy of the permit is available upon request.

TEMPORARY EROSION CONTROL **(SILT FENCE/STRAW BALES/ SILT DIKE DITCH CHECK)**

156-4.1 DESCRIPTION. This work shall consist of furnishing, installing, maintaining and removing erosion controls for temporary ditch checks and at other temporary locations shown on the plans for controlling pollution and erosion, and removing sediment deposits at these locations and disposing of the sediment deposits at a location approved by the engineer. The quantities of temporary erosion control shown on the plans may be increased or decreased at the direction of the engineer. At the engineer's discretion, the location may be field modified to fit field conditions. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

156-4.2 MATERIAL. Geotextile Fabric shall meet the physical and chemical requirements of AASHTO M 288.

Posts for silt fence may be wood, steel or synthetic. Posts shall be sufficient length, not less than 4 feet, to ensure adequate embedment while fully supporting the silt fence and shall have sufficient strength to resist damage during installation and to support applied loads while in service.

All geotextile silt fence shall be **supported either externally by wire or other approved mesh** to a height of at least 24 inches or by a suitable designed-in support system capable of keeping the material erect. Either method shall be strong enough to withstand applied loads. The support system shall be installed at all silt fence locations and shall be securely attached to the geotextile fabric.

Prefabricated fence systems may be used provided they meet all of the above requirements.

Straw bales shall meet the requirements of MO-908.

Posts for straw bales shall be wood. Posts shall be 2 inch by 2 inch and sufficient length, not less than 3 feet, to ensure adequate embedment.

Silt dike ditch checks shall be triangular in shape with a minimum height of 10 inches and shall consist of urethane foam and geotextile fabric with a protective apron.

156-4.3 CONSTRUCTION REQUIREMENTS. The contractor shall install the temporary erosion control as shown on the plans or at other locations as directed by the engineer. Silt fence construction shall be adequate to handle the stress from hydraulic and sediment loading. Fabric at the bottom of the silt fence shall be buried a minimum 6 inches so that no flow can pass under the barrier. The trench shall be backfilled and the soil compacted over the fabric. The fabric shall be spliced together only at a support post with a minimum 6-inch overlap. Any installation method acceptable to the engineer will be allowed as long as the effectiveness and intent of the silt fence is achieved.

Post spacing shall not exceed 5 feet. Posts shall be driven a sufficient depth into the ground or placed on closer spacing as necessary to ensure adequate resistance to applied loads.

The silt fence shall be fastened securely to the upslope side of the post. When wire support is used, the wire shall extend into the trench a minimum of 2 inches.

Straw bale construction shall be adequate to handle the stress from hydraulic and sediment loading. Geotextile fabric shall be fastened securely to the bale on the side of flow and on top and then embedded a minimum of 6 inches so that no flow can pass under the barrier.

Post spacing shall not exceed 2 feet. Posts shall be driven a sufficient depth into the ground or placed on closer spacing as necessary to ensure adequate resistance to applied loads.

The contractor shall maintain the integrity of the erosion control as long as they are necessary to contain sediment runoff. **The contractor shall inspect all erosion control** within 48 hours of a rain event exceeding 0.5 inches and at least daily during prolonged rainfall. Any deficiencies shall be immediately corrected by the contractor. In addition, the contractor shall make a **daily review** of the location of erosion control in areas where construction activities have changed the natural contour and drainage runoff to ensure the erosion control is properly located for effectiveness. Where deficiencies exist, additional erosion control shall be installed as approved or directed by the engineer.

The contractor shall remove and dispose of sediment deposits when the deposit approaches one-half the height of the original height or sooner when directed by the engineer. Periodic sediment removal shall include removal and disposal of sediment in a location where it will not erode into construction areas or watercourses.

The erosion control shall remain in place until the engineer directs it to be removed. Upon removal, the contractor shall remove and dispose of any excess silt accumulations, grade and dress the area to the satisfaction of the engineer, and establish vegetation on all bare areas in accordance with the contract requirements. The erosion control material shall remain the property of the contractor and may be used at other locations, provided the material continues to meet the requirements of this specification, is sound and not weakened by exposure to the elements.

Upon completion of the work and removal of the silt fence and silt dike ditch checks the contractor shall replace the area disturbed by the removal of the silt fence and silt dike ditch checks with sod in accordance with the details in the plans, matching the lines grades and elevations of the surrounding turf creating a smooth transition between the disturbed area and the surrounding turf. Installation of the sod shall be considered incidental to the silt fence and silt dike ditch check pay items.

156-4.4 METHOD OF MEASUREMENT. Measurement of temporary silt fence erosion control will be made to the nearest linear foot. The temporary erosion control will be measured in place from end to end of each separate installation completed and approved in place. The measurement of silt dike ditch check will be made per each installation location regardless of the total length needed at each location.

The removal of accumulated sediment shall not be measured for payment but shall be considered incidental to the silt fence and silt dike pay items.

156-4.5 BASIS OF PAYMENT. The accepted quantities of temporary site fence erosion control completed, accepted and in-place will be paid for at the contract unit price per linear foot. The accepted quantities of silt dike ditch check completed, accepted and in-place will be paid for at the contract unit price per each. Both items shall be full compensation for all labor, equipment and material to complete the described work. This includes maintaining and repairing the original structure and the removal and disposal of the erosion control after completion of the work. The contractor will be compensated if the engineer determines unusual conditions warrant a repair or replacement of the erosion control.

The removal of accumulated quantity of sediment is considered incidental to the silt fence and silt dike ditch check line items and will not be paid for.

There will be no payment for the construction of the temporary stabilized construction entrance, nor its removal, fine grading, seeding, and mulching upon project completion. It shall be considered incidental to the project.

Payment will be made under:

Item P-156-.5.1	Silt Fence--per linear foot
Item P-156-5.2	Silt Dike Ditch Check--per linear foot

TEMPORARY SEEDING AND MULCHING

156-5.1 DESCRIPTION. This work shall consist of fertilizing, furnishing and sowing of seed, mulching or other acceptable cover authorized by the engineer. This work shall produce a quick ground cover to reduce erosion in disturbed areas expected to be redisturbed at a later date. Finish grading of areas will not be required. Hydraulic seeding and fertilizing in accordance with P-901 will be allowed.

156-5.2 CONSTRUCTION REQUIREMENTS. Seeding and mulching shall be a continuous operation on all cut and fill slopes, excess material sites and borrow pits during the construction process. All disturbed areas shall be seeded and mulched as necessary to eliminate erosion. The contractor shall provide permanent seeding and mulching as shown on the plans following temporary seeding.

Temporary seeding mixtures of oats, cereal rye or wheat shall be applied at a rate of 100 pounds per acre. Temporary seeding mixtures of oats shall be applied only during the months of December through May.

Temporary mulch placed over temporary seed mixtures shall be applied in accordance with P-908.

Fertilizer shall be applied at a rate of 40 pounds nitrogen per acre. Lime will not be required for temporary seeding.

156-5.3 METHOD OF MEASUREMENT. Temporary Seeding and mulching will not be measured for payment but will be considered incidental to the grading and erosion control.

TEMPORARY ROLLED EROSION CONTROL PRODUCTS (RECP)

156-6.1 DESCRIPTION. This work shall consist of furnishing and installation of RECP acceptable and authorized by the engineer. Net-less or single-net blankets, as specified on the detail plan sheets, shall maintain a functional longevity between 3 and 12 months. The RECP must be composed of curled wood fibers with 80 percent of the fibers six-inch or greater in length, and of consistent thickness and fiber distribution throughout the entire area of the blanket. Single-net products shall be covered with photodegradable or biodegradable netting. Single-net products must provide protection from shear stress up to 1.75 lb/ft²; net-less products must provide protection from shear stress up to 1.0 lb/ft².

RECP shall be used as erosion control blanket on the embankment slopes as shown on the plans and in the areas shown for Wood Fiber Erosion Control Blanket on the stream stabilization plan sheets.

156-6.2 CONSTRUCTION REQUIREMENTS. Installation of RECP shall follow manufacturer's instructions. Within the areas shown on the plan sheets to be covered in RECP, the RECP shall not be installed prior to final grading and permanent seeding, and shall be installed within seven days of the permanent seeding, as approved by the engineer.

156-6.3 METHOD OF MEASUREMENT. Measurement of all RECP will be made to the nearest square yard.

156-6.4 BASIS OF PAYMENT. The accepted quantities of all RECP will be paid for at the contract unit price per square yard.

Payment will be made under:

P-156-5.3 _____ Erosion Control Blanket—per square yard

RIPRAP

156-7.1 DESCRIPTION. This item shall include the construction of permanent erosion control features through the use of a rock bed (riprap) placed on bedding material on geotextile fabric.

156-7.2 MATERIAL. The material for riprap shall consist of a predominantly one-sized, durable stone, shot rock, or broken concrete. Acceptance by the engineer may be made by visual inspection. The size of the riprap shall meet the requirements of the 2004 Missouri Standard Specification for Highway Construction (MSSHC), Section 609.60 – Rock Ditch Liner for Type 3 Rock Ditch Liner.

The riprap shall be placed on a bedding material that shall conform to the requirements of MSSHC, Section 609.60.2.5. Bedding shall consist of crushed stone or gravel with a gradation consisting of 100 percent passing the 3-inch sieve, 30 to 70 percent passing the 1-1/2-inch sieve and 0 to 15 percent passing the No. 4 sieve.

The geotextile fabric to be placed below the bedding material shall conform to the requirement of the MSSHC, Section 1011.3.3, Permanent Erosion Control Geotextile. The fabric shall meet the requirements of AASHTO Class 1 or Class 2 geotextiles, have a minimum permittivity of 1.0 sec⁻¹ and shall be suitable for use as permanent erosion control

156-7.3 CONSTRUCTION REQUIREMENTS. A trench at the toe of the pipe outlet shall be excavated to the dimensions shown on the plans or as indicated by the resident engineer in the field. The slopes shall conform to the proper cross section and be compacted to a uniform density as required for

adjacent material. The rock or broken concrete to be placed on the slope, to the specified thickness, elevation, and extent, and manipulated so that most of the flat sides are in contact, thereby eliminating large voids. The finished surface of the blanket shall present an appearance free from segregation and with a proportionate quantity of the larger pieces showing.

156-7.4 METHOD OF MEASUREMENT. Measurement of permanent rip rap erosion control shall be made by the square yard of rock bed (riprap), including the bedding material and geotextile fabric, in place installed and maintained by the Contractor and accepted by the Engineer.

156-7.5 BASIS OF PAYMENT. The accepted quantities of riprap will be paid for at the contract unit price per square yard and will be full compensation for all labor, equipment and material to complete the described work.

Payment will be made under:

Item P-156-5.4 Rip Rap--per square yard

INLET PROTECTION

156-8.1 DESCRIPTION. This work shall consist of constructing inlet protection basins in accordance with the details in the plans for the purpose of preventing infiltration of silt into the inlets.

156-8.2 CONSTRUCTION REQUIREMENTS. The contractor shall construct inlet protection reservoirs around inlets on the project in accordance with the details shown in the plans. The contractor shall inspect, clean and properly maintain the excavated inlet protection basin after every storm until the contributing drainage basin has been permanently stabilized. The Contractor shall remove sediment when the volume of the basin has been reduced by one-half. The excavated material shall be spread evenly over the surrounding ground or placed in an area which still needs stabilized. Once the drainage basin has been stabilized, the basin shall be backfilled in accordance with Item MO-152 and stabilized.

Posts for straw bales shall be wood. Posts shall be 2 inch by 2 inch and sufficient length, not less than 3 feet, to ensure adequate embedment.

156-8.3 METHOD OF MEASUREMENT. The quantity of inlet protection to be paid for shall be the number of inlet protection systems installed.

156-8.4 BASIS OF PAYMENT. The accepted quantity of inlet protection will be paid for at the contract unit price per each. This price shall be full compensation for all materials, equipment, labor and incidentals necessary to complete and maintain this work to the satisfaction of the Engineer.

Payment will be made under:

Item P 156-5.5 Inlet Protection--per each

END OF ITEM P-156

ITEM T-901 SEEDING

DESCRIPTION

901-1.1 This item shall consist of soil preparation, seeding, application of lime and commercial fertilizer on the areas shown on the plans or as directed by the Engineer in accordance with these specifications.

MATERIALS

901-2.1 Seed. The species and application rates of grass, legume, and cover-crop seed furnished shall be those stipulated herein. Seed shall conform to the requirements of Federal Specification JJJ-S-181, Federal Specification, Seeds, Agricultural.

Seed shall be furnished separately or in mixtures in standard containers labeled in conformance with the Agricultural Marketing Service (AMS) Seed Act and applicable state seed laws with the seed name, lot number, net weight, percentages of purity and of germination and hard seed, and percentage of maximum weed seed content clearly marked for each kind of seed. The Contractor shall furnish the Engineer duplicate signed copies of a statement by the vendor certifying that each lot of seed has been tested by a recognized laboratory for seed testing within six (6) months of date of delivery. This statement shall include: name and address of laboratory, date of test, lot number for each kind of seed, and the results of tests as to name, percentages of purity and of germination, and percentage of weed content for each kind of seed furnished, and, in case of a mixture, the proportions of each kind of seed. Wet, moldy, or otherwise damaged seed will be rejected.

Seeds shall be applied as follows:

Seed Mixture – Type A (Upland Turf Mix)*

Seed Species		Rate of Application
<i>Scientific Name</i>	Common Name	lb./acre
<i>Festuca arundinacea</i>	Tall Fescue	200
<i>Trifolium repens</i>	White Clover	2
Total		202

***no cover crop necessary unless seeded as a dormant crop (post August 1)**

Seed Mixture – Cover Crops, Type A*

Seed Species		Rate of Application
<i>Scientific Name</i>	Common Name	lb./acre
August 1-September 15		
<i>Avena sativa</i>	Oats	50
September 16-October 10		
<i>Triticum aestivum</i>	Winter Wheat	50

***Only necessary if dormant seeding; seeding prior to March 1 or past October 10 not permissible**

***Seeding prior to March 1 or past October 10 not permissible**

The following percentages for purity and germination or pure live seed will be the minimum requirements in the acceptance of seed, unless otherwise permitted by the engineer. For species not shown on the table, PLS listed for each vendor must be supplied to the engineer to determine if adjustments to the seeding rates is required.

SEED REQUIREMENTS				
Non-native Grasses	Scientific Name	Purity	Germination¹	Pure Live Seed
Tall Fescue	Festuca arundinacea	97	85	
Cereal or Cover Crop	Scientific Name	Purity	Germination	Pure Live Seed
Oat Grain	Avena sativa	98	85	
Wheat Grain	Triticum aestivum	97	85	
Legumes	Scientific Name	Purity	Germination	Pure Live Seed
White Clover	Trifolium repens	98	85	
Native Grasses	Scientific Name	Purity	Variety(s)	Pure Live Seed
Blue Grama	Bouteloua gracilis			40
Buffalograss	Buchloe dactyloides		Mo. Ecotype Sharp's Improved Texoka	65
Little Bluestem	Schizachyrium scoparium		Mo. Ecotype Aldous Cimmaron	40
Wildrye, Canada	Elymus canadensis			60
Rough Dropseed	Sporobolus compositus ²		Mo. Ecotype	40

¹ Will not apply if unhulled or unscarified seed is specified.

² *S. asper* synonym

If the specified quantity is in pounds of seed, no reduction will be permitted in the specified quantity of seed if the purity or germination, or both, are higher than the minimum required by the specifications. If the specified quantity is in pounds of pure live seed, the pure live seed quantity shall be determined from the actual percentage shown by the supplier for native grasses or by multiplying the actual percentages of purity times the actual percentage of germination including hard seed for other seed.

All leguminous seed shall be inoculated or treated with the proper quantity of cultures approved for the particular legume to be sown. Leguminous seed include alsike clover, Korean lespedeza, red clover, white clover, hairy vetch, partridge pea and slender bush clover. The inoculant for treating leguminous seed shall be a nitrogen-fixing bacteria culture. The inoculant containers shall be plainly marked with the expiration date for use. The manufacturer's recommendations for inoculating seed shall be followed.

901-2.2 Lime. Lime shall be ground limestone containing not less than 85% of total carbonates, and shall be ground to such fineness that 90% will pass through a No. 20 mesh sieve and 50% will pass through a No. 100 mesh sieve. Coarser material will be acceptable, providing the rates of application are increased to provide not less than the minimum quantities and depth specified in the special provisions on the basis of the two sieve requirements above. Dolomitic lime or a high magnesium lime shall contain at least 10% of magnesium oxide. Lime shall be applied at the rate of **1,000 lbs per acre**. All liming materials shall conform to the requirements of ASTM C602.

The Contractor may test the in-place topsoil in order to reduce the required rate of application of lime to provide at least the quantity of effective neutralizing material (E.N.M.) in pounds per acre subsequent to grading activities, prior to seeding application. Surface soil pH will be supplied to the engineer by the contractor and the Engineer shall determine if a reducing in lime is acceptable.

901-2.3 Fertilizer. Fertilizer shall be a standard commercial product which, when applied at the proper rate, will supply the quantity of total nitrogen (N), available phosphoric acid (P₂O₅) and soluble potash (K₂O) as specified below. Material may be accepted on the basis of bag label analysis or supplier's certification, and shall be in accordance with all applicable Missouri fertilizer laws.

Fertilizer	lbs/acre
Nitrogen (N)	40
Phosphoric Acid (P ₂ O ₅)	10
Potash (K ₂ O)	20

901-2.4 Soil for repairs. The soil for fill and topsoiling of areas to be repaired shall be at least of equal quality to that which exists in areas adjacent to the area to be repaired. The soil shall be relatively free from large stones, roots, stumps, or other materials that will interfere with subsequent sowing of seed, compacting, and establishing turf, and shall be approved by the Engineer before being placed.

CONSTRUCTION METHODS

901-3.1 Advance preparation and cleanup. After grading of areas has been completed and before applying fertilizer and ground limestone, areas to be seeded shall be raked or otherwise cleared of stones larger than 2 inches (50 mm) in any diameter, sticks, stumps, and other debris that might interfere with sowing of seed, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other causes has occurred after the completion of grading and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage include filling gullies, smoothing irregularities, and repairing other incidental damage.

An area to be seeded shall be considered a satisfactory seedbed without additional treatment if it has recently been thoroughly loosened and worked to a depth of not less than 5 inches (125 mm) as a result of grading operations and, if immediately prior to seeding, the top 3 inches (75 mm) of soil is loose, friable, reasonably free from large clods, rocks, large roots, or other undesirable matter, and if shaped to the required grade.

When the area to be seeded is sparsely sodded, weedy, barren and unworked, or packed and hard, any grass and weeds shall first be cut or otherwise satisfactorily disposed of, and the soil then scarified or otherwise loosened to a depth not less than 5 inches (125 mm). Clods shall be broken and the top 3 inches (75 mm) of soil shall be worked into a satisfactory seedbed by discing, or by use of cultipackers, rollers, drags, harrows, or other appropriate means.

901-3.2 Dry application method.

a. Liming. Lime shall be applied separately and prior to the application of any fertilizer or seed and only on seedbeds that have previously been prepared as described above. The lime shall then be worked into the top 3 inches (75 mm) of soil after which the seedbed shall again be properly graded and dressed to a smooth finish.

b. Fertilizing. Following advance preparations and cleanup fertilizer shall be uniformly spread at the rate that will provide not less than the minimum quantity stated in paragraph 901-2.3.

c. Seeding. Grass seed shall be sown at the rate specified in paragraph 901-2.1 immediately after fertilizing. The fertilizer and seed shall be raked within the depth range stated in the special provisions. Seeds of legumes, either alone or in mixtures, shall be inoculated before mixing or sowing, in accordance with the instructions of the manufacturer of the inoculant. When seeding is required at other than the seasons shown on the plans or in the special provisions, a cover crop shall be sown by the same methods required for grass and legume seeding.

d. Rolling. After the seed has been properly covered, the seedbed shall be immediately compacted by means of an approved lawn roller, weighing 40 to 65 pounds per foot (60 to 97 kg per meter) of width for clay soil (or any soil having a tendency to pack), and weighing 150 to 200 pounds per foot (223 to 298 kg per meter) of width for sandy or light soils.

901-3.3 Wet application method.

a. General. The Contractor may elect to apply seed and fertilizer (and lime, if required) by spraying them on the previously prepared seedbed in the form of an aqueous mixture and by using the methods and equipment described herein. The rates of application shall be as specified in the special provisions.

b. Spraying equipment. The spraying equipment shall have a container or water tank equipped with a liquid level gauge calibrated to read in increments not larger than 50 gallons (190 liters) over the entire range of the tank capacity, mounted so as to be visible to the nozzle operator. The container or tank shall also be equipped with a mechanical power-driven agitator capable of keeping all the solids in the mixture in complete suspension at all times until used.

The unit shall also be equipped with a pressure pump capable of delivering 100 gallons (380 liters) per minute at a pressure of 100 lb / sq inches (690 kPa). The pump shall be mounted in a line that will recirculate the mixture through the tank whenever it is not being sprayed from the nozzle. All pump passages and pipe lines shall be capable of providing clearance for 5/8 inch (16 mm) solids. The power unit for the pump and agitator shall have controls mounted so as to be accessible to the nozzle operator. There shall be an indicating pressure gauge connected and mounted immediately at the back of the nozzle.

The nozzle pipe shall be mounted on an elevated supporting stand in such a manner that it can be rotated through 360 degrees horizontally and inclined vertically from at least 20 degrees below to at least 60 degrees above the horizontal. There shall be a quick-acting, three-way control valve connecting the recirculating line to the nozzle pipe and mounted so that the nozzle operator can control and regulate the amount of flow of mixture delivered to the nozzle. At least three different types of nozzles shall be supplied so that mixtures may be properly sprayed over distance varying from 20 to 100 feet (6 to 30 m). One shall be a close-range ribbon nozzle, one a medium-range ribbon nozzle, and one a long-range jet

nozzle. For case of removal and cleaning, all nozzles shall be connected to the nozzle pipe by means of quick-release couplings.

In order to reach areas inaccessible to the regular equipment, an extension hose at least 50 feet (15 m) in length shall be provided to which the nozzles may be connected.

c. Mixtures. Lime, if required, shall be applied separately, in the quantity specified, prior to the fertilizing and seeding operations. Not more than 220 pounds (100 kg) of lime shall be added to and mixed with each 100 gallons (380 liters) of water. Seed and fertilizer shall be mixed together in the relative proportions specified, but not more than a total of 220 pounds (100 kg) of these combined solids shall be added to and mixed with each 100 gallons (380 liters) of water.

All water used shall be obtained from fresh water sources and shall be free from injurious chemicals and other toxic substances harmful to plant life. Brackish water shall not be used at any time. The Contractor shall identify to the Engineer all sources of water at least two (2) weeks prior to use. The Engineer may take samples of the water at the source or from the tank at any time and have a laboratory test the samples for chemical and saline content. The Contractor shall not use any water from any source that is disapproved by the Engineer following such tests.

All mixtures shall be constantly agitated from the time they are mixed until they are finally applied to the seedbed. All such mixtures shall be used within two (2) hours from the time they were mixed or they shall be wasted and disposed of at approved locations.

d. Spraying. Lime, if required, shall be sprayed only upon previously prepared seedbeds. After the applied lime mixture has dried, the lime shall be worked into the top 3 inches (75 mm), after which the seedbed shall again be properly graded and dressed to a smooth finish.

Mixtures of seed and fertilizer shall only be sprayed upon previously prepared seedbeds on which the lime, if required, shall already have been worked in. The mixtures shall be applied by means of a high-pressure spray that shall always be directed upward into the air so that the mixtures will fall to the ground like rain in a uniform spray. Nozzles or sprays shall never be directed toward the ground in such a manner as might produce erosion or runoff.

Particular care shall be exercised to ensure that the application is made uniformly and at the prescribed rate and to guard against misses and overlapped areas. Proper predetermined quantities of the mixture in accordance with specifications shall be used to cover specified sections of known area.

Checks on the rate and uniformity of application may be made by observing the degree of wetting of the ground or by distributing test sheets of paper or pans over the area at intervals and observing the quantity of material deposited thereon.

On surfaces that are to be mulched as indicated by the plans or designated by the Engineer, seed and fertilizer applied by the spray method need not be raked into the soil or rolled. However, on surfaces on which mulch is not to be used, the raking and rolling operations will be required after the soil has dried.

901-3.4 Maintenance of seeded areas. The Contractor shall protect seeded areas against traffic or other use by warning signs or barricades, as approved by the Engineer. Surfaces gullied or otherwise damaged following seeding shall be repaired by regrading and reseeding as directed. The Contractor shall mow, water as directed, and otherwise maintain seeded areas in a satisfactory condition until final inspection and acceptance of the work.

When either the dry or wet application method outlined above is used for work done out of season, it will be required that the Contractor establish a good stand of grass of uniform color and density to the satisfaction of the Engineer. A grass stand shall be considered adequate when bare spots are one square foot (0.01 sq m) or less, randomly dispersed, and do not exceed 3% of the area seeded.

METHOD OF MEASUREMENT

901-4.1 The quantity of seeding to be paid for shall be the number of units **to the nearest 1/10 acre** measured on the ground surface, completed and accepted.

BASIS OF PAYMENT

901-5.1 Payment shall be made at the contract unit price per **acre** or fraction thereof, which price and payment shall be full compensation for furnishing and placing all material and for all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this item.

Payment will be made under:

Item 901-5.1 Seeding - per acre

MATERIAL REQUIREMENTS

ASTM C602	Standard Specification for Agricultural Liming Materials
ASTM D977	Standard Specification for Emulsified Asphalt
FED SPEC	JJJ-S-181, Federal Specification, Seeds, Agricultural

END OF ITEM T-901

ITEM T-908 MULCHING

DESCRIPTION

908-1.1 This work shall consist of furnishing, hauling, placing, and securing hydraulically applied mulch on surfaces indicated on the plans or as designated by the engineer. Disturbed areas outside of authorized construction limits shall be mulched at the contractor's expense. This work may be combined with the seeding described in Item MO-901 in areas other than are not to receive erosion control blanket.

MATERIALS

908-2.0 BUY AMERICAN. All materials used for this work shall meet the requirements of Buy American in accordance with Title 49 U.S.C. Section 50101. A certification statement or waiver request shall be submitted by the supplier for each proposed material. All waiver requests shall be submitted prior to issuance of the Notice to Proceed.

908-2.1 HYDRALICALLY APPLIED MULCH MATERIALS. No vegetative mulch will be allowed on this project. In lieu of the vegetative mulch, a hydraulically applied mulch material shall be applied. The mulch material shall be North American Green HydraCM or approved equal and shall be green in color.

The contractor shall furnish a manufacturer's certification in triplicate certifying that the overspray mulch materials comply with these specifications. The engineer may sample and test these materials prior to approval and use. Acceptance will be based upon a satisfactory certification and results of any test deemed necessary by the engineer.

CONSTRUCTION METHODS

908-3.1 MULCHING. Before spreading mulch, all stones larger than 2 inches in any diameter, sticks, stumps, and other debris shall be removed from the area to be mulched. All mulch shall be distributed evenly over the area to be mulched within 24 hours following the seeding operation.

Special care shall be taken to prevent any of the slurry from being sprayed onto any hardscape areas including concrete walks, pavements, fences, buildings, runway and taxiway edge lights, etc. Any slurry sprayed onto surfaces other than those to be seeded shall be washed immediately before the slurry dries.

The hydraulically applied mulch shall be mixed and applied according to the manufacturers recommendations. The Contractor shall provide the Engineer a copy of the manufacturer's installation procedures a minimum of seven (7) calendar days prior to the start of the work.

The mulch material shall be mixed with water in a manner to provide a homogenous slurry as recommended by the manufacturer. Equipment for mixing and applying the slurry shall be capable of applying it uniformly over the seeded ground surface. The slurry mixture shall be agitated during application to keep the ingredients thoroughly mixed.

The mulch material shall be applied at a rate of 2,500 pounds per acre. All empty packaging shall be kept onsite until the Engineer authorizes the removal of the packaging. The empty packaging will be used by the Engineer for yield check calculations for the application rate.

Mulch shall provide uniform coverage and thickness such that rill erosion is prevented from sheet flow during precipitation events. Bare soil should not be exposed. Mulch layer shall be applied to engineer's satisfaction. Mulching shall not occur prior to seeding.

908-3.2 CARE AND REPAIR.

Following the overspray operation, precautions shall be taken to prohibit foot or vehicular traffic over the mulched area. The contractor shall be required to repair or replace any mulching that is defective or becomes damaged until the project is finally accepted. When, in the judgment of the engineer, such defects or damages are the result of poor workmanship or failure to meet the requirements of the specifications, the cost of the necessary repairs or replacement shall be borne by the contractor.

However, once the contractor has completed the mulching of any area in accordance with the provisions of the specifications and to the satisfaction of the engineer, no additional work at his/her expense will be required, but subsequent repairs and replacements deemed necessary by the engineer shall be made by the contractor and will be paid for as additional or extra work in accordance with Section 40-04 of the General Provisions.

METHOD OF MEASUREMENT

908-4.1 Measurement of mulch will be made to the nearest 1/10 acre of the area mulched. Temporary mulching as required under MO-156 and the SWPPP will not be measured for payment and shall be considered incidental to the contract. Mulching required for pond removal shall not be measured for payment and shall be considered incidental to the pond removal.

BASIS OF PAYMENT

908-5.1 Payment shall be made at the contract unit price per acre or fraction thereof, for the accepted quantity of mulching. The price shall be full compensation for furnishing and placing all material and for all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this item.

Payment will be made under:

Item T-908-5.1 Mulching--per acre

END ITEM T-908