CITY OF NORMAN, OK
FLOODPLAIN PERMIT COMMITTEE MEETING
Development Center, Room B, 225 N. Webster Ave., Norman, OK 73069
Tuesday, September 02, 2025 at 3:30 PM

AGENDA

It is the policy of the City of Norman that no person or groups of persons shall on the grounds of race, color, religion, ancestry, national origin, age, place of birth, sex, sexual orientation, gender identity or expression, familial status, marital status, including marriage to a person of the same sex, disability, relation, or genetic information, be excluded from participation in, be denied the benefits of, or otherwise subjected to discrimination in employment activities or in all programs, services, or activities administered by the City, its recipients, sub-recipients, and contractors. In the event of any comments, complaints, modifications, accommodations, alternative formats, and auxiliary aids and services regarding accessibility or inclusion, please call 405-366-5424, Relay Service: 711. To better serve you, five (5) business days' advance notice is preferred.

ROLL CALL

MINUTES

1. Approval of Minutes from the August 18, 2025 Meeting

ACTION ITEMS

2. **Floodplain Permit Application No. 724 -** This permit application is for the proposed replacement of an existing natural gas line in the floodplain of Bishop Creek near the intersection of Dewey Ave. and Merrimac St.

3. **Floodplain Permit Application No. 730 -** This permit application is for the proposed construction of a bank stabilization project in the Imhoff Creek channel south of Imhoff Road and north of State Highway 9.

MISCELLANEOUS COMMENTS

ADJOURNMENT

CITY OF NORMAN, OK
FLOODPLAIN PERMIT COMMITTEE MEETING

Development Center, Conference Room B, 225 N. Webster Avenue, Norman, OK 73069
Monday August 18, 2025 at 3:30 PM

MINUTES

The Floodplain Permit Committee of the City of Norman, Cleveland County, State of Oklahoma, met in Regular Session in Conference Room B at the Development Center, on the 18th day of August, 2025, at 3:30 p.m., and notice of the agenda of the meeting was posted at the Norman Municipal Building at 201 West Gray, Development Center at 225 N. Webster and on the City website at least 24 hours prior to the beginning of the meeting.

ROLL CALL

The meeting was called to order by Mr. Miles at 3:30 p.m. Roll was taken. Committee members in attendance included Bill Scanlon, Resident Member; Sherri Stansel, Resident Member; Tim Miles, City Engineer; Lora Hoggatt, Planning Services Manager; and Ken Danner, Subdivision Development Manager. Committee members absent included Scott Sturtz, Floodplain Administrator and Jane Hudson, Director of Planning. Also in attendance were Todd McLellan, Development Engineer; Jason Murphy, Stormwater Program Manager; and Roxsie Stephens, Staff. Citizens in attendance included Heather Reeves, Kevin Smith, Chris Anderson, Jeanne Fuller, and Jerry Brown.

MINUTES

1. Approval of minutes from the Aug 4th, 2025, meeting
    a. Mr. Danner motioned to approve the minutes. Mrs. Hoggatt seconded the motion. Minutes were approved with a vote of 5 to 0.

ACTION ITEMS

2. Floodplain Permit No. 728

Mr. Miles stated that the floodplain permit application is for the proposed development of Summit Valley Section 4 Subdivision located north of the intersection of Highway 9 and 36th Ave SE.

Mr. Miles stated the applicant is Summit Valley Development LLC. The engineer is SMC Consulting Engineers.

Mr. Murphy provided the staff report, detailing the request with respect to the floodplain permit requirements and potential impacts. It was noted that the preliminary plat for this development was originally completed in 2003 and then revised in 2020.

Mr. Murphy stated staff recommends permit app #728 be approved.

Mr. Miles asked for any comments from the public.

The public attendees expressed concerns related to the potential impacts the development could have for run off and to the green belt. Chris Anderson stated that the flood study was done in 2003 and again in 2020.

Mr. Miles asked the committee if they had any questions.

Mr. Danner motioned to approve the permit. Mrs. Hoggatt seconded the motion.

The permit application was approved with a vote of 5-0.

MISCELLANEOUS COMMENTS

ADJOURNMENT

Mr. Danner motioned to adjourn. Mr. Scanlon seconded the motion. Mr. Miles adjourned the meeting at 4:08 p.m.

Passed and approved this _____ day of _____ , 2025

_____

City of Norman City Engineer, Tim Miles
For City of Norman Floodplain Administrator, Scott Sturtz

STAFF REPORT 09/02/2025 **PERMIT NO. 724**

ITEM: This Floodplain Permit Application is for the proposed replacement of an existing natural gas pipeline in the Bishop Creek floodplain near the intersection of Merrimac St. and Dewey Ave. and north of State Highway 9.

BACKGROUND:
APPLICANT: Oklahoma Natural Gas – Drew Nixon
ENGINEER: Johnson and Associates – Brian Rowe

The applicant is proposing a project to bore under Bishop Creek to replace a gas main. The proposed bore pits will be located outside of the regulatory floodplain in the gas line easement. The bore pits will be approximately 410' apart according the submitted plans. The width of the floodplain at this location is approximately 260'. Plans indicate that no ground disturbance within the floodplain will occur.

STAFF ANALYSIS:
Site located in the Lake Thunderbird Watershed? Yes _ No ✓

According to the latest FIRM, the site of the proposed work is located in the Bishop Creek Floodplain (Zone AE). The BFE for this location is 1109.0'.

Applicable Ordinance Sections:		Subject Area:
36-533	(e)2(a)……	Fill restrictions
	(e)2(e)……	Compensatory storage
	(e)4(c)……	Special requirements for drilling oil and gas wells
	(f)(3)(8) …….....	No rise considerations

(e)2(a) and (e)2(e) Fill Restrictions in the Floodplain and Compensatory Storage – Fill is restricted because storage capacity is removed from floodplains, natural drainage patterns are adversely altered, and erosion problems can develop. Compensatory storage must be provided within the general location of any storage that is displaced by fill or other development activity and must serve the equivalent hydrologic function as the portion which is displaced with respect to the area and elevation of the floodplain.

> No ground disturbance or fill will be brought into the floodplain as a result of this project. Only boring will occur within the floodplain. Bore pits will be located outside of the floodplain.

(e)4(c) Special Requirements for drilling oil and gas wells in a special flood hazard area (SFHA) – … The drilling operation shall comply with all other local, State and federal requirements prior to issuance of a floodplain development permit. All new or replacement flowlines, pipelines, etc., that will cross rivers, streams, creeks, and channels, shall be bored to be below the bed. The depth below the bed shall be a minimum of ten feet. The pipe used for the crossing shall be one pipe grade higher, or have a wall thickness twice the thickness of the standard pipe used for the flowline, pipeline, etc. If the flowline, pipeline, etc. becomes exposed, the crossing must be rebored. The ground surface shall not be disturbed within 50 feet of the river, stream, creek, or channel banks.

> The applicant has indicated in their plans that the replacement gas main will be a minimum of 10' below Bishop Creek and the bore pits are located out of the SFHA and greater than 50' from the edge of channel.

(f)3(a)(8) No Rise Considerations – For proposed development within any flood hazard area (except for those designated as regulatory floodways), certification that a rise of no more than 0.05 ft. will occur in the BFE on any adjacent property as a result of the proposed work is required. For proposed development within a designated regulatory floodway, certification that no increase in the BFE on any adjacent

property as a result of the proposed work is required.

The project engineer has submitted a No Rise statement and floodplain analysis report indicating that this project will not cause a rise in the BFE at this location, meeting the ordinance requirements.

RECOMMENDATION: Staff recommends Floodplain Permit Application #724 be approved.

ACTION TAKEN: _____

City of Norman

Floodplain Permit Application

Floodplain Permit No. 724

Building Permit No. _____

Date 9/2/2025

FLOODPLAIN PERMIT APPLICATION
($100.00 Application Fee Required)

SECTION 1: GENERAL PROVISIONS (APPLICANT to read and sign):

1. No work may start until a permit is issued.
2. The permit may be revoked if any false statements are made herein.
3. If revoked, all work must cease until permit is re-issued.
4. Development shall not be used or occupied until a Certificate of Occupancy is issued.
5. The permit will expire if no work is commenced within 2 years of issuance.
6. Applicant is hereby informed that other permits may be required to fulfill local, state and federal regulatory requirements and must be included with this floodplain permit application.
7. Applicant hereby gives consent to the City of Norman or his/her representative to access the property to make reasonable inspections required to verify compliance.
8. The following floodplain modifications require approval by the City Council:
   (a) A modification of the floodplain that results in a change of ten percent (10%) or more in the width of the floodplain.
   (b) The construction of a pond with a water surface area of 5 acres or more.
   (c) Any modifications of the stream banks or flow line within the area that would be regulatory floodway whether or not that channel has a regulatory floodplain, unless the work is being done by the City of Norman staff as part of a routine maintenance activity.
9. All supporting documentation required by this application is required along with the permit fee by the submittal deadline. Late or incomplete applications will not be accepted.
10. I, THE APPLICANT, CERTIFY THAT ALL STATEMENTS HEREIN AND IN ATTACHMENTS TO THIS APPLICATION ARE, TO THE BEST OF MY KNOWLEDGE, TRUE AND ACCURATE.

SECTION 2: PROPOSED DEVELOPMENT (To be completed by APPLICANT.)

APPLICANT: Oklahoma Natural Gas | Drew Nixon ADDRESS: 4901 N. Santa Fe Avenue

TELEPHONE: 405.530.2563 SIGNATURE: Teagan Moore

BUILDER: _____ ADDRESS: _____

TELEPHONE: _____ SIGNATURE: _____

ENGINEER: Johnson and Associates | Brian Rowe ADDRESS: 1 E. Sheridan Avenue, Suite 200

TELEPHONE: 405.235.8075 SIGNATURE: _____

PROJECT LOCATION

To avoid delay in processing the application, please provide enough information to easily identify the project location. Provide the street address, subdivision addition, lot number or legal description (attach) and, outside urban areas, the distance to the nearest intersecting road or well known landmark. A sketch attached to this application showing the project location would be helpful.

Columbus & Monitor, Norman.

Exact coordinates: Latitude 35.1801869133584 Longitude -97.4315498544041

DESCRIPTION OF WORK (Check all applicable boxes):

A. STRUCTURAL DEVELOPMENT

ACTIVITY	STRUCTURE TYPE
☐ New Structure	☐ Residential (1-4 Family)
☐ Addition	☐ Residential (More than 4 Family)
☐ Alteration	☐ Non-Residential (Flood proofing? ☐ Yes)
☐ Relocation	☐ Combined Use (Residential & Commercial)
☐ Demolition	☐ Manufactured (Mobile) Home
☐ Replacement	☐ In Manufactured Home Park? ☐ Yes

ESTIMATED COST OF PROJECT $_____ Work that involves substantial damage/substantial improvement requires detailed cost estimates and an appraisal of the structure that is being improved.

B. OTHER DEVELOPMENT ACTIVITIES:

☐ Fill ☐ Mining ☐ Drilling ☐ Grading ☑ Gas Main Installation

☐ Excavation (Beyond the minimum for Structural Development)

☐ Watercourse Alteration (Including Dredging and Channel Modifications)

☐ Drainage Improvements (Including Culvert Work) ☐ Road, Street or Bridge Construction

☐ Subdivision (New or Expansion) ☐ Individual Water or Sewer System

In addition to items A. and B. provide a complete and detailed description of proposed work (failure to provide this item will be cause for the application to be rejected by staff). Attach additional sheets if necessary.

Boring for ONG gas line project to replace BS Main in Norman. Install 3,025' of 8" PE Main and 570' of 8" CS

C. ATTACHMENTS WHICH ARE REQUIRED WITH EVERY APPLICATION:

The applicant must submit the documents listed below before the application can be processed. If the requested document is not relevant to the project scope, please check the Not Applicable box and provide explanation.

A. Plans drawn to scale showing the nature, location, dimensions, and elevation of the lot, existing or proposed structures, fill, storage of materials, flood proofing measures, and the relationship of the above to the location of the channel, floodway, and the regulatory flood-protection elevation.

B. A typical valley cross-section showing the channel of the stream, elevation of land areas adjoining each side of the channel, cross-sectional areas to be occupied by the proposed development, and high-water information.

☐ Not Applicable:

C. Subdivision or other development plans (If the subdivision or other developments exceeds 50 lots or 5 acres, whichever is the lesser, the applicant **must** provide 100-year flood elevations if they are not otherwise available).

☑ Not Applicable:
Application for gas extension bore only

D. Plans (surface view) showing elevations or contours of the ground; pertinent structure, fill, or storage elevations; size, location, and spatial arrangement of all proposed and existing structures on the site; location and elevations of streets, water supply, sanitary facilities; photographs showing existing land uses and vegetation upstream and downstream, soil types and other pertinent information.

☐ Not Applicable:
Bore plan provided

E. A profile showing the slope of the bottom of the channel or flow line of the stream.

☐ Not Applicable:
Bore plan provided

F. Elevation (in relation to mean sea level) of the lowest floor (including basement) of all new and substantially improved structures.

☑ Not Applicable:
No proposed structures

G. Description of the extent to which any watercourse or natural drainage will be altered or relocated as a result of proposed development.

☑ Not Applicable:
No proposed watercourse alterations

H. For proposed development within any flood hazard area (except for those areas designated as regulatory floodways), certification that a rise of no more than five hundredths of a foot (0.05') will occur on any adjacent property in the base flood elevation as a result of the proposed work. For proposed development within a designated regulatory floodway, certification of no increase in flood levels within the community during the occurrence of the base flood discharge as a result of the proposed work. All certifications shall be signed and sealed by a Registered Professional Engineer licensed to practice in the State of Oklahoma.

I. A certified list of names and addresses of all record property owners within a three hundred fifty (350) foot radius of the exterior boundary of the subject property not to exceed 100 feet laterally from the Special Flood Hazard Area. The radius to be extended by increments of one hundred (100) linear feet until the list of property owners includes not less than fifteen (15) individual property owners of separate parcels or until a maximum radius of one thousand (1,000) feet has been reached.

J. A copy of all other applicable local, state, and federal permits (i.e. U.S. Army Corps of Engineers 404 permit, etc).

After completing SECTION 2, APPLICANT should submit form to Permit Staff for review.

SECTION 3: FLOODPLAIN DETERMINATION (To be completed by Permit Staff.)

The proposed development is located on FIRM Panel No.: 40027C0295J, Dated: 2/20/2013

The Proposed Development:

☐ Is NOT located in a Special Flood Hazard Area
(Notify the applicant that the application review is complete and NO FLOODPLAIN PERMIT IS REQUIRED).

☑ Is located in a Special Flood Hazard Area. (Bore under)

☑ The proposed development is located in a floodway.

☐ 100-Year flood elevation at the site is 1108.9' Ft. NGVD (MSL) ☐ Unavailable

See Section 4 for additional instructions.

SIGNED: _____ **DATE:** 8/27/2025

SECTION 4: ADDITIONAL INFORMATION REQUIRED (To be completed by Permit Staff.)

The applicant must also submit the documents checked below before the application can be processed.

☐ Flood proofing protection level (non-residential only) _____ Ft. NGVD (MSL). For flood proofed structures applicant must attach certification from registered engineer.

☐ Certification from a registered engineer that the proposed activity in a regulatory floodway will not result in any increase in the height of the 100-year flood (Base Flood Elevation). A copy of all data and calculations supporting this finding must also be submitted.

☐ Certification from a registered engineer that the proposed activity in a regulatory flood plain will result in an increase of no more than 0.05 feet in the height of the 100-year flood (Base Flood Elevation). A copy of all data and calculations supporting this finding must also be submitted.

☐ All other applicable federal, state, and local permits have been obtained.

Other: _____

_____

_____

SECTION 5: PERMIT DETERMINATION (To be completed by Floodplain Chairman.)

The proposed activity: **(A)** ☐ **Is**; **(B)** ☐ **Is Not** in conformance with provisions of Norman's City Code Chapter 22, Section 429.1. The permit is issued subject to the conditions attached to and made part of this permit.

SIGNED: _____ DATE: _____

If **BOX A** is checked, the Floodplain committee chairman may issue a Floodplain Permit.

If **BOX B** is checked, the Floodplain committee chairman will provide a written summary of deficiencies. Applicant may revise and resubmit an application to the Floodplain committee or may request a hearing from the Board of Adjustment.

APPEALS: Appealed to Board of Adjustment: ☐ Yes ☐ No

Hearing date: _____

Board of Adjustment Decision - Approved: ☐ Yes ☐ No

Conditions:

_____

_____

_____

SECTION 6: AS-BUILT ELEVATIONS (To be submitted by APPLICANT before Certificate of Occupancy is issued.)

1. FEMA Elevation Certificate
   and/or
2. FEMA Floodproofing Certificate

NOTE: The completed certificate will be reviewed by staff for completeness and accuracy. If any deficiencies are found it will be returned to the applicant for revision. A Certificate of Occupancy for the structure will not be issued until an Elevation and /or Floodproofing Certificate has been accepted by the City.

JOHNSON & ASSOCIATES

1 EAST SHERIDAN, SUITE 200
OKLAHOMA CITY, OK 73104
(405) 235-8075

August 12, 2025

City of Norman – Stormwater Management Division
225 N. Webster
Norman, OK 73069

Attention: Mr. Jason Murphy, CFM

RE: Oklahoma Natural Gas – Gas Main Replacement
No-Rise Certification

Dear Mr. Murphy:

Johnson & Associates, on behalf of Oklahoma Natural Gas Company, is submitting the following 'No-Rise' certification for a gas main replacement in the area north of E. State Highway 9 crossing under Bishop Creek. The entire project is located within the City of Norman, Cleveland County, Oklahoma, Sec. 8, T8N, R2W, of the I.M.

The project will replace an existing gas main with a new 6" gas main pipe along E. State Highway, approximately 0.5 mile easterly of S. Jenkins Avenue via a trench and bore operation. Trenching is proposed where feasible, and bore methods will be used when crossing creeks and for existing improvements. All ground disturbance proposed in this application, including ground elevations and landscaping cover, will be restored to pre-project conditions. The alignment proposed is defined and shown on the attached bore profile improvement plan.

A portion of the alignment crosses under the effective Bishop Creek floodplain. The methods and alignment of the proposed construction will have zero impact on the flow conveyance and will result in "no rise" to the flood elevations in the creeks being crossed. Furthermore, no above-ground structures requiring protection from the 100-year flood event are proposed.

Based on the above, please issue the floodplain activity permit required for the development.

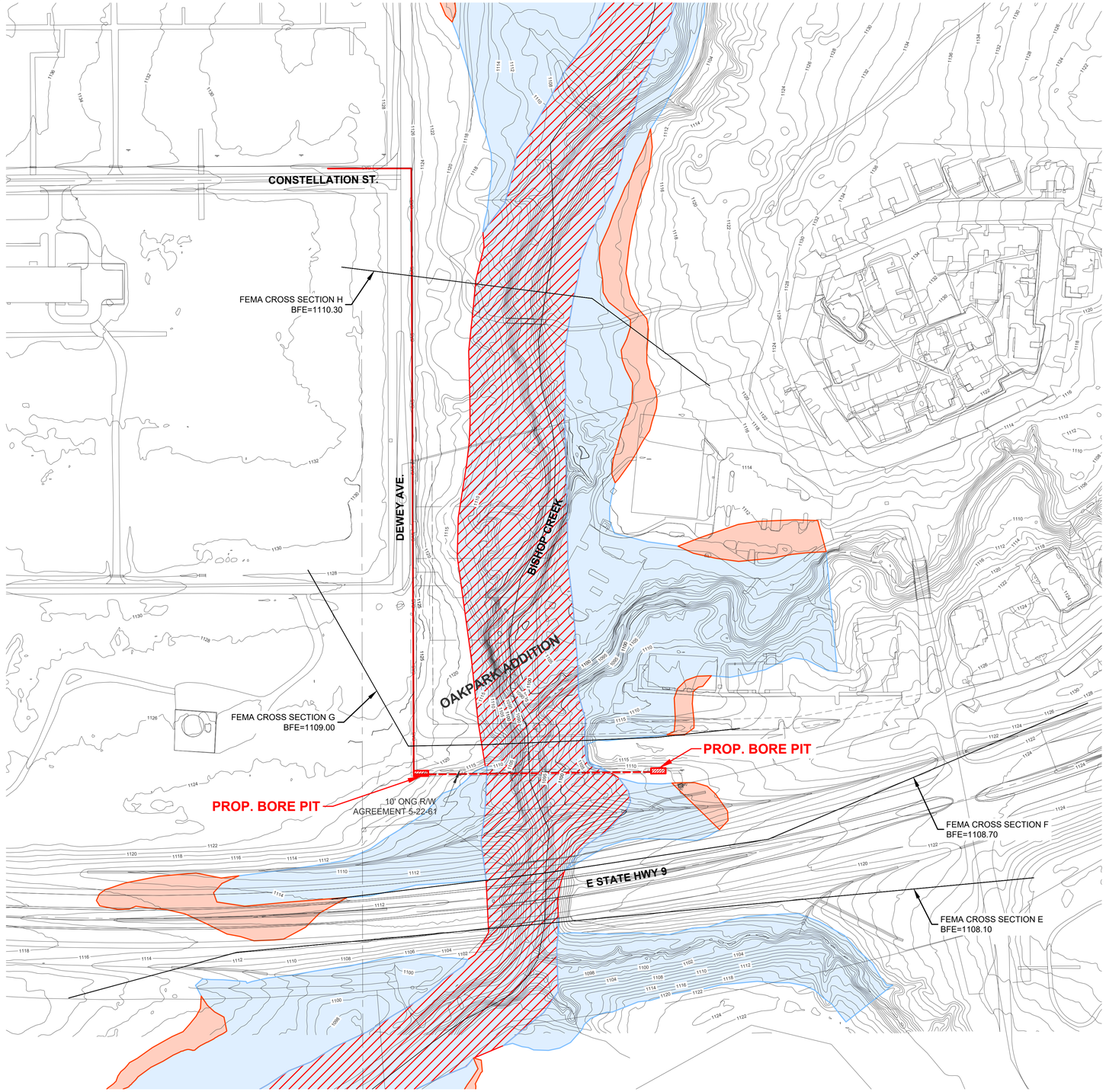
Respectfully submitted,

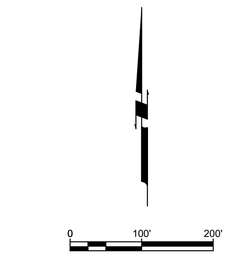
LICENSED PROFESSIONAL ENGINEER
TIMOTHY W. JOHNSON
12277
OKLAHOMA

Timothy W. Johnson, P.E.
JOHNSON & ASSOCIATES

TWJ/rw
Attachment(s): Bore Profile Exhibit
cc: Brian Rowe, CFM
Project # 12406/PER

S:\– 9000 ONG\12406 Columbus and Monitor Norman\PER\FPAT\12406-No Rise Certification.docx





LOCATION MAP
SCALE: 1"=2000'

LEGEND

- FEMA FLOODWAY
- FEMA 100 YR FLOODPLAIN
- FEMA 500 YR FLOODPLAIN
- PROP. 6" GAS MAIN EXTENSION (BORE)
- PROP. 6" GAS MAIN EXTENSION (TRENCH)
- PROP. 15' GAS EASEMENT
- FEMA CROSS SECTIONS

NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL EXISTING FIELD CONDITIONS AND THE LOCATION OF ALL EXISTING UTILITIES, WHETHER SHOWN ON THESE PLANS OR NOT, BEFORE COMMENCING WORK.
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REVISIONS		
NO.	DESCRIPTION	DATE

Johnson & Associates
1 E. Sheridan Ave., Suite 200
Oklahoma City, OK 73104
(405) 235-8075 FAX (405) 235-8078 www.jaokc.com
Certificate of Authorization #1484 Exp. Date: 06-30-2027
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OKLAHOMA NATURAL GAS CO.

NORMAN, CLEVELAND COUNTY, OKLAHOMA

GENERAL LAYOUT

Proj. No.: _____
Date: 08-07-25
Scale: 1"=100'
Checked By: _____
Approved By: _____

SHEET NUMBER
EX1

K:\OKC\E_E\Sht_Fl\Utility\DWG\Xref Columbus and Monroe Norman\Working Folder\12406-BORE PROFILE.dwg, 8/7/2025 12:27 PM, Christie Stone
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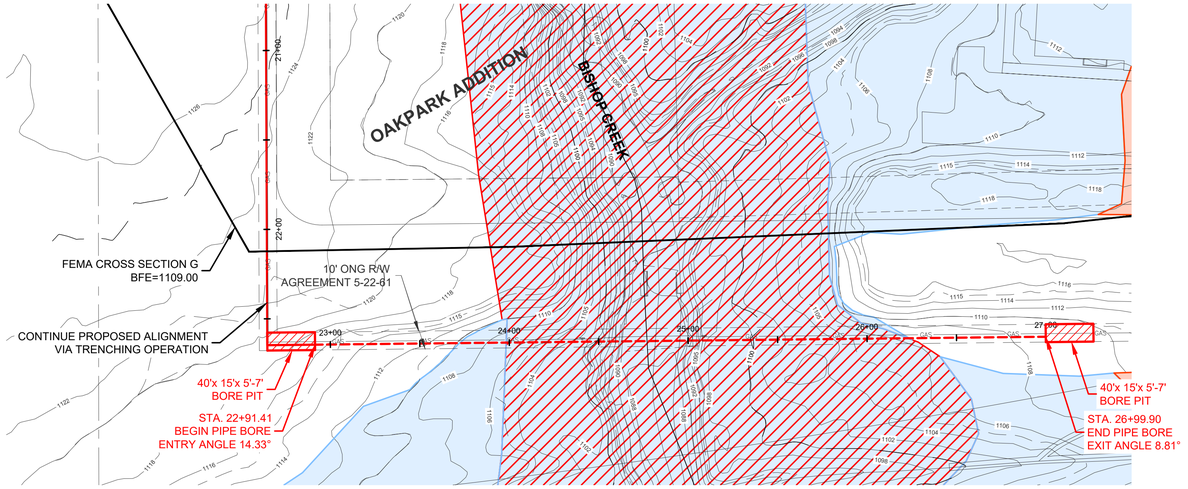
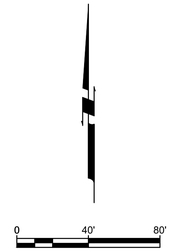
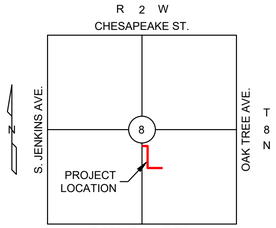
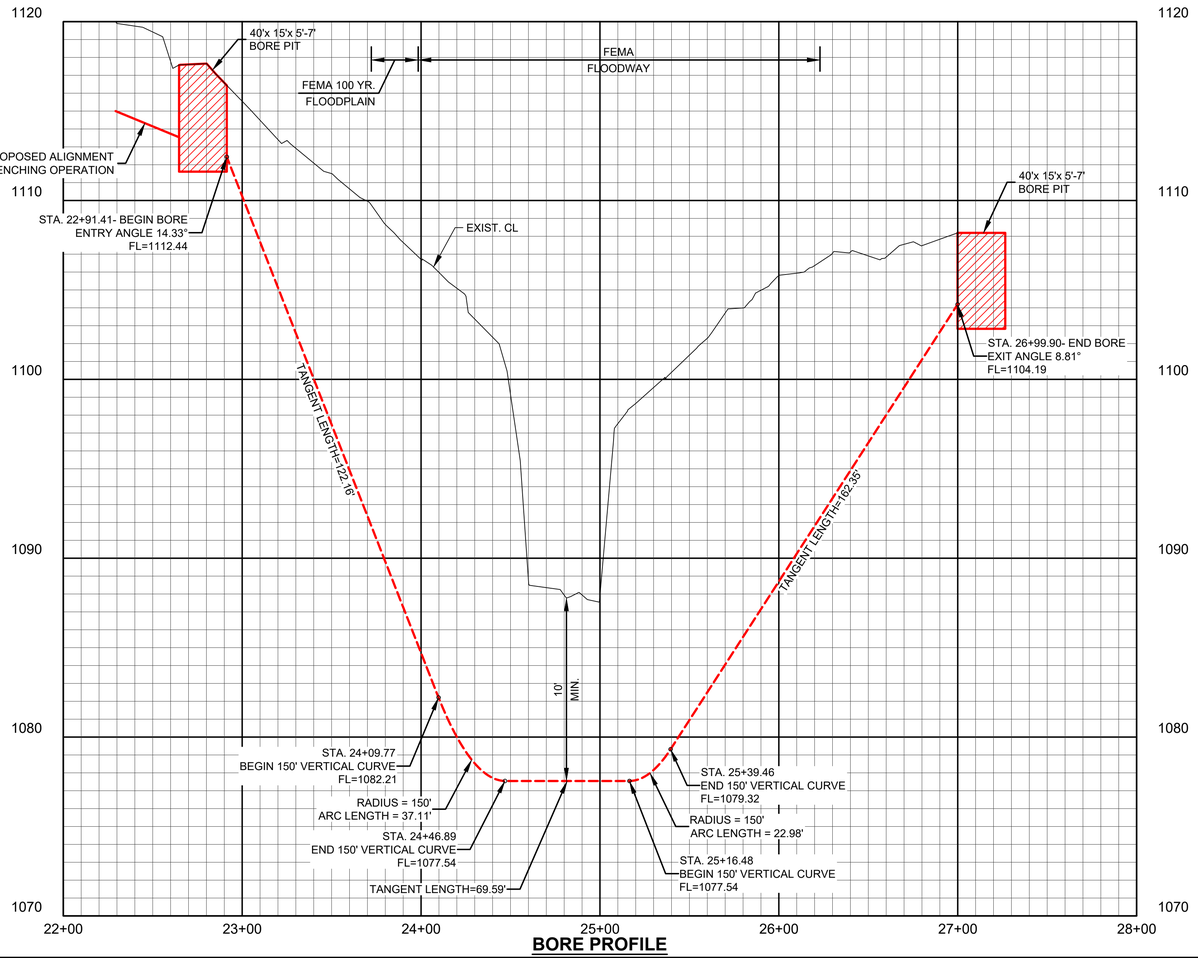






LOCATION MAP
SCALE: 1"=2000'



BORE PROFILE

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LEGEND

- FEMA FLOODWAY
- FEMA 100 YR FLOODPLAIN
- FEMA 500 YR FLOODPLAIN
- PROP. 6" GAS MAIN EXTENSION (BORE)
- PROP. 6" GAS MAIN EXTENSION (TRENCH)
- PROP. 15' GAS EASEMENT
- FEMA CROSS SECTIONS

REVISIONS		
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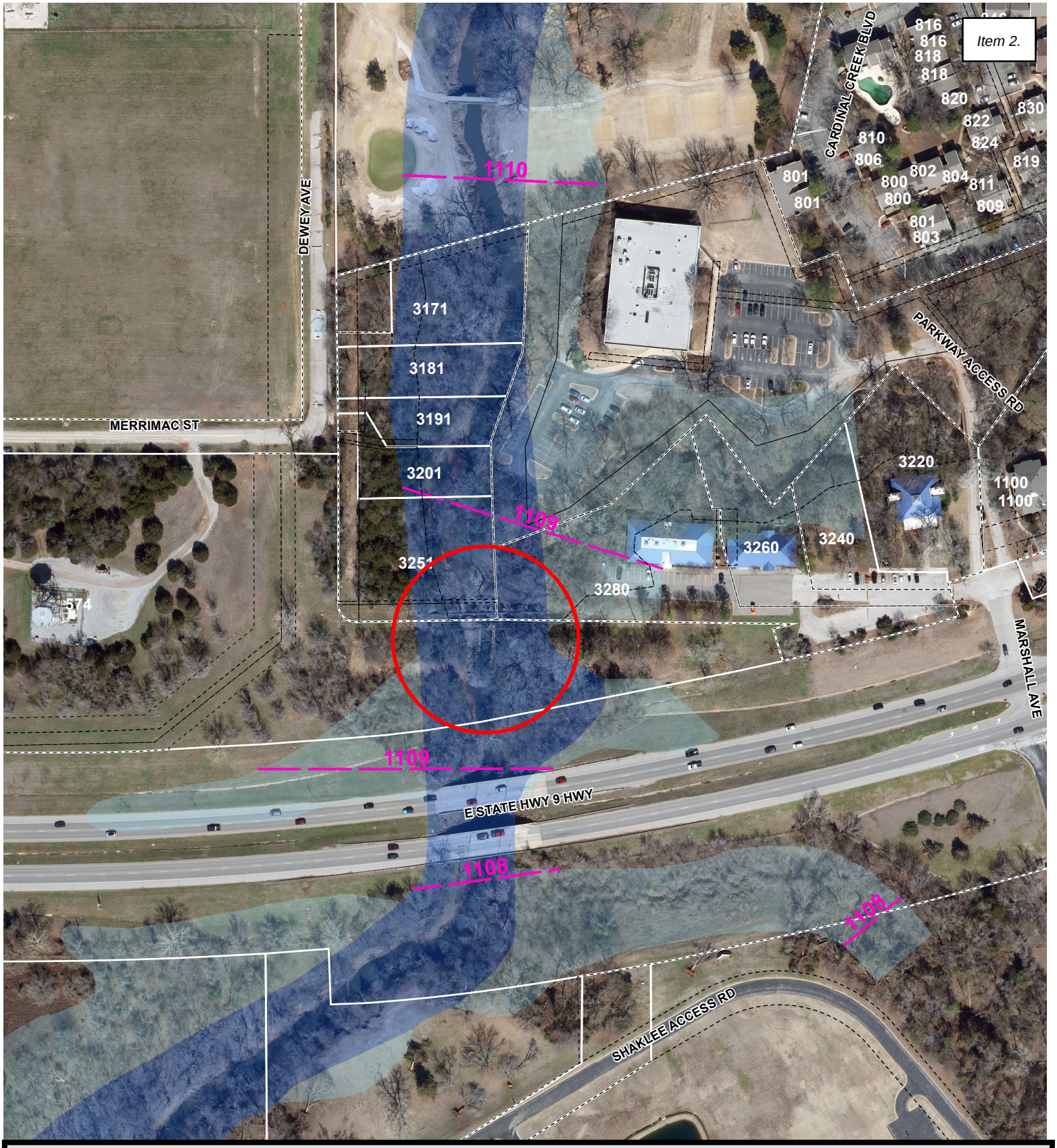
NORMAN, CLEVELAND COUNTY, OKLAHOMA

BORE PROFILE

Proj. No.:
Date: 08-07-25
Scale: (Horiz.) 1"=40'
(Vert.) 1"= 4'
Checked By:
Approved By:

SHEET NUMBER
EX2

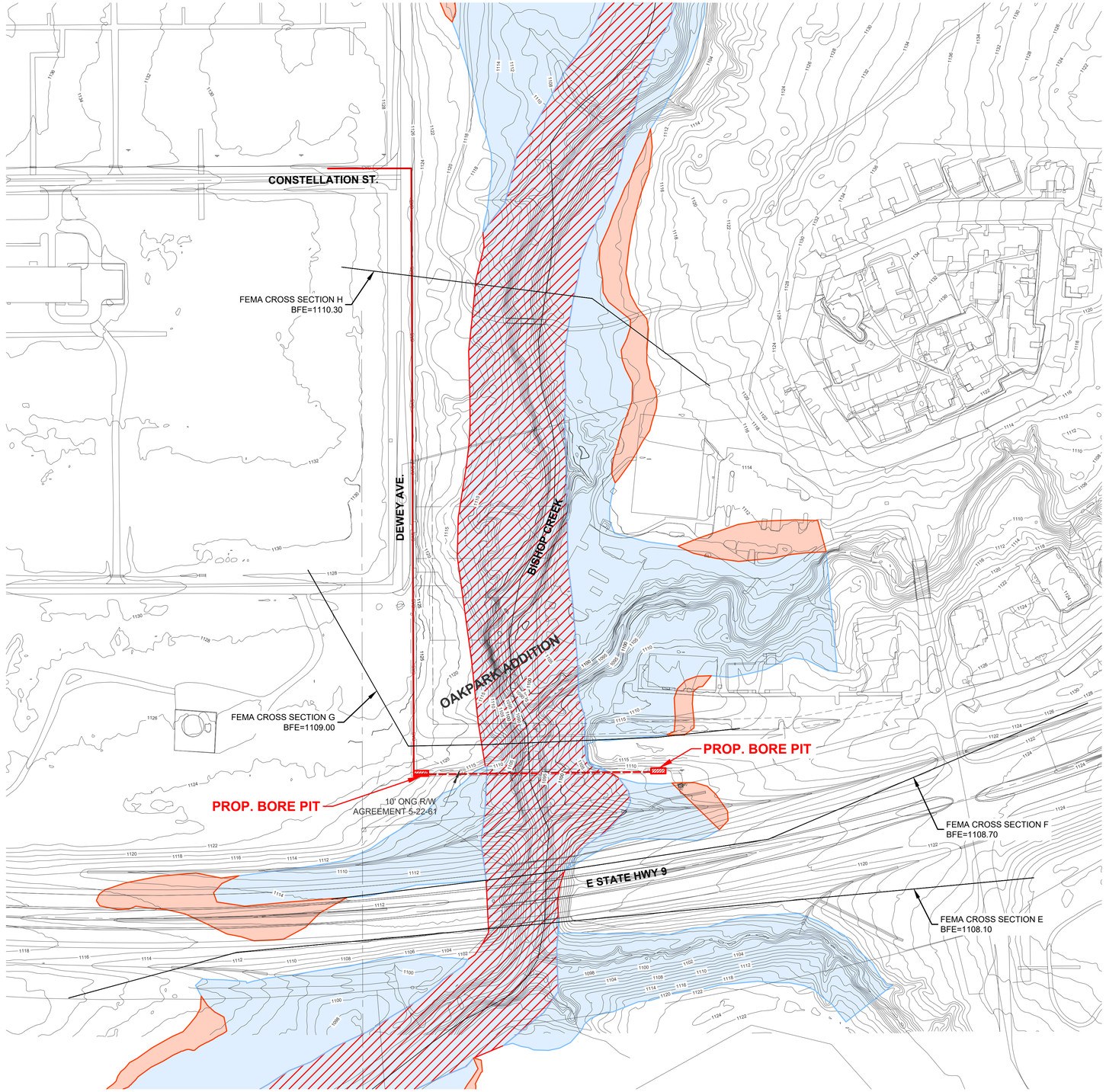
PLOT DATE: 8-Dec-25 plotted by CHRIS DAVIS Columbus and Monitor Norman\Working Folder\12406-BORE PROFILE.dwg 8/7/2025 12:57 PM Christa Stone
XREFS LOADED: 12406-LOC.dwg

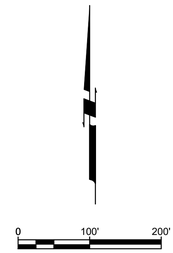


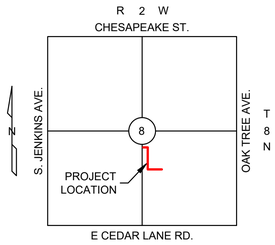
Bishop Creek
State Highway 9

Legend

- Easement
- BFE 2021
- 1% Chance Floodplain
- Floodway
- Parcel
- Easement







LOCATION MAP
SCALE: 1"=2000'

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OKLAHOMA NATURAL GAS CO.

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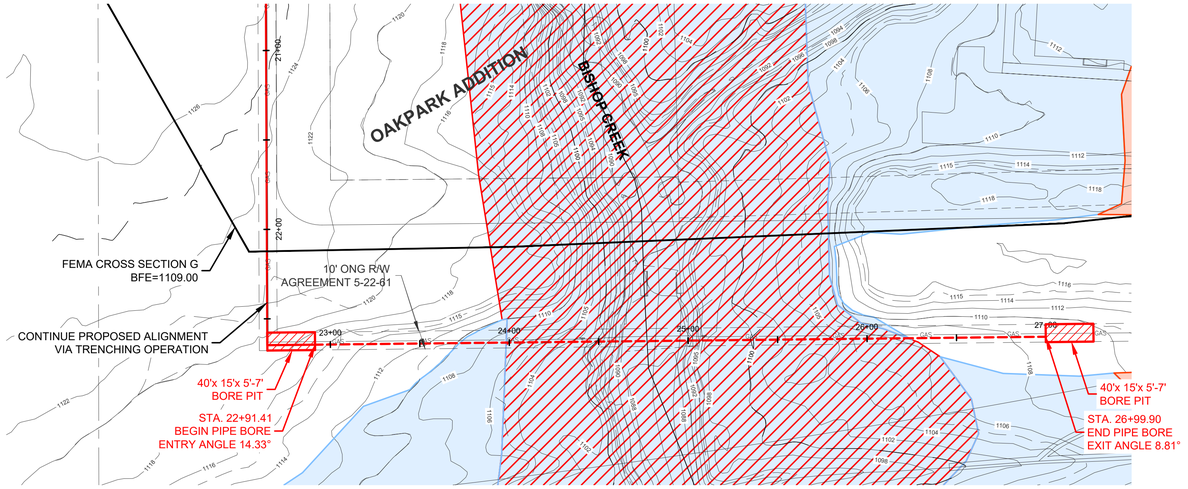
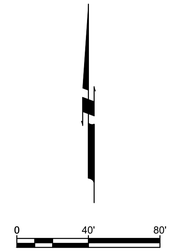
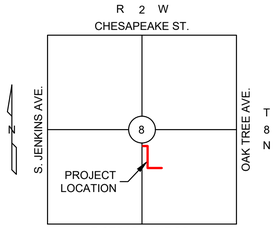
GENERAL LAYOUT

Proj. No.: _____
Date: 08-07-25
Scale: 1"=100'
Checked By: _____
Approved By: _____

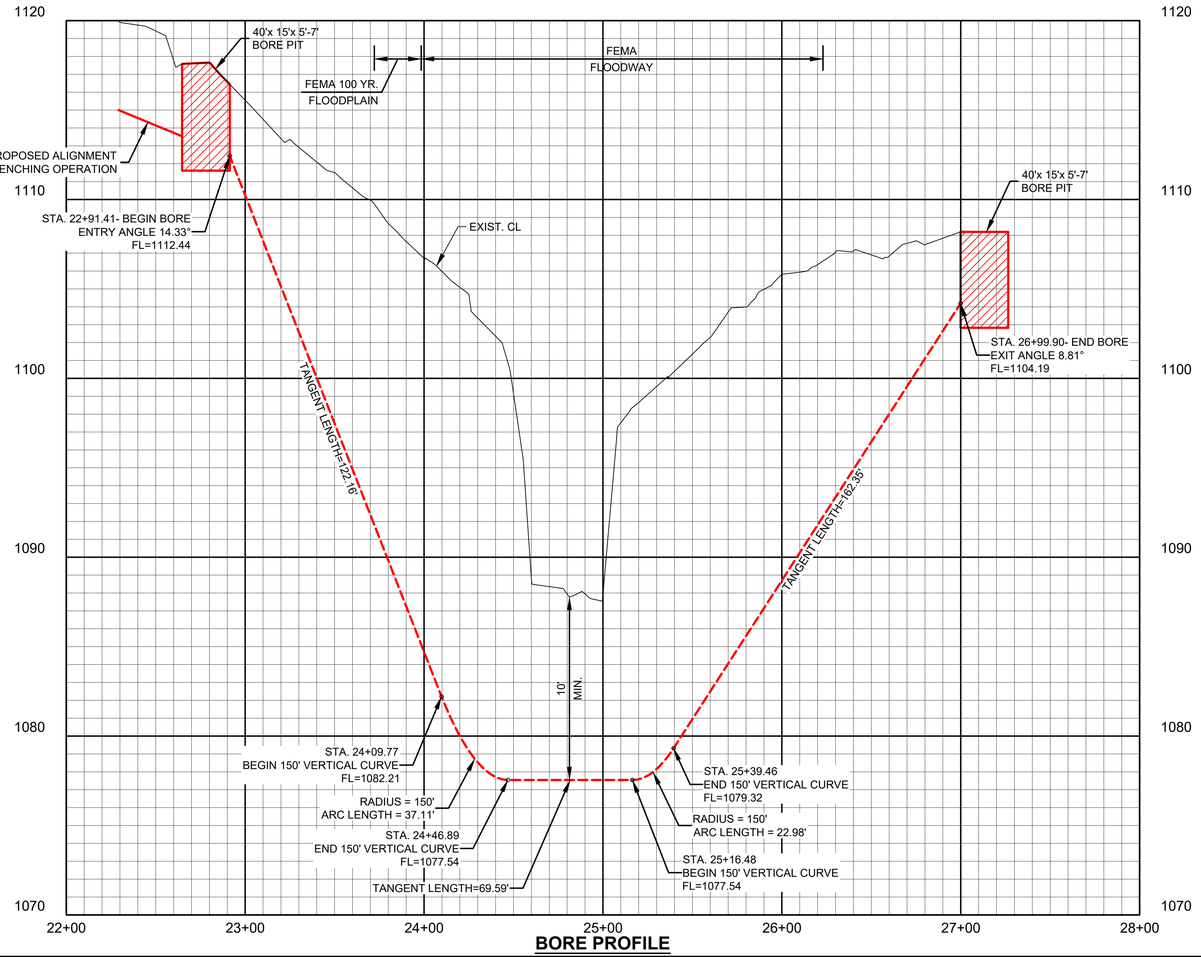
SHEET NUMBER
EX1







LOCATION MAP
SCALE: 1"=2000'



BORE PROFILE

NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL EXISTING FIELD CONDITIONS AND THE LOCATION OF ALL EXISTING UTILITIES, WHETHER SHOWN ON THESE PLANS OR NOT, BEFORE COMMENCING WORK.
2. WHILE REASONABLE EFFORTS HAVE BEEN MADE TO DEPICT EXISTING UTILITIES AND CONDITIONS BASED ON AVAILABLE RECORDS AND FIELD INVESTIGATIONS, THE PREPARER OF THESE PLANS MAKES NO GUARANTEES, WARRANTIES, OR REPRESENTATIONS AS TO THE COMPLETENESS, ACCURACY, OR EXACT LOCATION OF SUCH ITEMS.
3. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY UPON DISCOVERY OF ANY DISCREPANCIES OR CONFLICTS IN THE FIELD AND SHALL NOT PROCEED WITH AFFECTED WORK UNTIL FURTHER DIRECTION IS PROVIDED.

LEGEND

- FEMA FLOODWAY
- FEMA 100 YR FLOODPLAIN
- FEMA 500 YR FLOODPLAIN
- PROP. 6" GAS MAIN EXTENSION (BORE)
- PROP. 6" GAS MAIN EXTENSION (TRENCH)
- PROP. 15' GAS EASEMENT
- FEMA CROSS SECTIONS

NO.	DESCRIPTION	DATE
	REVISIONS	

Johnson & Associates
1 E. Sheridan Ave., Suite 200
Oklahoma City, OK 73104
(405) 235-8075 FAX (405) 235-8078 www.jaokc.com
Certificate of Authorization #1484 Exp. Date: 06-30-2027
• ENGINEERS • SURVEYORS • PLANNERS •

OKLAHOMA NATURAL GAS CO.

NORMAN, CLEVELAND COUNTY, OKLAHOMA

BORE PROFILE

Proj. No.:
Date: 08-07-25
Scale: (Horiz.) 1"=40'
(Vert.) 1"= 4'
Checked By:
Approved By:

SHEET NUMBER
EX2

PLOT DATE: 8/7/2025 12:57 PM By: Christa Stone
XREFS LOADED: 12408-LOC.dwg
PLOT FILE: C:\Projects\2025\12408 Columbus and Moreton\Working Folder\12408-BORE PROFILE.dwg

ONE Gas

Location Detail Report

Location

Latitude: 35.1801869133584

Longitude: -97.4315498544041

Address: DEWEY OK

Zipcode: 73072

USGS Map Grid

Grid Name: 17_8N_2W_8

Lot: 1

Block: 1

Sections

MTR: 17 8.0N 2.0W

Q-SEC: SE S08 T08N R02W IN

SEC: 8

Tax District

District Name:

SD Code: 14I029

SD Name: Norman

Joint County:

AV Tax Code:

AV School District Tax Code: 119

Ad Valorem Ref Num: 14/119/17

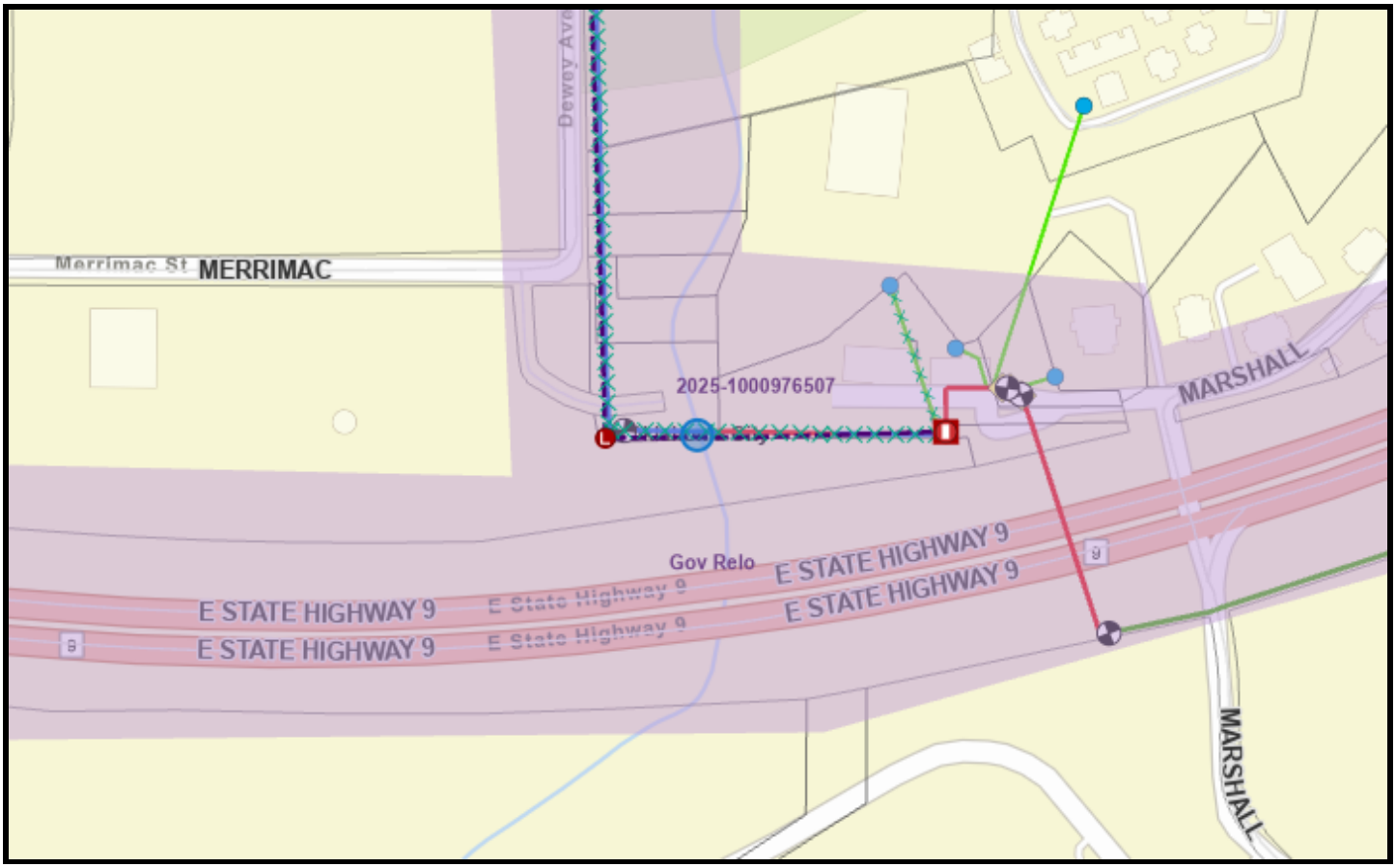
Vtech Code: 17

City: Norman

County: Cleveland

State: OK

Legal Desc:



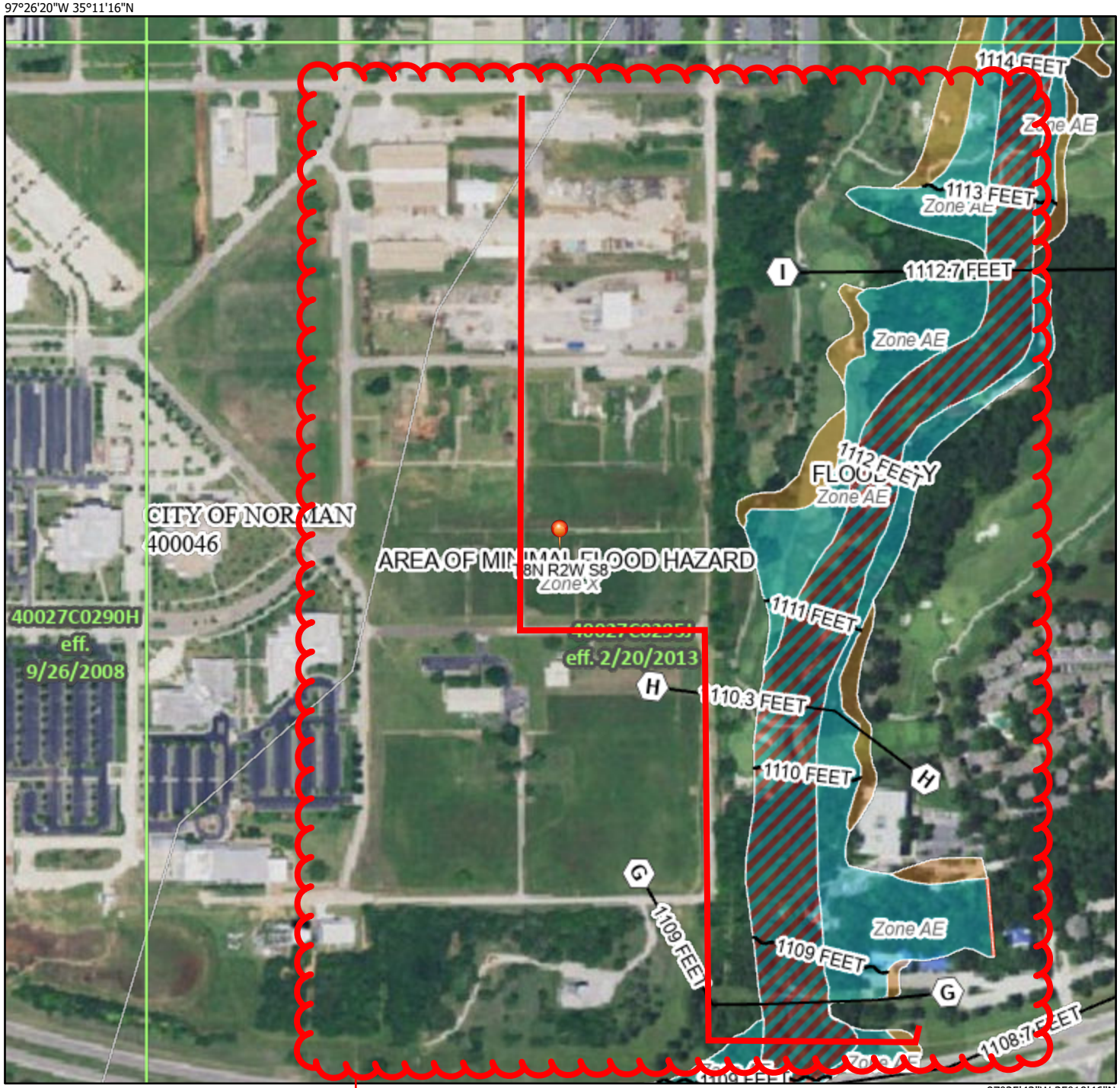
Created By: Teagan Moore(OKE23009@onegas.com)

Scale: 1:4514

National Flood Hazard Layer FIRMette

FEMA

97°26'20"W 35°11'16"N



97°25'42"W 35°10'46"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Approx. Project Location

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR F UT

Item 2.

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/25/2025 at 2:21 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community ide FIRM panel number, and FIRM effective date. Map in unmapped and unmodernized areas cannot be used regulatory purposes.

drainage basins of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Oklahoma State Plane South zone (FIPSZONE 3502). The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by the Geo Information Systems department of the University of Oklahoma and by the City of Norman, GIS Division.

This map may reflect more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

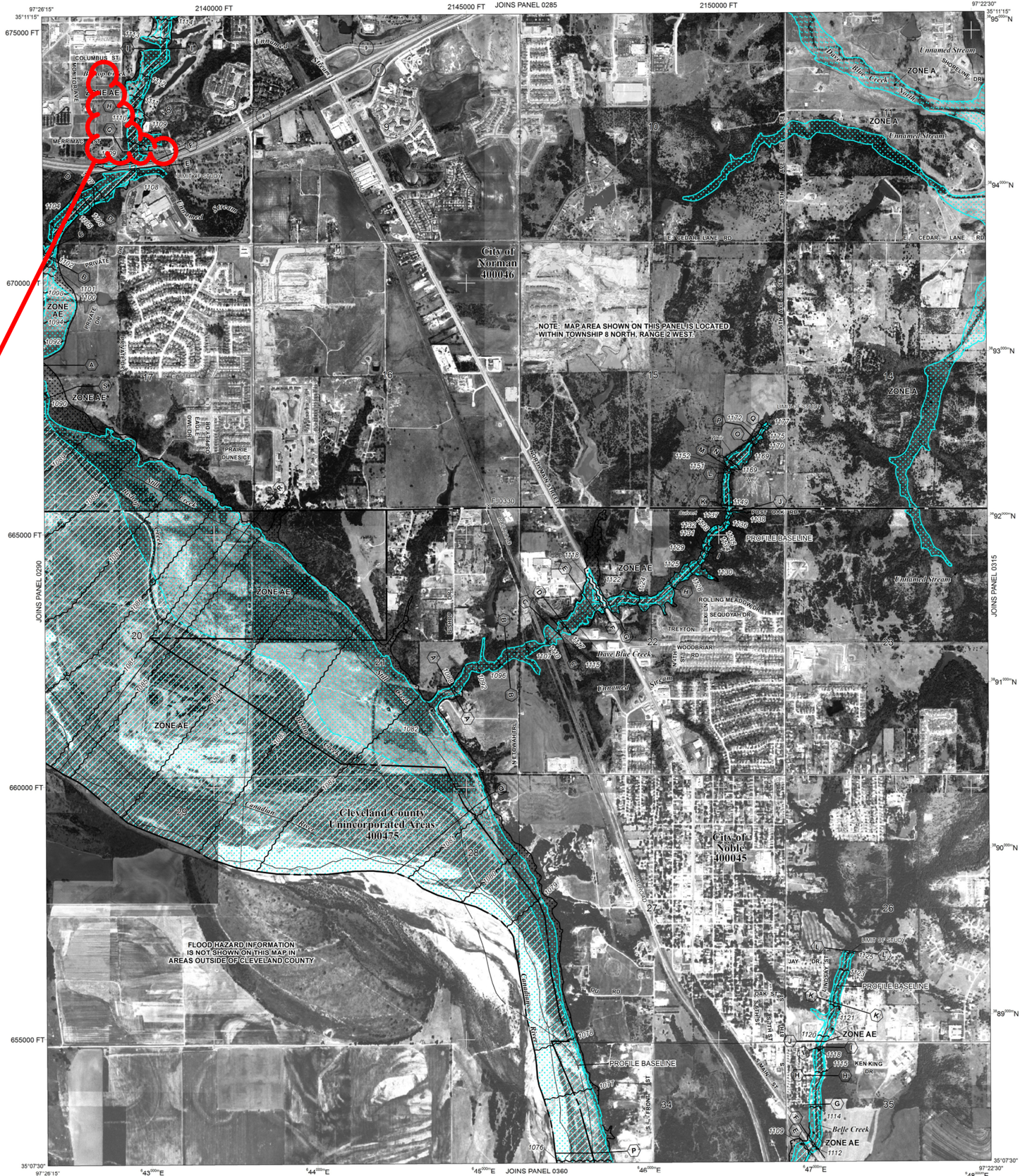
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange (FMIX) at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

Approx. Project Location



Item 2.

BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- Limit of Moderate Wave Action
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- Cross section line
- Transect line
- Culvert, Flume, Penstock or Aqueduct
- Road or Railroad Bridge
- Footbridge
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 2976000mN — 1000-meter Universal Transverse Mercator grid values, zone 14
- 600000 FT — 5000-foot grid values: Oklahoma State Plane coordinate system, South zone (FIPSZONE 3502), Lambert Conformal Conic projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- ● M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
March 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

September 26, 2008 – to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, to incorporate previously issued Letters of Map Revision.

February 20, 2013 – to change Base Flood Elevations and Special Flood Hazard Areas, to add roads and road names, to incorporate previously issued Letters of map Revision.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP

PANEL 0295J

FIRM
FLOOD INSURANCE RATE MAP

CLEVELAND COUNTY, OKLAHOMA
AND INCORPORATED AREAS

PANEL 295 OF 475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLEVELAND COUNTY	400475	0295	J
NOBLE, CITY OF	400045	0295	J
NORMAN, CITY OF	400046	0295	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
40027C0295J

MAP REVISED

NATIONAL FLOOD INSURANCE PROGRAM

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE
Bishop Creek								
A	12,000	1,143	4,353	2.2	1,090.8	1,090.8	1,091.8	1.0
B	14,120	227	1,593	6.1	1,101.9	1,101.9	1,102.2	0.3
C	14,460	129	1,262	7.3	1,102.9	1,102.9	1,103.1	0.2
D	15,720	156	1,797	5.2	1,106.5	1106.7	1,106.9	0.2
E	16,780	112	1,342	6.9	1,108.1	1,108.1	1,108.3	0.2
F	16,900	120	1,676	5.5	1,108.7	1,108.7	1,109.0	0.3
G	17,100	173	1,721	5.4	1,109.0	1,109.0	1,109.3	0.3
H	18,000	152	1,303	6.4	1,110.3	1,110.3	1,110.5	0.2
I	19,540	102	1,146	7.3	1,112.7	1,112.7	1,113.5	0.8
J	21,580	275	2,030	4.1	1,116.6	1,116.6	1,117.1	0.5
K	22,860	296	1,141	4.2	1,119.7	1,119.7	1,120.1	0.4
L	23,010	160	1,022	4.7	1,119.9	1,119.9	1,120.3	0.4
M	24,840	151	1,095	4.4	1,124.3	1,124.3	1,124.4	0.1
N	25,340	54	3,044	3.7	1,126.4	1,126.4	1,126.6	0.2
O	26,807	21	264	11.0	1,129.9	1,129.9	1,129.9	0.0
P	28,508	109	954	3.0	1,135.5	1,135.5	1,135.7	0.2
Q	29,388	32	314	9.3	1,136.5	1,136.5	1,136.9	0.4
R	29,460	32	354	8.2	1,137.7	1,137.7	1,138.1	0.4
S	30,400	130	922	2.1	1,143.4	1,143.4	1,143.4	0.0
T	32,079	87	512	3.7	1,148.2	1,148.2	1,148.2	0.0
U	33,280	12	75	7.9	1,156.7	1,156.7	1,156.9	0.2

[1] Feet above confluence with the Canadian River

Proposed bore is approximately 50' downstream of cross section G: BFE = 1108.9'

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

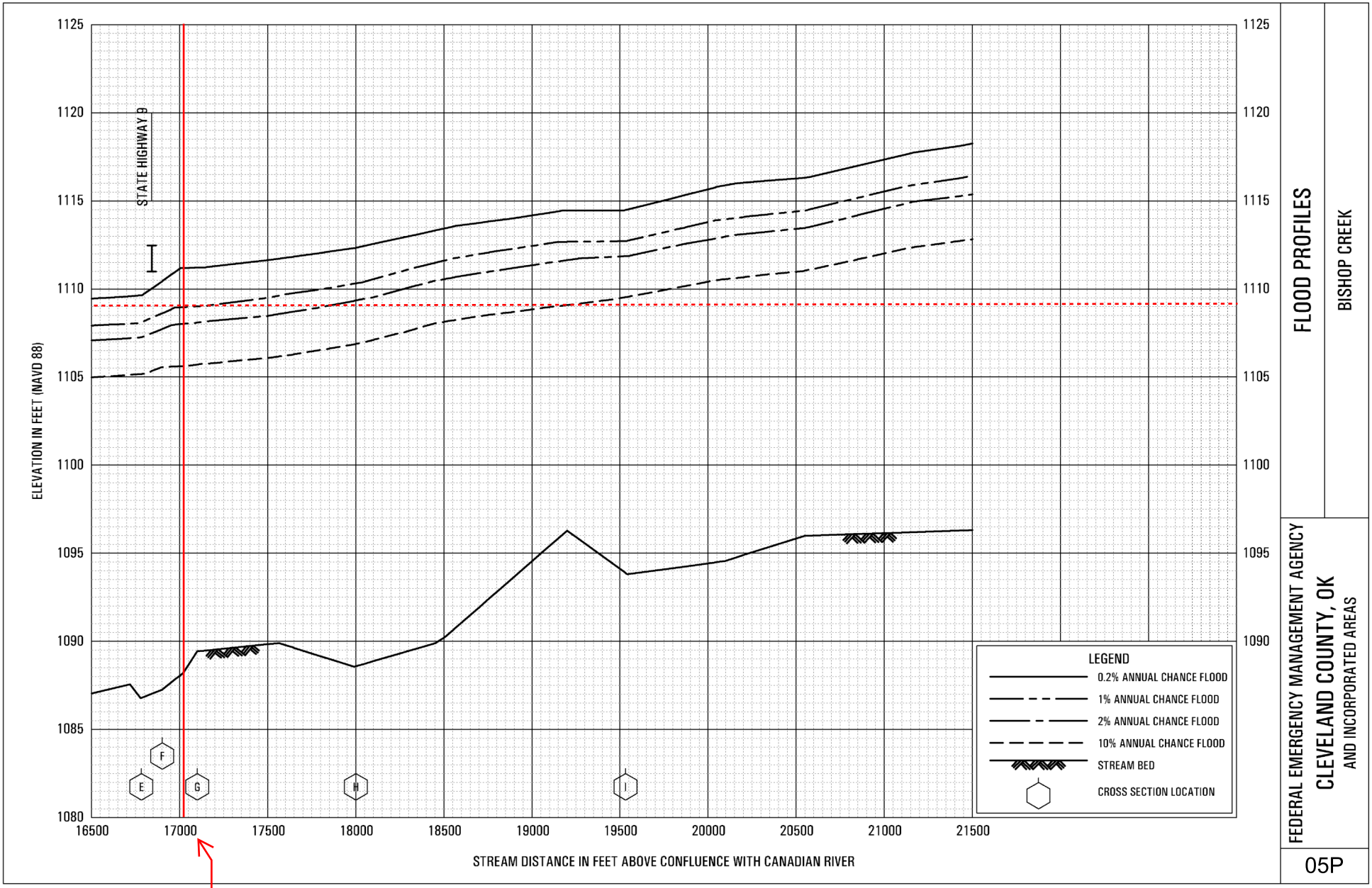
CLEVELAND COUNTY, OK

AND INCORPORATED AREAS

FLOODWAY DATA

BISHOP CREEK

BFE (- - -) = 1108.9'



Approximate bore crossing location

STAFF REPORT 09/02/2025 **PERMIT #730**

ITEM: This Floodplain Permit Application is for a bank stabilization project in the Lower Imhoff Creek channel.

BACKGROUND:
APPLICANT: City of Norman Public Works Department
CONTRACTOR: Cimmaron
ENGINEER: WSB and WSP

A Storm Water Master Plan (SWMP) was developed for the City of Norman by PBS&J and accepted by City Council in November 2009. The identified problem in the SWMP for Imhoff Creek is "4,200 lineal feet (LF) of severe bank erosion along both banks beginning at the upstream face of Highway 9 to approximately 2,000 LF upstream of Imhoff Road. The erosion along the banks has caused property fences and trees to fall into the creek." The SWMP recommends design and installation of stream bank stabilization techniques along stream segments of Imhoff Creek.

As Imhoff Creek adjusted to changing upstream conditions, down cutting and widening of the creek resulted in extreme bank and bed erosion, which are characteristic in this portion of Imhoff Creek. Development along the length of the stream has increased the runoff in the creek leading to trees and fences falling into the creek, loss of property and threats to infrastructure, including the Imhoff Road Bridge. In July of 2021, a critical failure of this bridge due to increased erosion problems, led to this road being closed until April of 2022 to complete emergency repairs, with a resulting cost of just under $2 million dollars.

Since the repair of the Imhoff Road Bridge in 2021, this channel has continued to erode. A study conducted by WSB showed that 6 inches or more of creek bank is being removed per year on each side. Evidence of this extreme erosion has been well documented. The City applied for and received grant funding through the Hazard Mitigation Grant Program (HMGP) for a bank stabilization project and a contract for construction has been awarded and approved by City Council. Work is ready to begin September 8, 2025.

This project involves the installation of reinforced soil slope walls on the east bank, rock toe revetment on the west bank and two cross vanes in the channel. As stated in the no-rise certification, the purpose of the project is to restore some of the east bank that has been lost to erosion, protect addtional vunerable areas of the west bank, and to reduce the flow velocities that have increased due to the steep channel flow line caused by erosion downstream of Imhoff Road.

Site located in Lake Thunderbird Watershed? yes __ no✓

STAFF ANALYSIS:
The project is located in the Imhoff Creek floodplain (Zone AE). Base flood elevation varies from approximately 1110’ upstream to 1104’ downstream.

Applicable Ordinance Sections:	Subject Area:
36-533 (e)(2)(a)..……..…	Fill restrictions in the floodplain
(e)(2)(e)..……..…	Compensatory storage
(f)(3)(8)……..	No rise considerations

(e)(2)(a) and (e)(2)(e) Fill Restrictions in the Floodplain and Compensatory Storage – The use of fill is restricted in the floodplain unless compensatory storage is provided.

The Erosion Analysis report submitted by Wood Engineering in 2022 estimates an average annual erosion rate of about 1300 cubic yards for current conditions for this

section of Imhoff Creek. This project proposes to replace approximately 3500 cubic yards as part of the bank stabilization.

(f)(3)(8) No Rise Considerations – For proposed development within any flood hazard area (except for those designated as regulatory floodways), certification that a rise of no more than 0.05 feet will occur in the BFE on any adjacent property as a result of the proposed work must be provided.

The engineer has certified that the project will not cause a rise in the BFE which meets this ordinance requirement.

RECOMMENDATION: Staff recommends that Floodplain Permit Application #730 be approved.

ACTION TAKEN: _____

City of Norman

Floodplain Permit Application

Floodplain Permit No. 730

Building Permit No. _____

Date 9/2/2025

FLOODPLAIN PERMIT APPLICATION
($100.00 Application Fee Required)

SECTION 1: GENERAL PROVISIONS (APPLICANT to read and sign):

1. No work may start until a permit is issued.
2. The permit may be revoked if any false statements are made herein.
3. If revoked, all work must cease until permit is re-issued.
4. Development shall not be used or occupied until a Certificate of Occupancy is issued.
5. The permit will expire if no work is commenced within 2 years of issuance.
6. Applicant is hereby informed that other permits may be required to fulfill local, state and federal regulatory requirements and must be included with this floodplain permit application.
7. Applicant hereby gives consent to the City of Norman or his/her representative to access the property to make reasonable inspections required to verify compliance.
8. The following floodplain modifications require approval by the City Council:
   (a) A modification of the floodplain that results in a change of ten percent (10%) or more in the width of the floodplain.
   (b) The construction of a pond with a water surface area of 5 acres or more.
   (c) Any modifications of the stream banks or flow line within the area that would be regulatory floodway whether or not that channel has a regulatory floodplain, unless the work is being done by the City of Norman staff as part of a routine maintenance activity.
9. All supporting documentation required by this application is required along with the permit fee by the submittal deadline. Late or incomplete applications will not be accepted.
10. I, THE APPLICANT, CERTIFY THAT ALL STATEMENTS HEREIN AND IN ATTACHMENTS TO THIS APPLICATION ARE, TO THE BEST OF MY KNOWLEDGE, TRUE AND ACCURATE.

SECTION 2: PROPOSED DEVELOPMENT (To be completed by APPLICANT.)

APPLICANT: City of Norman ADDRESS: 225 N. Webster

TELEPHONE: 405 366-5455 SIGNATURE: Jason Murphy

BUILDER: Cimarron ADDRESS: _____

TELEPHONE: _____ SIGNATURE: _____

ENGINEER: WSB Engineering ADDRESS: _____

TELEPHONE: 405-229-3260 SIGNATURE: _____

PROJECT LOCATION

To avoid delay in processing the application, please provide enough information to easily identify the project location. Provide the street address, subdivision addition, lot number or legal description (attach) and, outside urban areas, the distance to the nearest intersecting road or well known landmark. A sketch attached to this application showing the project location would be helpful.

Imhoff channel south of Imhoff Road and north of State Highway 9

DESCRIPTION OF WORK (Check all applicable boxes):

A. STRUCTURAL DEVELOPMENT

ACTIVITY	STRUCTURE TYPE
☐ New Structure	☐ Residential (1-4 Family)
☐ Addition	☐ Residential (More than 4 Family)
☐ Alteration	☐ Non-Residential (Flood proofing? ☐ Yes)
☐ Relocation	☐ Combined Use (Residential & Commercial)
☐ Demolition	☐ Manufactured (Mobile) Home
☐ Replacement	☐ In Manufactured Home Park? ☐ Yes

ESTIMATED COST OF PROJECT $ 5,400,000 Work that involves substantial damage/substantial improvement requires detailed cost estimates and an appraisal of the structure that is being improved.

B. OTHER DEVELOPMENT ACTIVITIES:

☑ Fill ☐ Mining ☐ Drilling ☑ Grading

☑ Excavation (Beyond the minimum for Structural Development)

☑ Watercourse Alteration (Including Dredging and Channel Modifications)

☐ Drainage Improvements (Including Culvert Work) ☐ Road, Street or Bridge Construction

☐ Subdivision (New or Expansion) ☐ Individual Water or Sewer System

In addition to items A. and B. provide a complete and detailed description of proposed work (failure to provide this item will be cause for the application to be rejected by staff). Attach additional sheets if necessary.

Installation of reinforced slope walls, rock toe revetment, installation of cross vanes. Restore bank lost to erosion, protect infrastructure and residential structures and reduce flow velocities

C. ATTACHMENTS WHICH ARE REQUIRED WITH EVERY APPLICATION:

The applicant must submit the documents listed below before the application can be processed. If the requested document is not relevant to the project scope, please check the Not Applicable box and provide explanation.

A. Plans drawn to scale showing the nature, location, dimensions, and elevation of the lot, existing or proposed structures, fill, storage of materials, flood proofing measures, and the relationship of the above to the location of the channel, floodway, and the regulatory flood-protection elevation.

B. A typical valley cross-section showing the channel of the stream, elevation of land areas adjoining each side of the channel, cross-sectional areas to be occupied by the proposed development, and high-water information.

☐ Not Applicable:

_____

_____

C. Subdivision or other development plans (If the subdivision or other developments exceeds 50 lots or 5 acres, whichever is the lesser, the applicant **must** provide 100-year flood elevations if they are not otherwise available).

☐ Not Applicable:

_____

_____

D. Plans (surface view) showing elevations or contours of the ground; pertinent structure, fill, or storage elevations; size, location, and spatial arrangement of all proposed and existing structures on the site; location and elevations of streets, water supply, sanitary facilities; photographs showing existing land uses and vegetation upstream and downstream, soil types and other pertinent information.

☐ Not Applicable:

_____

_____

E. A profile showing the slope of the bottom of the channel or flow line of the stream.

☐ Not Applicable:

_____

_____

F. Elevation (in relation to mean sea level) of the lowest floor (including basement) of all new and substantially improved structures.

☐ Not Applicable:

_____

_____

G. Description of the extent to which any watercourse or natural drainage will be altered or relocated as a result of proposed development.

☐ Not Applicable:

_____

H. For proposed development within any flood hazard area (except for those areas designated as regulatory floodways), certification that a rise of no more than five hundredths of a foot (0.05') will occur on any adjacent property in the base flood elevation as a result of the proposed work. For proposed development within a designated regulatory floodway, certification of no increase in flood levels within the community during the occurrence of the base flood discharge as a result of the proposed work. All certifications shall be signed and sealed by a Registered Professional Engineer licensed to practice in the State of Oklahoma.

I. A certified list of names and addresses of all record property owners within a three hundred fifty (350) foot radius of the exterior boundary of the subject property not to exceed 100 feet laterally from the Special Flood Hazard Area. The radius to be extended by increments of one hundred (100) linear feet until the list of property owners includes not less than fifteen (15) individual property owners of separate parcels or until a maximum radius of one thousand (1,000) feet has been reached.

J. A copy of all other applicable local, state, and federal permits (i.e. U.S. Army Corps of Engineers 404 permit, etc).

After completing SECTION 2, APPLICANT should submit form to Permit Staff for review.

SECTION 3: FLOODPLAIN DETERMINATION (To be completed by Permit Staff.)

The proposed development is located on FIRM Panel No.: 400027C0280J, Dated: 1/15/2021

The Proposed Development:

☐ Is NOT located in a Special Flood Hazard Area
(Notify the applicant that the application review is complete and NO FLOODPLAIN PERMIT IS REQUIRED).

☑ Is located in a Special Flood Hazard Area.

☑ The proposed development is located in a floodway.

☑ 100-Year flood elevation at the site is 1104'-1110' Ft. NGVD (MSL) ☐ Unavailable

See Section 4 for additional instructions.

SIGNED: _____ **DATE:** 8/27/2025

SECTION 4: ADDITIONAL INFORMATION REQUIRED (To be completed by Permit Staff.)

The applicant must also submit the documents checked below before the application can be processed.

☐ Flood proofing protection level (non-residential only) _____ Ft. NGVD (MSL). For flood proofed structures applicant must attach certification from registered engineer.

☐ Certification from a registered engineer that the proposed activity in a regulatory floodway will not result in any increase in the height of the 100-year flood (Base Flood Elevation). A copy of all data and calculations supporting this finding must also be submitted.

☐ Certification from a registered engineer that the proposed activity in a regulatory flood plain will result in an increase of no more than 0.05 feet in the height of the 100-year flood (Base Flood Elevation). A copy of all data and calculations supporting this finding must also be submitted.

☐ All other applicable federal, state, and local permits have been obtained.

Other: _____

_____

_____

SECTION 5: PERMIT DETERMINATION (To be completed by Floodplain Chairman.)

The proposed activity: **(A)** ☐ **Is**; **(B)** ☐ **Is Not** in conformance with provisions of Norman's City Code Chapter 22, Section 429.1. The permit is issued subject to the conditions attached to and made part of this permit.

SIGNED: _____ DATE: _____

If **BOX A** is checked, the Floodplain committee chairman may issue a Floodplain Permit.

If **BOX B** is checked, the Floodplain committee chairman will provide a written summary of deficiencies. Applicant may revise and resubmit an application to the Floodplain committee or may request a hearing from the Board of Adjustment.

APPEALS: Appealed to Board of Adjustment: ☐ Yes ☐ No
Hearing date: _____

Board of Adjustment Decision - Approved: ☐ Yes ☐ No

Conditions:

_____

_____

_____

SECTION 6: AS-BUILT ELEVATIONS (To be submitted by APPLICANT before Certificate of Occupancy is issued.)

1. FEMA Elevation Certificate
   and/or
2. FEMA Floodproofing Certificate

NOTE: The completed certificate will be reviewed by staff for completeness and accuracy. If any deficiencies are found it will be returned to the applicant for revision. A Certificate of Occupancy for the structure will not be issued until an Elevation and /or Floodproofing Certificate has been accepted by the City.

August 13, 2025

Mr. Scott Sturtz, P.E., CFM
Floodplain Administrator
City of Norman

Re: No Rise Certification
Imhoff Creek Bank Stabilization Phase 1
Norman, OK

Dear Mr. Sturtz:

This project involves the installation of reinforced soil slope walls on the east bank, rock toe revetment on the west bank, and two cross vanes in the channel of Imhoff Creek between Imhoff Road and Highway 9. This project's purpose is to restore some of the east bank that has been lost to erosion, to protect additional vulnerable areas of the west bank, and to reduce the flow velocities that have increased due to the steep channel flow line caused by erosion just downstream of Imhoff Road.

There will not be any increase in the Base Flood Elevation at this location due to the project when compared to the Corrected Effective modeling, which used city elevation data from 1978 in the project area to establish a pre-erosion stream bed profile.

Please contact me at 316-370-9670 if you have any questions or need further information.

Sincerely,

Eric Broce, PE
Vice President – Civil Engineering

13 August 2025

Mr. Jason Murphy
Stormwater Program Manager
City of Norman
225 N. Webster
Norman, OK 73069

Re: Imhoff Creek Cut/Fill Quantities

Dear Mr. Murphy

The cut/fill quantities for the Imhoff Creek bank stabilization project are presented below. These quantities represent the cut and fill within the flood plan for this project.

CUT/FILL WITHIN FEMA BFE		
ITEM/OPERATION	**CUT (CY)**	**FILL (CY)**
REVETMENT	1355.95	834.67
RSS WALL	98.63	4051.31
CROSS VANES	0	24
TOTAL	**1454.58**	**4909.98**
NET	**FILL**	**3455.4**

The table shows a net Fill of **3455.4 Cubic Yards**.

Sincerely,

Harris C. Wilson

Harris Wilson, PE
Senior Project Manager

405.229.3260 (c)
-
615 N Hudson Avenue, Suite 300
Oklahoma City, OK 73102
wsbeng.com

615 N. HUDSON AVENUE | SUITE 300 | OKLAHOMA CITY, OK | 73102 | 405.229.3260 | WSBENG.COM

Lower Imhoff Creek Bank Stabilization Project: Erosion Analysis

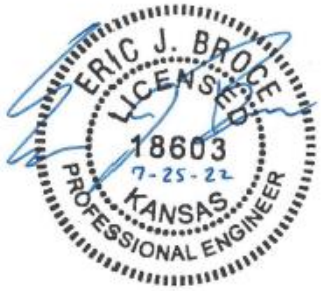
Norman, OK

prepared for:

City of Norman
201 W Gray St
Norman, OK 73069

prepared by:

Wood Environment & Infrastructure Solutions, Inc.
245 N Waco Ave, Suite 110
Wichita, KS 67202



July 25, 2022

Project #: 15NOR01 (Meshek)
Project #: 8275000431 (Wood)

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1.0 Purpose & Background

Imhoff Creek is a small urban watershed with approximately 4 square miles of contributing drainage area located within the City of Norman, Oklahoma. Much of the open channel system is concrete or articulated block lined improved channel. During storm events the excess runoff quickly accumulates causing rapid rising and receding flooding events that can be highly turbulent and very erosive to unprotected channel areas. Over the years the channel has developed numerous areas in which exposed vertical banks have been created by head-cutting along the unlined sections of the channel and scouring induced by vegetative debris thus creating erosive tendencies adjacent to or just downstream of the blockage areas. In some instances, erosion has caused vertical embankments to migrate, encroaching onto private property and jeopardizing critical infrastructure and residential structures. The stability of the existing bridge at Imhoff Road is being threatened by head cutting downstream of the bridge, which is being exacerbated by upstream scour and undermining of the structure. Figure 1-1 below exemplifies the 2016 embankment conditions downstream of Imhoff Road.

Figure 1-1: Left bank of Imhoff Creek just downstream of Imhoff Road, 2016

Meshek & Associates, LLC retained Wood Environment & Infrastructure Solutions, Inc (Wood) to conduct geotechnical, hydrological and hydraulic analyses in support of the engineering and design of structures to restore and stabilize bank erosion of lower Imhoff Creek for the City of Norman, Oklahoma. As part of the analyses, an erosion study was completed to evaluate the historic rate of erosion and predict future erosion and impacts to critical infrastructure.

2.0 Geotechnical Investigation

Two geotechnical engineering studies were conducted (2016 and 2021) to evaluate the stability of proposed improvements along lower Imhoff Creek. The information gathered that is pertinent to the erosion analysis is summarized in Tables 2.1 to 2.3. The complete geotechnical studies and analysis obtained in 2016 and 2021 are included in Appendix A and Appendix B respectively.

The 2016 geotechnical investigation consisted of sieve analysis and pocket penetrometer testing on eight soil samples taken at three locations at various heights along the creek bank (S-1, S-2, and S-3). The 2021 investigation included sieve analysis of one boring (B-1) and four Dynamic Cone Penetrometer (DCP) tests (DCP-1, DCP-2, DCP-3A and DCP-3B). Figure 2-1 shows the locations of the soil samples and penetrometer tests.

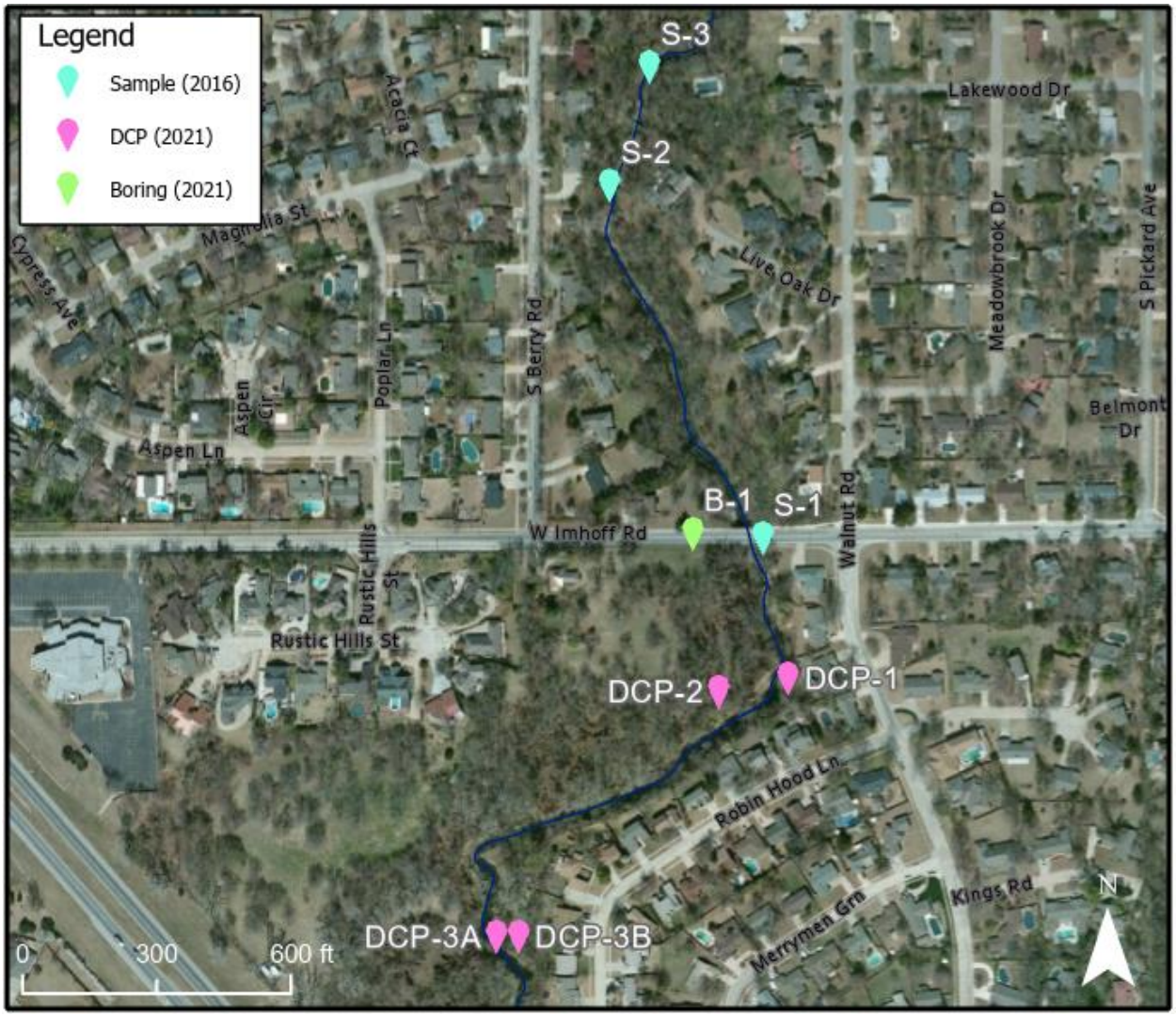


Figure 2-1: Locations of soil samples

Table 2-1 summarizes the sieve analysis results for the 2016 and 2021 soil samples. The 2016 samples taken along the creek bank (S-1, S-2 and S-3) consist predominantly of clay with varying amounts of silt and sand. The boring at B-1 was taken from the west overbank and all three samples were classified as silty sands.

Table 2-1: Laboratory Classification Test Results

Sample ID	Depth (ft)	Moisture (%)	Gravel (%)	Sand (%)	Fines (%)	Description
S-1A	9	11.9	14	39	47	Clayey Sand, brown
S-1B	19	19	0	14	86	Lean Clay, brown
S-1C	21	19.7	0	46	54	Lean Clay, sandy, reddish brown
S-2A	15	15.2	0	32	68	Silty Clay, sandy, dark brown
S-2B	21	10.6	0	56	44	Silty Sand, reddish brown
S-2C	25	17.3	0	42	58	Lean Clay, sandy, brown
S-3A	10	7.6	0	18	82	Silty Clay, with sand, brown
S-3B	18	17.4	0	32	68	Lean Clay, sandy, reddish brown
B-1A	4.5-10	11.3	0.03	62.81	27.16	SM - Silty Sand
B-1B	18.5-25	9.1	0	88.66	11.34	SP-SM - poorly graded sand with silt
B-1C	28.5-35	23.7	1.43	82.92	15.66	SM - Silty Sand

Table 2-2: Laboratory Classification Test Results

Table 2-3 summarize results for the 2016 and 2021 penetrometer tests, respectively. The results indicate stiff to very stiff soils along the banks of the creek.

Table 2-2: Pocket Penetrometer Test Results (2016)

Test Location	Depth (ft)	Pocket Penetrometer Reading (tsf)
S-1	9	1.5-2
	19	3.5-4.5
	21	4.5+
S-2	15	1.5-2.2
	21	1.5-2.2
	25	2.5-3.5
S-3	10	4.5
	18	3-4.5

Table 2-3: DCP Test Results (2021)

Test Location	Depth (in)	Bearing Capacity (psi)
DCP-1	9.4	11.5
	13.8	20.5
	14	342.6
	14.2	204.6
	14.4	342.6
	14.6	204.6
DCP-2	9.4	11.5
	15.2	16.7
DCP-3A	8.3	12.7
	13.8	17.2
	18.9	18.1
	23.6	19.3
DCP-3B	10.2	10.8
	18.1	13.2
	25.6	13.7

3.0 Erosion Analysis

3.1 Analysis Approach

The goal of the erosion analysis is to evaluate the historical vertical and horizontal rate of streambank erosion and predict the future erosion and impacts to critical infrastructure and residential property. Historical LiDAR was used to estimate observed historical erosion. A HEC-RAS Unsteady Sediment Transport Model and a Bank Stability and Toe Erosion Model were developed to quantitatively evaluate the vertical and horizontal changes in the Imhoff stream to and validate the historical observations.

3.1.1 Historical LiDAR

The LiDAR elevation data developed for the conceptual phase of the project consisted of 2015 survey data incorporated into the 2007 1-foot contour topography provided by the City of Norman. The 2015 LiDAR was established as the baseline against which the 2021 LiDAR was compared to analyze the topographical changes over six years.

3.1.2 HEC-RAS

The unsteady-state, one-dimensional (1D), Hydrologic Engineering Center's River Analysis System (HEC-RAS), version 4.1.0 effective FEMA hydraulic model for the Zone AE study of Imhoff Creek was modified with updated hydrology and survey data as part of the conceptual phase of this project in 2017. The model was updated to version 6.0, LiDAR was incorporated into the model that included the most recent survey data, and the geometry was updated to create the new existing conditions model.

3.1.3 Bank Stability and Toe Erosion Model

The Bank Stability and Toe Erosion Model (BSTEM) is a combination of models developed by the U.S. Department of Agriculture's Agricultural Research Service (USDA-ARS) that runs in Microsoft Office Excel™. The Bank Stability model calculates the factor of safety of an input bank geometry and provides a plane of failure, while the Toe Erosion Model estimates the amount of erosion at the toe of the bank based on input flow parameters.

3.2 Vertical Analysis

3.2.1 Historical Observations

Figure 3-1 shows the stream bed profile for Imhoff Creek from the Imhoff Road bridge to approximately 400 ft downstream of the structure using channel survey and LiDAR data for 2007, 2015 and 2021.

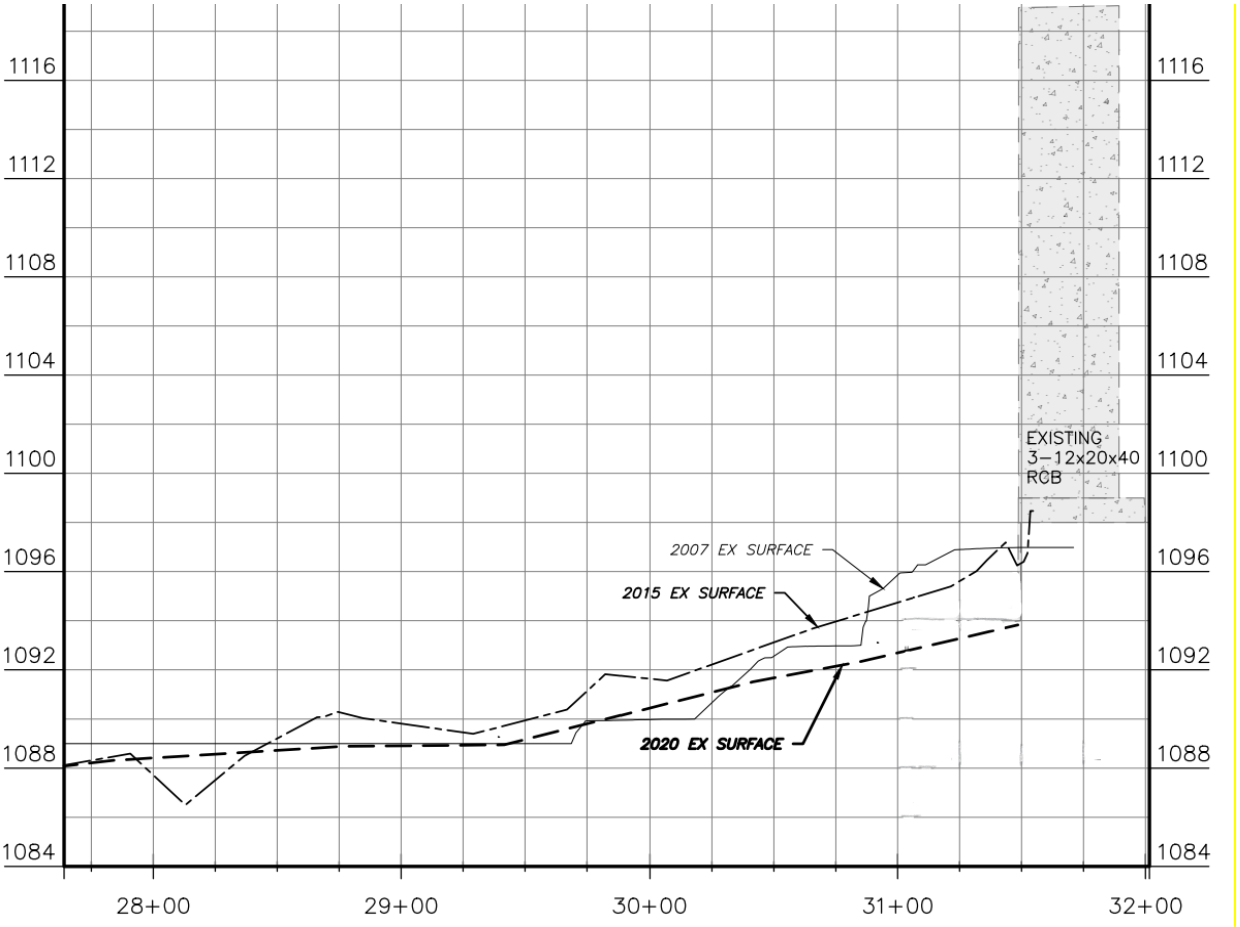


Figure 3-1: Stream bed profile

As seen in Figure 3-1, there is significant scour occurring just downstream of the bridge structure at Imhoff Road, as well as vertical head cutting. The scour immediately downstream of the bridge is shown to have eroded vertically at an average rate of 2.25 inches per year between 2007 and 2015, and an average rate of 6 inches per year from 2015 to 2020. As the drop at the downstream face of the structure continues to increase, the rate of erosion will continue to increase as well.

The head cut is moving upstream at an average rate of approximately 5 feet per year. At this rate, the head cut will begin to undermine the Imhoff Road bridge by 9 feet in approximately 30 years if no counteractive measures are taken.

3.2.2 HEC-RAS Model

A HEC-RAS unsteady sediment transport model was developed to simulate the bed change along Imhoff Creek. The existing conditions unsteady model was trimmed down to the reach downstream of the articulated block channel for model stability, and inflows from the existing conditions model were applied. Sediment data was developed based on the geotechnical information available and interpolated between sample locations.

Due to the lack of accurate historical flow data for Imhoff Creek, as well as minimal sediment data and the variety of materials present in the reach, accurate calibration of the model is unattainable. Though the model results cannot be quantitatively validated, general trends in erosion driven by the channel geometry and flow characteristics can be inferred. Figure 3-2 shows the results of the 50 percent annual chance (2-year) storm event.

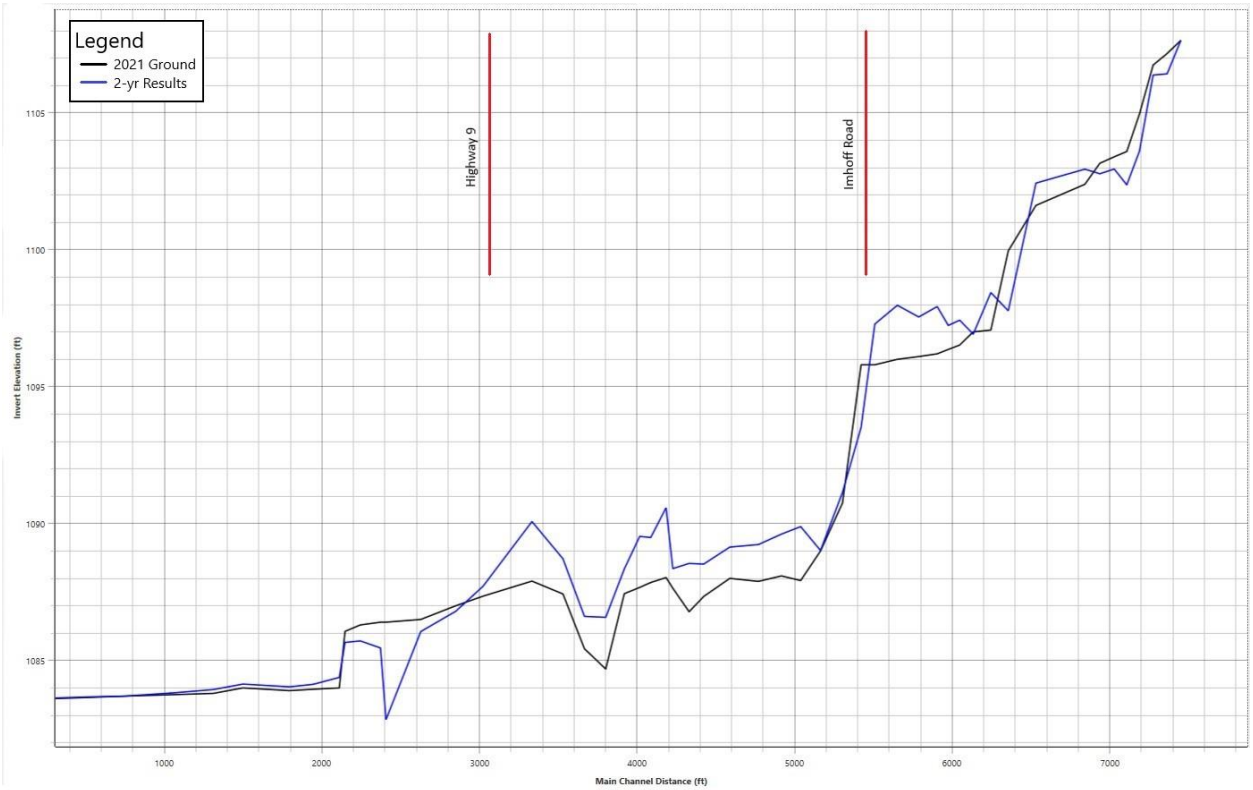


Figure 3-2: Sediment transport results for the 2-yr storm event

The results show that the head cutting just downstream of the Imhoff Road structure is likely to continue moving upstream and undermine the existing Imhoff bridge structure. There is also additional head cutting occurring upstream of Highway 9, which will continue to erode upstream towards Imhoff Road over time.

3.3 Horizontal Analysis

3.3.1 Historical Observations

To estimate the historical horizontal movement of the channel, the 2015 and 2021 LiDAR were compared volumetrically, and profiles of several cross sections were evaluated. Figure 3-3 shows the two areas that were evaluated volumetrically, with Reach 1 in red and Reach 2 in orange. Table 3-1 shows the results of the volumetric analysis.

Figure 3-3: Area that was evaluated volumetrically

Table 3-1: Volumetric erosion results

	Volume Lost (ft^3)	Volume Lost (yd^3)	Reach Length (ft)	Bank Height (ft)	Time (yr)	Annual Lateral Erosion (ft/yr)	Annual Lateral Erosion (in/yr)	Annual Volumetric Erosion (yd^3/yr)
Reach 1	170,030	6,297.4	2,075.3	20	6	0.68	8.19	1,049.6
Reach 2	44,797	1,659.1	515.3	22.6	6	0.64	7.7	276.5

Figure 3-4 shows the locations of the evaluated cross sections, and Table 3-2 shows a summary of the yearly lateral movement of the toe and the top of the left bank to the east at each cross section.

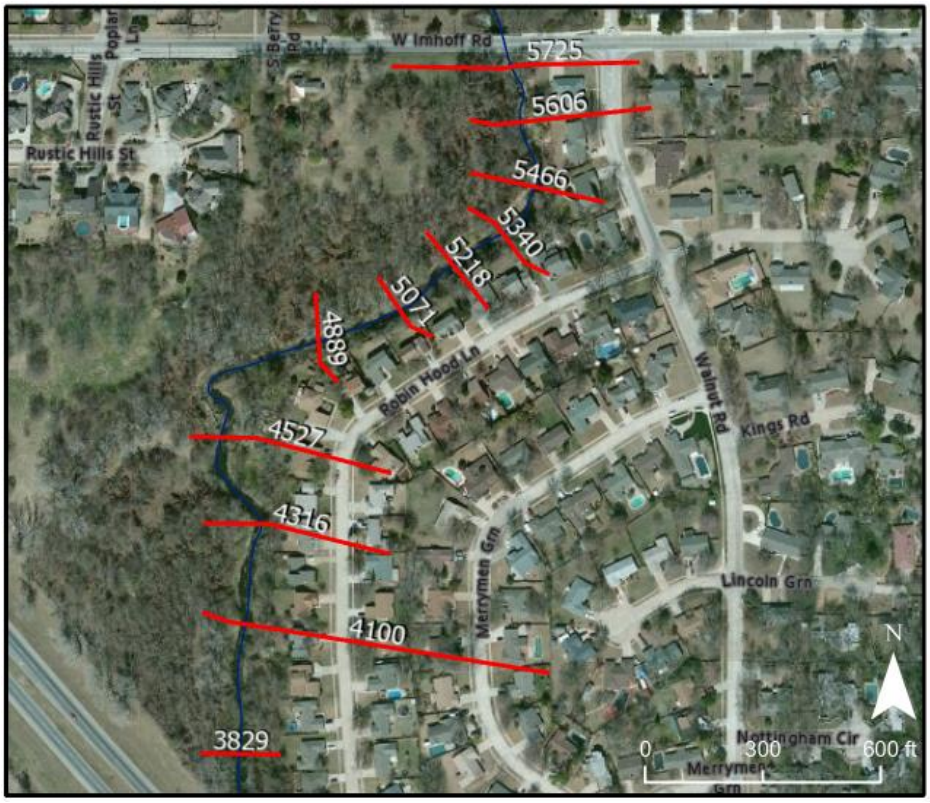


Figure 3-4: Locations of cross sections used to evaluate the lateral shift of the bank

Table 3-2: Lateral shift of the east bank

Cross Section	Lateral Shift of the channel toe to the east (feet per year)	Lateral Shift of the top of the east bank to the east (feet per year)
5725	.9	1.02
5606	1.9	0.48
5466	0	0
5340	.95	1.34
5218	1.3	0.41
5071	0	1.5
4889	0	1.02
4527	.49	1.1
4316	0	1.68
4100	0	1.01
3829	.46	0.41
Average	.49	0.9

3.3.2 Bank Stability and Toe Erosion Model

A USDA-ARS Bank Stability and Toe Erosion Model was used to simulate the lateral erosion at the toe and top of the left bank for three cross sections (5725, 5606 and 5340). The elevation of flow was input as the maximum water surface elevation of the 50 percent annual chance (2-year) storm event from the HEC-RAS unsteady flow model. A flow duration of 2 hours was used as that is how long the water surface elevation stays above the 2-year maximum elevation during a 10 percent annual chance (10-year) storm. The 10-year storm is equivalent to 5.53 in of precipitation, and it was assumed that this storm event would happen seven times a year based on the normal water year rainfall of 38.6 in for Cleveland County (Mesonet). Based on the geotechnical data available, all cross sections were evaluated with a soil profile of resistant stiff clay. The results of the toe erosion and bank stability model are summarized in Table 3-3 below.

Table 3-3: BSTEM Results

Cross Section	Maximum Lateral Toe Retreat of East Bank (feet per year)	Lateral Retreat (top of bank) to a Stable Bank (feet)
5725	0.23	32.89
5606	2.78	45.94
5340	1.15	61.16

4.0 Emergency Repair

4.1.1 Wingwall Failure

The Imhoff Road bridge was inspected in October of 2019 by Oklahoma Department of Transportation (ODOT) and rated scour critical. The inspection noted severe scour up to 1 ft at the upstream end with up to 1.5 ft of undermining and 2.25 ft of scour with up to 0.5 ft of undermining at the downstream end. Scour at the southeast wingwall was up to 4 ft with up to 3.3 ft of undermining. Figure 4-1 below shows the scour at the downstream end of the box, and Figure 4-2Figure 4-2 shows the undermining of the southeast wingwall. In September of 2021 the southeast wingwall failed, as shown in Figure 4-3.

Figure 4-1: Scour at the south end of the structure at Imhoff Road

Figure 4-2: Undermining of the southeast wingwall of the structure at Imhoff Road

Figure 4-3: Failure of the southeast wingwall of the structure at Imhoff Road

An emergency repair is underway, replacing all four wingwalls and adding new aprons on the upstream and downstream end of the structure. Figure 4-4 below shows the location of the emergency apron on the downstream end of the structure, with a 4 ft drop at the structure face and a 6 ft sheet pile wall at the end of the 42.5 ft long apron.

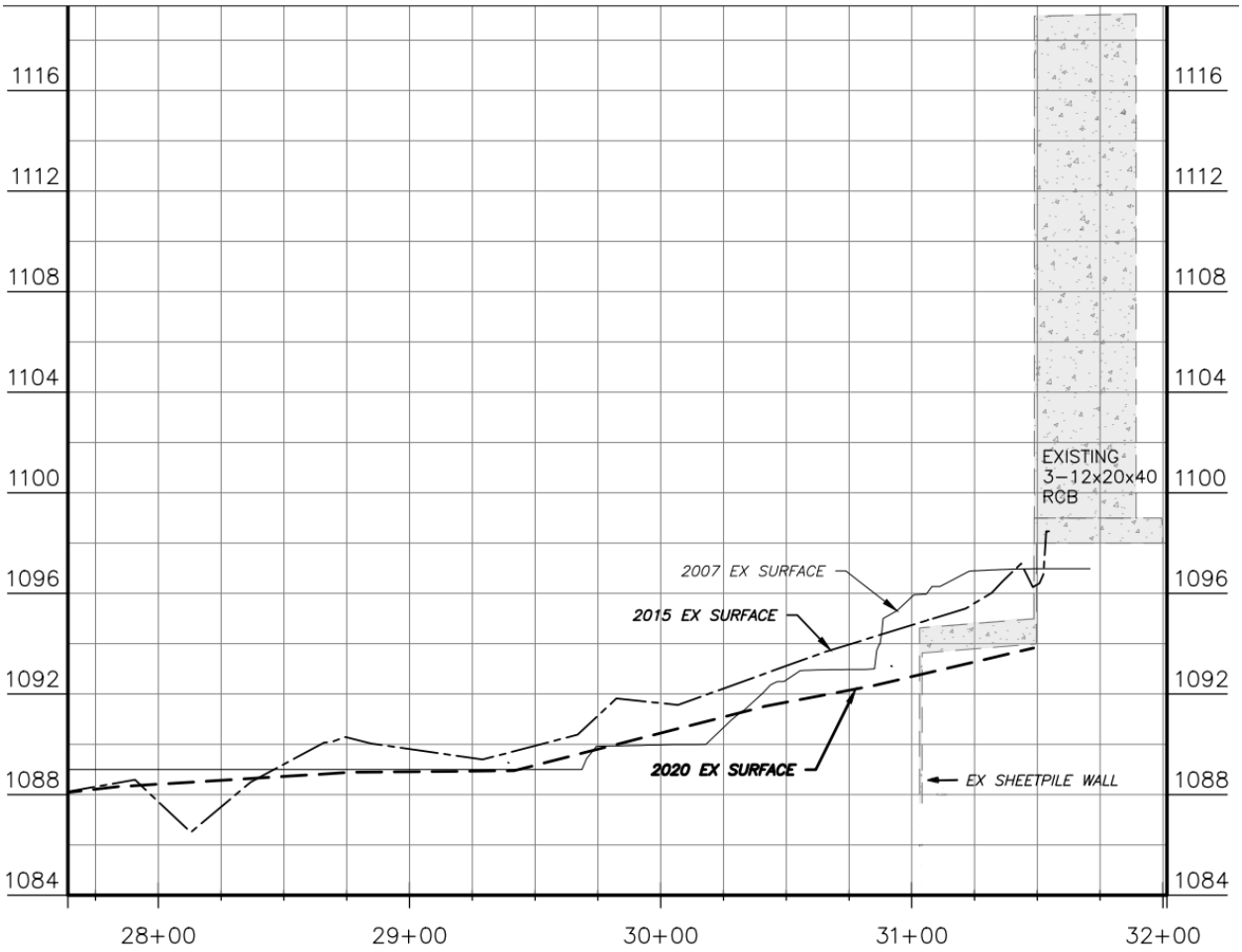


Figure 4-4: Profile view of downstream emergency repair

4.1.2 HEC-RAS Model

A comparison between current existing conditions and the emergency repair was done to determine the repair's effect on the stream flow and erosion. Figure 4-5 shows the increase in velocity due to the emergency repairs. While the velocity through the structure slightly decreased, the velocities increased 20-50% just downstream of the apron.

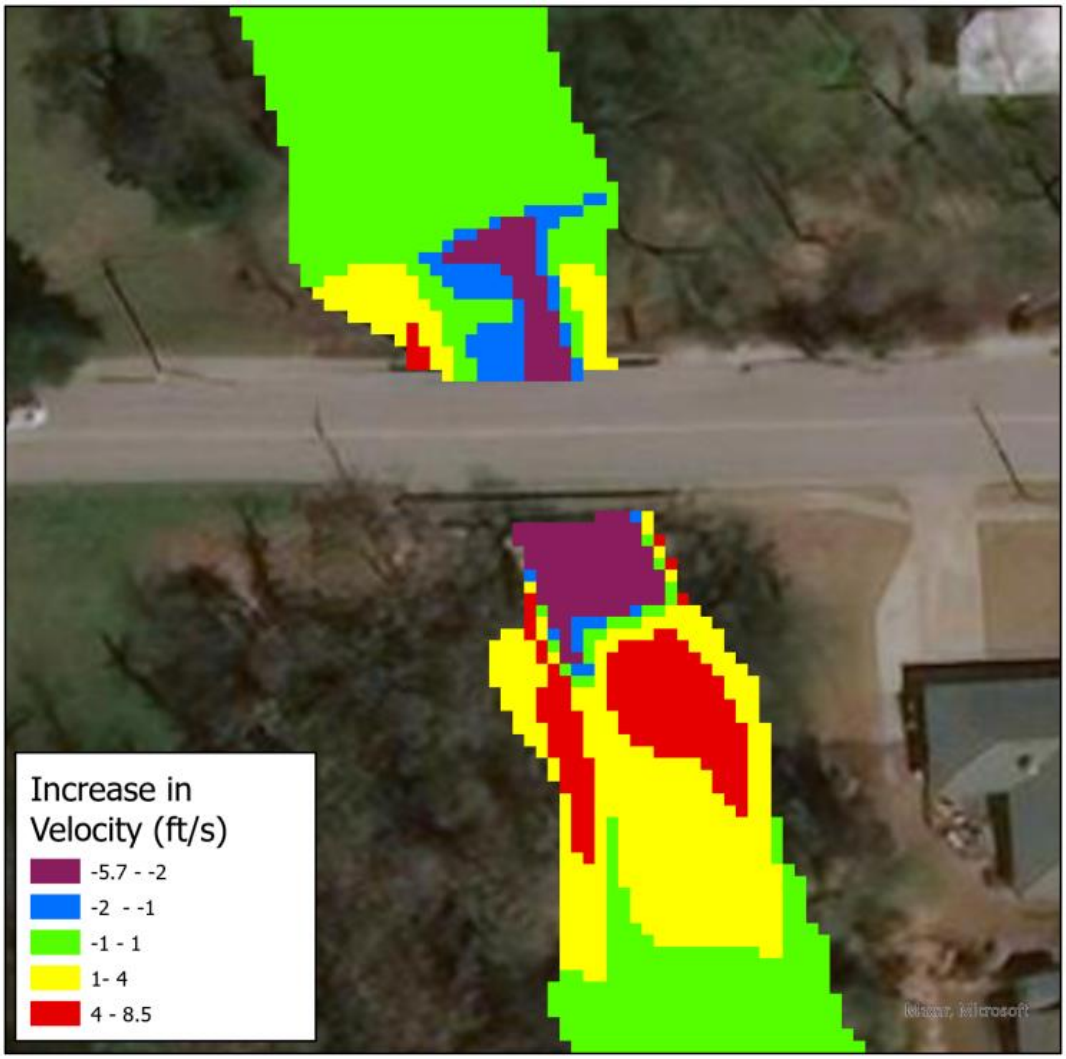


Figure 4-5: Increase in velocity due to the emergency repair

The increase in velocity will increase the rate of erosion in the area. Assuming the increased velocities will increase the rate of the head cut migration toward the Imhoff bridge structure by approximately 30%. Once the streambed head-cut reaches the bridge structure and the newly installed 6' sheet pile wall at the end of the apron, the bridge structure may be compromised in approximately 23 years. The engineer of record for the emergency bridge repairs estimates the life expectancy of those repairs to be approximately 15 years.

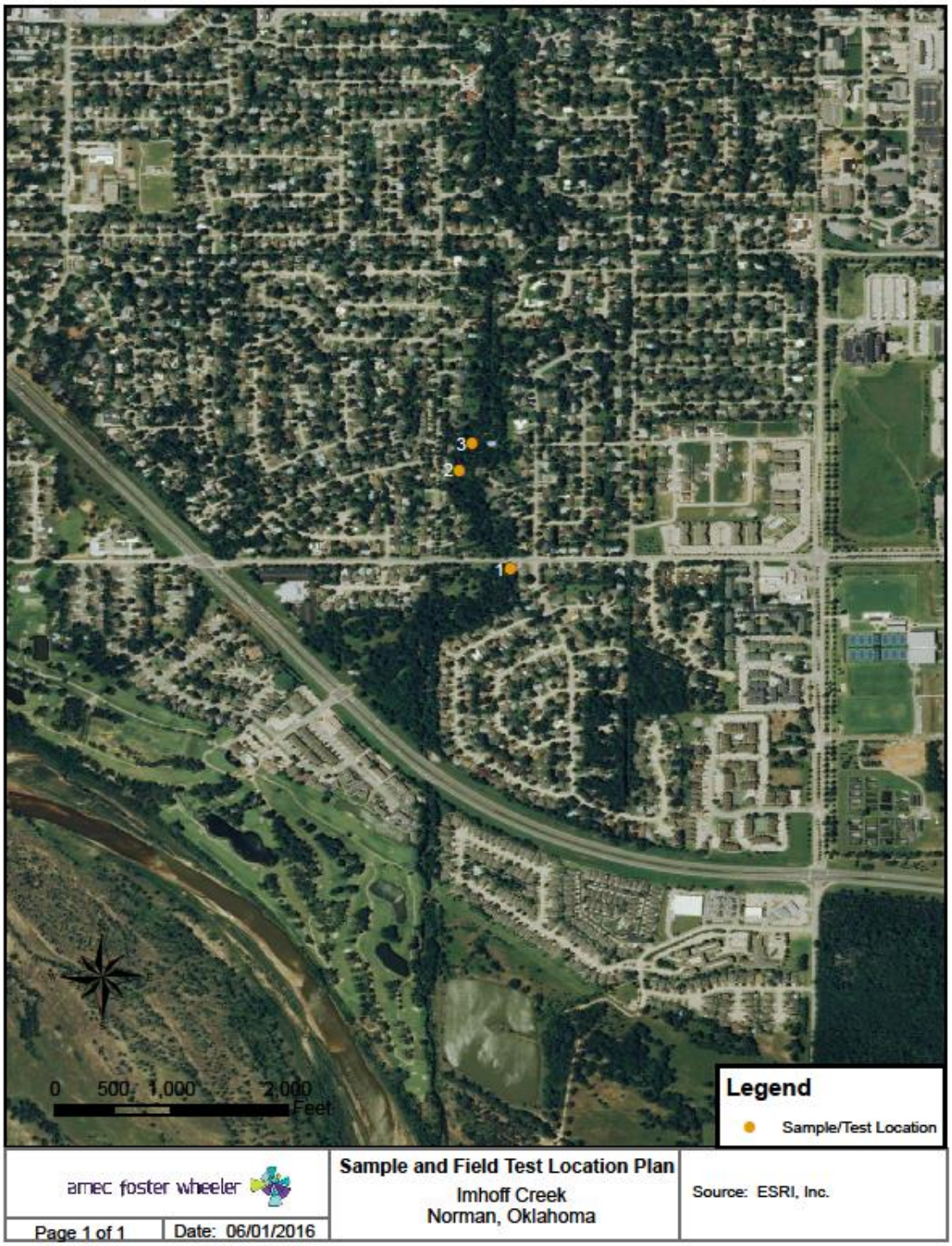
5.0 Erosion Analysis Conclusion

The goal of the erosion analysis is to quantify the future erosion and impacts to critical infrastructure along Imhoff Creek between Imhoff Road and Highway 9. The rate of erosion in the area is highly variable due to differences in channel geometry, bank and channel material, channel slope, flow velocities and shear stress throughout the reach. If no mitigation strategies are employed, the erosion will continue to head cut upstream and undermine the bridge structure at Imhoff Road in approximately 23 years. The east bank will continue to erode further to the east, threatening the residential properties and sanitary sewer infrastructure along the creek.

Assuming the average annual lateral rate of erosion of 0.7 feet per year from historical observations, Figure 5-1Figure 5-1 below shows the current top of bank line, and the estimated top of bank line in 10 years and 20 years. The predicted future banks threaten two houses and five sewer lines in the next ten years. The degradation of the structure at Imhoff Road puts an additional sewer line at risk if the structure fails.

Figure 5-1: Future top of bank lines due to erosion

6.0 Appendix A: Geotechnical Analysis (2016)



SUMMARY OF LABORATORY TEST RESULTS

PROJECT: Imhoff Creek

PROJECT NO.: 8275000239

DATE: 01-June-2016

BORING NUMBER	SAMPLE NUMBER	SAMPLE TYPE	DEPTH* (FT.)	NATURAL MOISTURE (%)	PERCENT GRAVEL (%)	PERCENT SAND (%)	PERCENT SILT /CLAY (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS			UNIFIED SOIL CLASSIFICATION	OTHER TESTS **	SOIL DESCRIPTION
									LIQUID LIMIT	PLASTIC LIMIT	Plasticity Indes			
	1A	Grab	9'	11.9	14	39	47		20	12	8	SC		Clayey Sand, brown
	1B	Grab	19'	19.0	0	14	86		34	14	20	CL		Lean Clay, brown
	1C	Grab	21'	19.7	0	46	54		25	12	13	CL		Lean Clay, sandy, reddish brown
	2A	Grab	15'	15.2	0	32	68		22	16	6	CL-ML		Silty Clay, sandy, dark brown
	2B	Grab	21'	10.6	0	56	44		NV	NP	NP	SM		Silty Sand, reddish brown
	2C	Grab	25'	17.3	0	42	58		29	12	17	CL		Lean Clay, sandy, brown
	3A	Grab	10'	7.6	0	18	82		23	17	6	CL-ML		Silty Clay, with sand, brown
	3B	Grab	18'	17.4	0	32	68		27	15	12	CL		Lean Clay, sandy, reddish brown

* ST-SHELBY TUBE, SS-SPLIT SPOON / SPLIT-BARREL SAMPLER, B-BAG / BULK, C-CORE

** C- Consolidation Test P-Proctor O-Fractional Organic Carbon pH-acidity

S-Sieve or Grain Size Analysis D-Direct Shear CBR-California Bearing Ratio K - Permeability

U-Unconfined Compression Test T-Triaxial Compression Test H-Hydrometer

R-Relative Density SL-Shrinkage Limits G-Specific Gravity

RE-Resistivity

Notes: * Depth is from top of bank

DATA CHECKED BY NCL

Summary of Pocket Penetrometer Field Testing
Imhoff Creek - Norman, Oklahoma

Test Location	Depth* (ft)	Pocket Penetrometer Readings (tsf)
1	9	1.5 - 2.0
	19	3.5 - 4.5
	21	4.5+
2	15	1.5 - 2.2
	21	1.5 - 2.2
	25	2.5 - 3.5
3	10	4.5
	18	3 - 4.5

* Depth is from top of bank

Imhoff Creek Bank Stabilization
FEMA CLOMR Application

Norman, Oklahoma
August 2025

Prepared For:
City of Norman, Oklahoma

Design Consultants:
Meshek & Associates, LLC
1437 S Boulder Ave | Suite 1550
Tulsa, OK 74119

WSP, USA
245 N. Waco Ave | Suite 110
Wichita, KS 67202

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INTRODUCTION

On behalf of the City of Norman, Oklahoma, the Design Consultant (Meshek & Associates, LLC and WSP, USA, formerly Wood/Amec Foster Wheeler) performed a detailed flood impact study for the proposed Imhoff Creek Bank Stabilization Project between Imhoff Road and State Highway 9. The purpose of this project is to address severe erosion along Imhoff Creek that has resulted in down cutting and bank widening, which threatens both the infrastructure and residences located along the stream. The project site is currently located within the floodway and floodplain fringe of Imhoff Creek as shown on the Cleveland County, OK Flood Insurance Rate Maps (FIRMs) 40027C0290H dated September 26, 2008, and 40027C0280J dated January 15, 2021. Local, state, and federal regulations require a floodplain impact study showing that the 1% annual chance water surface elevations are not impacted and that the proposed changes meet a “No-Rise” condition.

The baseline for this project comes from the FEMA Effective model for Imhoff Creek, a HEC-2 model created in 1997. As part of the study phase of this project completed by the Design Consultant in 2017, new hydrology and hydraulics were developed to create a preliminary Corrected Effective model using HEC-HMS Version 4.0 and HEC-RAS Version 4.1.0. The terrain data consist of 1-foot 2007 contours with 2015 survey data incorporated in the project area. For the detailed methodology used to develop the preliminary Corrected Effective, see Attachment 1: Lower Imhoff Creek Hydraulic & Hydrologic Study Project Report. In the present phase of the project, the 2017 preliminary Corrected Effective model has been updated to HEC-RAS Version 6.5, and the terrain was updated with 2-foot 1978 contours in the project area to create a Corrected Effective model that has a channel profile closer to that of the time when the Effective modeling was done, compared to the 2015 survey data that has eroded considerably since the Effective date. To create the preliminary Pre-Project (Existing) Conditions model, the terrain was updated in the project area with 2021 survey data. There was an emergency repair to the Imhoff Road bridge during the project, which was included in the modeling as the final Pre-Project (Existing) Conditions model.

The Post-Project (Proposed) Conditions model scenario represents a post-construction analysis which assumes the improvements are constructed per the plans. The Proposed Conditions model was developed by modifying a copy of the Existing Conditions model with the recommended improvements. It is then used to compute the changes to the water surface elevations which would result from the proposed stream embankment improvements. The following section details the methods used to perform this floodplain impact study. Below, Figure 1 shows the area of the project, along Imhoff Creek between Imhoff Road and Highway 9.

Figure 1: Imhoff Creek Project Reach

EFFECTIVE MODELING

To determine the impacts of the proposed streambank stabilization improvements along Imhoff Creek, the Design Consultant referenced the March 2024 Effective Cleveland County FEMA FIS report and the associated models. The current FEMA Effective floodplains were developed using a steady-state HEC-2 model for Imhoff Creek completed in 1997. Peak discharges from a HEC-1 model developed in 1996 were input into the HEC-2 model and used to compute the 1% annual chance water surface elevations (WSE). A digital version of the Effective HEC-2 model for Imhoff Creek was not available, and the HEC-2 results were provided in PDF format, therefore a Duplicate Effective model was not necessary. Below, Figure 2 shows the Effective regulatory floodplain and floodway for Imhoff Creek (FEMA, 2024).

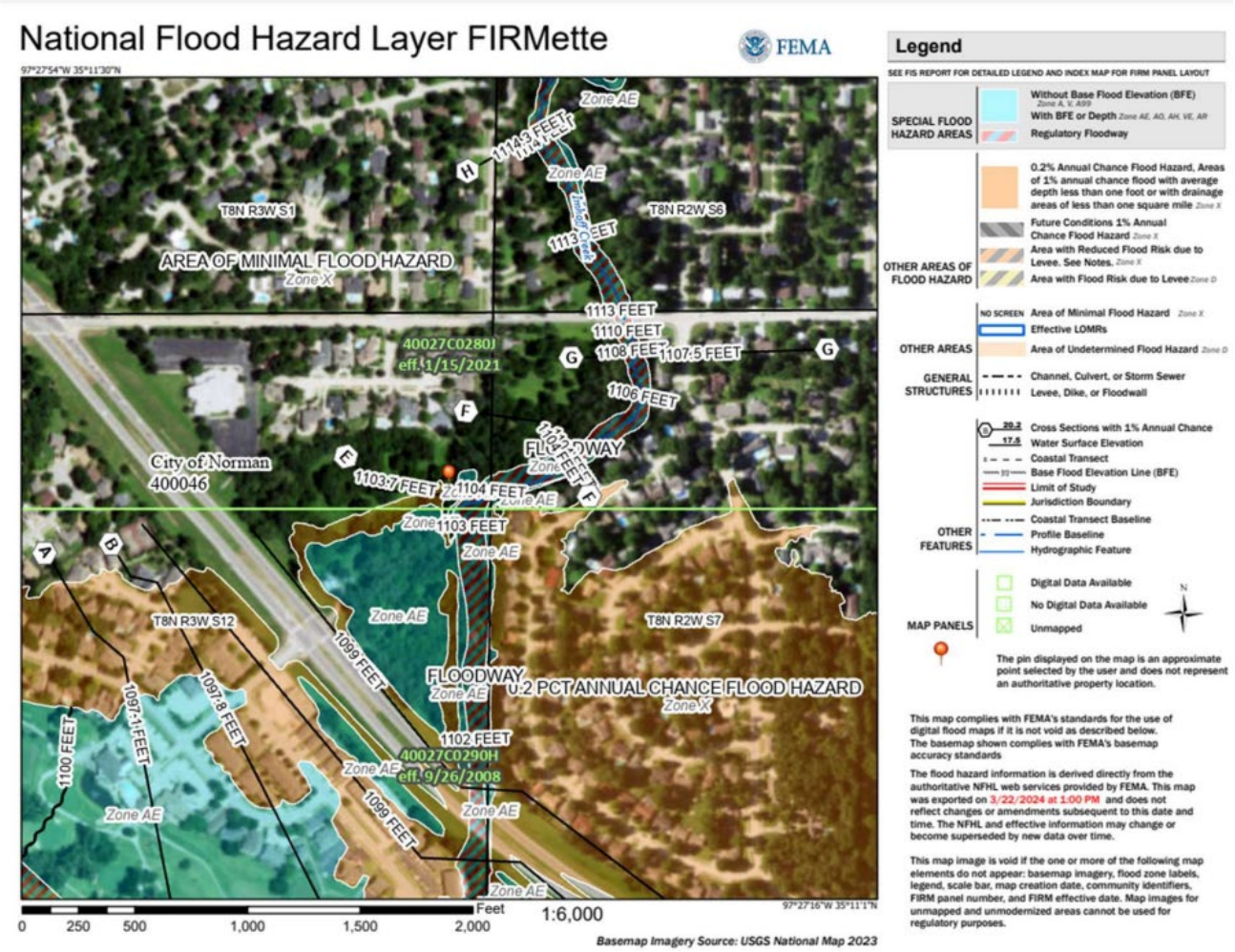


Figure 2: FIRMette for Imhoff Creek

CORRECTED EFFECTIVE AND PRE-PROJECT (EXISTING) CONDITIONS MODELING

HYDROLOGY

The Design Consultant created a rainfall runoff model using HEC-HMS Version 4.0 to generate subbasin runoff hydrographs for the 50%, 20%, 10%, 4%, 2%, 1%, 1%+ and 0.2% chance 24-hr SCS Type II rainfall events. The runoff infiltration was calculated using the NRCS Curve Number methodology based on land use, hydrologic soil group, and Antecedent Moisture Condition Type II. The hydrographs were routed and combined along the studied streams to produce the peak discharges. The resulting hydrographs were used as inflows to Imhoff Creek for the unsteady-state HEC-RAS model, which then routed the flow hydrographs along the channel. For a detailed discussion of the hydrologic methodology, see Attachment 1: Lower Imhoff Creek Hydraulic & Hydrologic Study Project Report

HYDRAULICS

The Design Consultant created a preliminary Corrected Effective hydraulic model for Imhoff Creek using unsteady-state HEC-RAS Version 4.1.0 during the study phase of this project to compare and evaluate design alternatives. Cross sections were placed using topography and standard guidance for spacing, and structure geometries were taken from past HEC models as well as field measurements, sketches and photographs. The terrain consisted of 2007 1-foot contours with 2015 survey incorporated in the area of interest (shown in Figure 3). Manning's "n" values were assigned based on aerial photography and field investigations and standard contraction and expansion coefficients of 0.1 and 0.3, or 0.3 and 0.5 near structures were used. A normal depth downstream boundary condition was applied.

Figure 3: Model Extents and Area of Interest

The preliminary Corrected Effective model was updated to HEC-RAS version 6.5, and 2-foot contours from 1978 were incorporated into the model terrain in the area of interest. It was decided to use older terrain data for the Corrected Effective so that the channel profile would be more similar to that of the Effective modeling than the 2015 survey that was originally in the model. The Design Consultant and the City of Norman agreed to use the Corrected Effective as the basis to evaluate rise against, as it is expected that the project will cause some rise compared to the current Existing Conditions due to the nature of the bank restoration where fill is added to the floodway, and it is expected that there will be rise compared to the Effective BFEs due to the updated modeling techniques. To create the Pre-Project (Existing) Conditions model, LiDAR (Light Detection and Ranging) elevation data including the most recent 2021 survey data was incorporated into the area of interest. Figure 4 shows a comparison of the streambed profile for the 1978 terrain, the 2015 terrain, and the 2021 terrain. Additional cross sections were added near the proposed improvement area to increase the model accuracy at the specific project area to be analyzed.

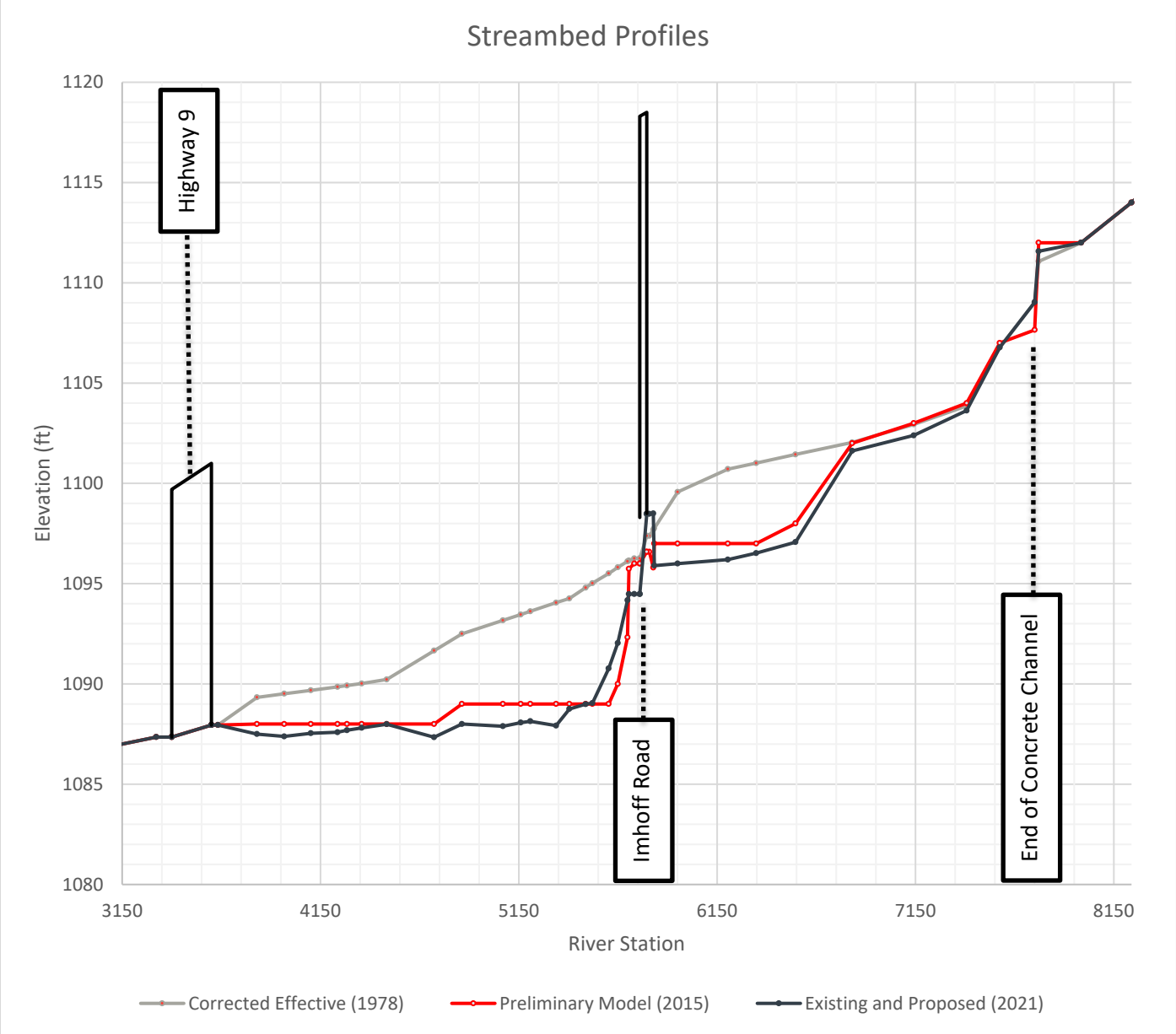


Figure 4: Streambed Profile Comparison

The Imhoff Road bridge located at the upstream end of the area of interest was inspected in October of 2019 by Oklahoma Department of Transportation (ODOT) and rated scour critical. In September of 2021 the southeast wingwall failed as shown in Figure 5 below. An emergency repair was constructed, replacing all four wingwalls and adding new aprons upstream and downstream of the bridge. The structure and its surrounding cross sections were updated to reflect the new construction, creating a new “Emergency Repair” Pre-Project (Existing) Conditions for the design alternatives to be compared to. All comparisons were made for the 1% annual chance storm event.

Figure 5: Failure of Wingwall on Imhoff Rd Bridge

PROPOSED CONDITIONS MODELING

Imhoff Creek is a small urban watershed with approximately 4 square miles of contributing drainage area located within the City of Norman, Oklahoma. Much of the open channel system is concrete or articulated block lined improved channel. During storm events the excess runoff quickly accumulates causing rapid rising and receding flooding events that can be highly turbulent and very erosive to unprotected channel areas. Over the years the channel has developed numerous areas in which exposed vertical banks are created by toe cutting from the channel or from vegetative debris that creates temporary blocks in isolated locations in the channel thus creating erosive tendencies opposite or just downstream of the blockage areas. In some instances, erosion has caused vertical embankments to migrate, impacting existing property owners’ lawns and hazardously approaching existing property structures and other critical infrastructure. If no mitigating action is taken, and the historical rate of lateral erosion of the left bank in the area of interest is maintained, the erosion will threaten two houses and five sewer lines in the next ten years.

The proposed improvements are focused between river station (RS) 5698 and 4284, and include the installation of two sections of stepped reinforced soil slope (RSS) walls on the east bank from RS 5698 to RS 4863, and RS 4358 to RS 4284. The RSS walls consist of a wire formed grid filled with reinforced soil fill, ODOT Type “D” aggregate, and topped with native soil. The walls are designed to allow for a natural vegetated face above the ordinary high water elevation to provide additional stabilization. The proposed improvements also include two sections of rock toe revetment on the west bank the protect the toe and prevent further migration due to washout. In addition to the RSS walls and rock toe revetment, two sheet pile reinforced cross vanes are proposed to be installed downstream of Imhoff Road to reduce flow velocities coming out of the bridge and lessen erosion potential. Figure 6 and Figure 7 show the 3D model and simplified cross section view of the RSS wall, and Figure 8, Figure 9, and Figure 10 show the layout, profile, and cross section view of the cross vanes. For detailed plans of each structure, see Appendix 3 – Proposed Plans.

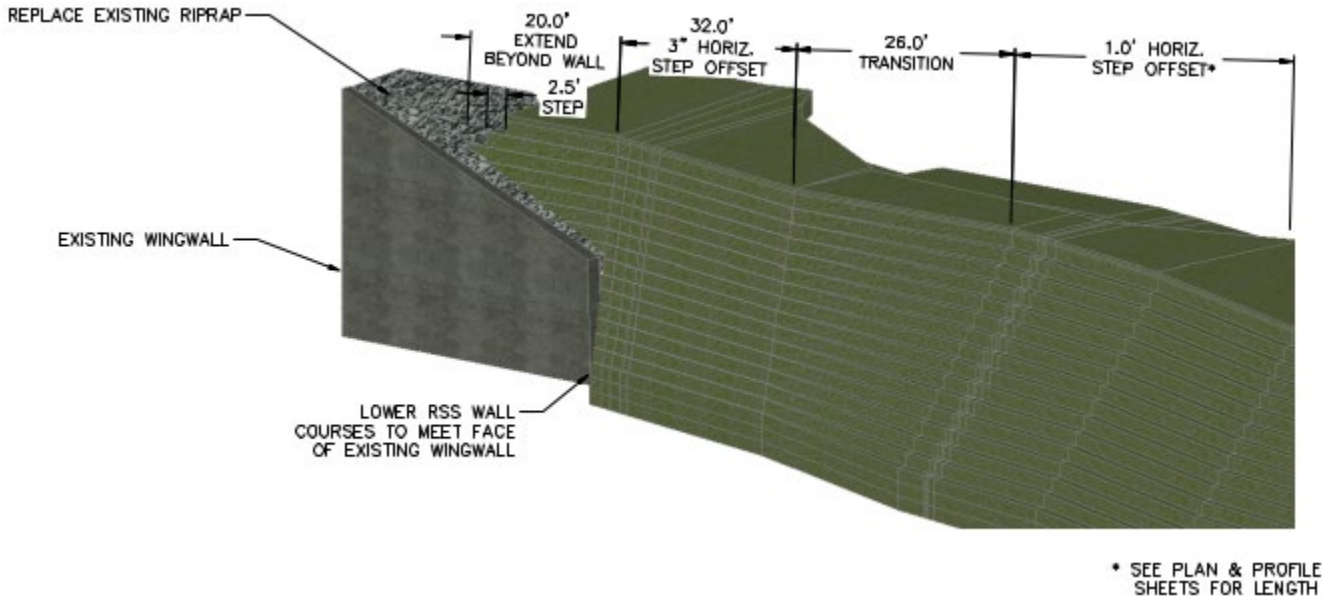


Figure 6: RSS Wall System 3D Model

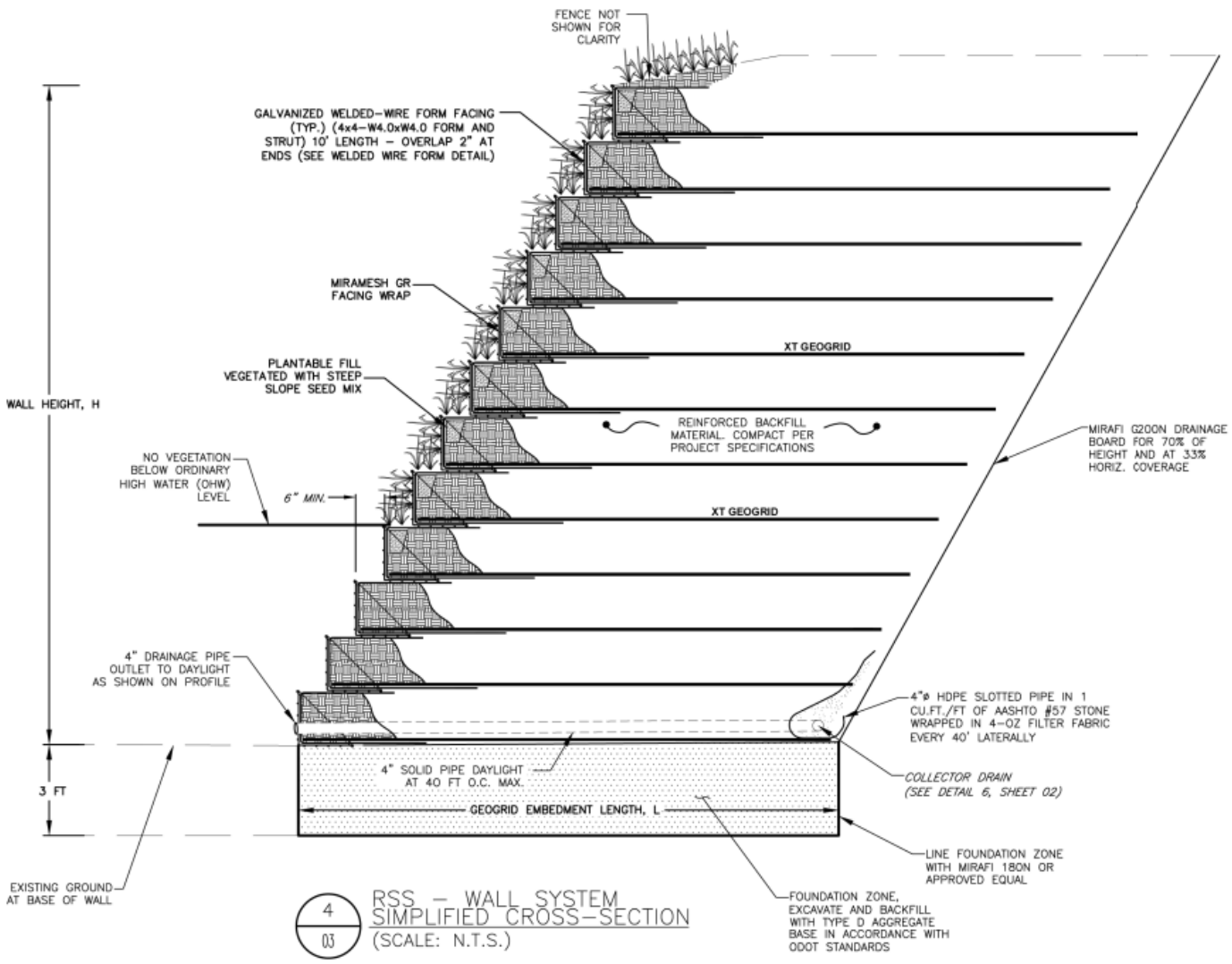


Figure 7: RSS Wall System Simplified Cross Section

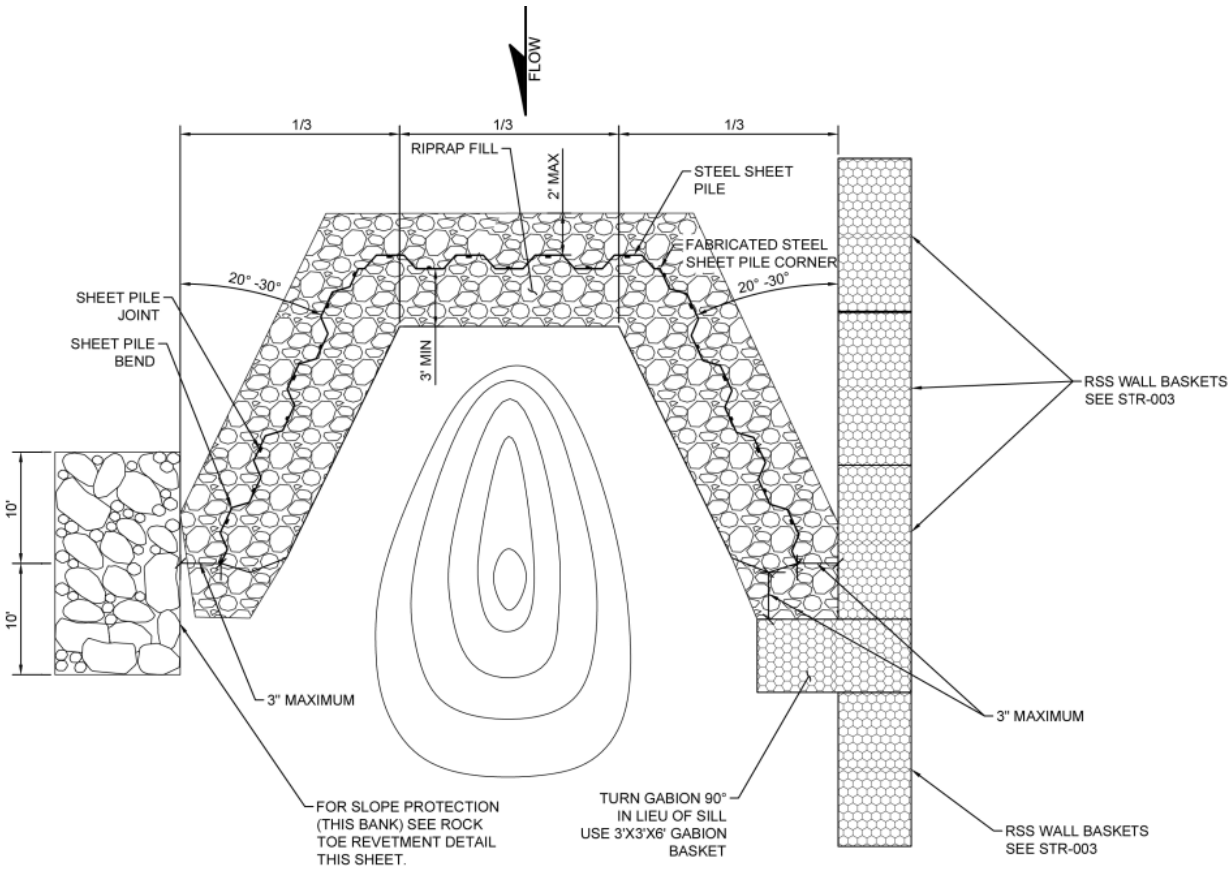


Figure 8: Sheet Pile Cross Vane Layout

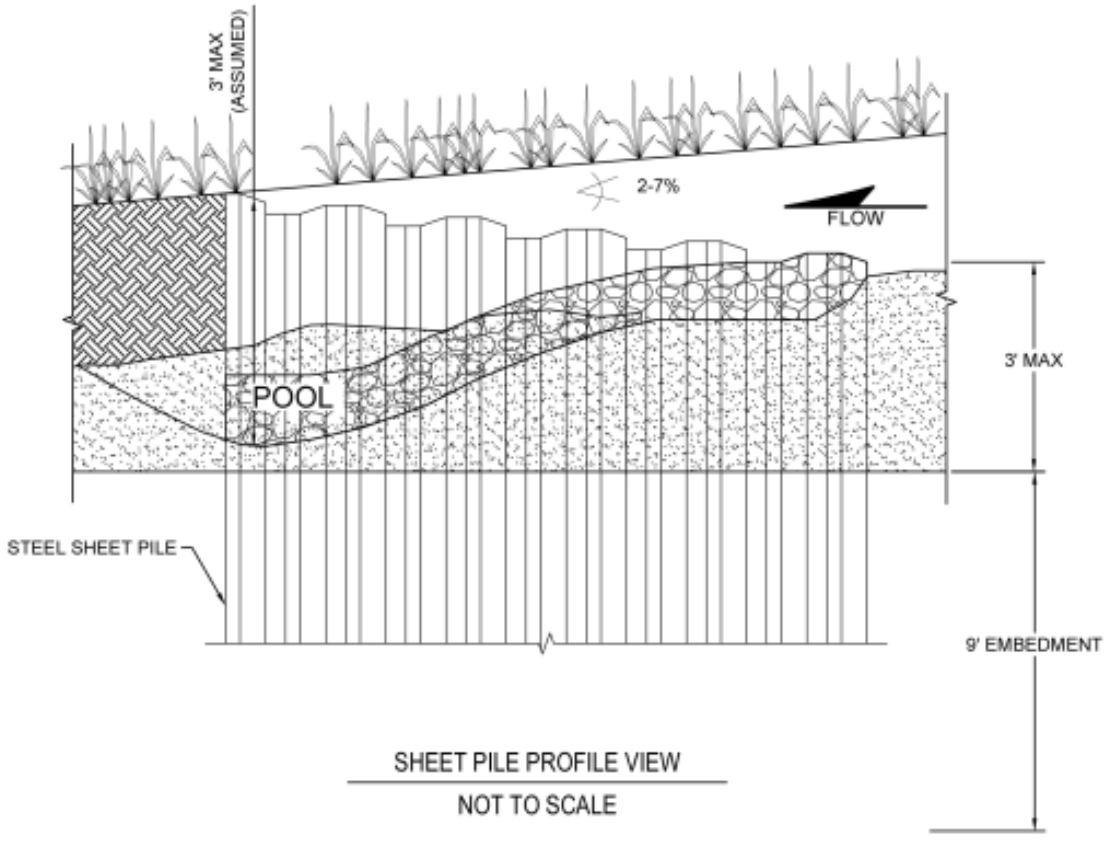


Figure 9: Sheet Pile Cross Vane Profile

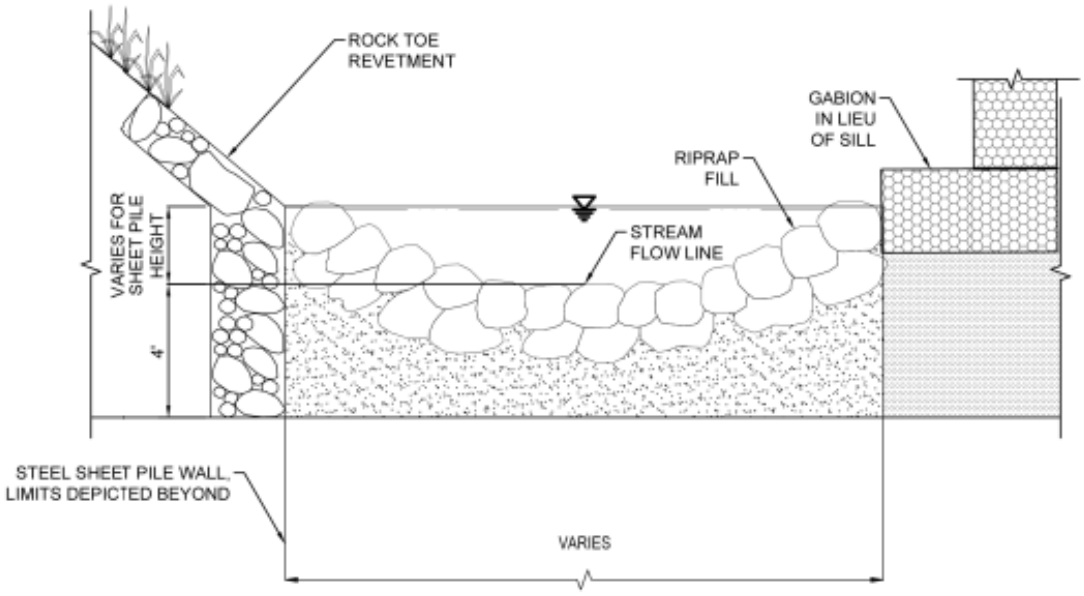


Figure 10: Sheet Pile Cross Vane Cross Section

The proposed RSS walls were represented in the model by altering the station-elevation data on the relevant cross sections according to the plans. The two cross vanes were modeled as inline structures at RS 5390 and 5145. Figure 12 shows the Existing and Proposed cross sections at RS 5405.

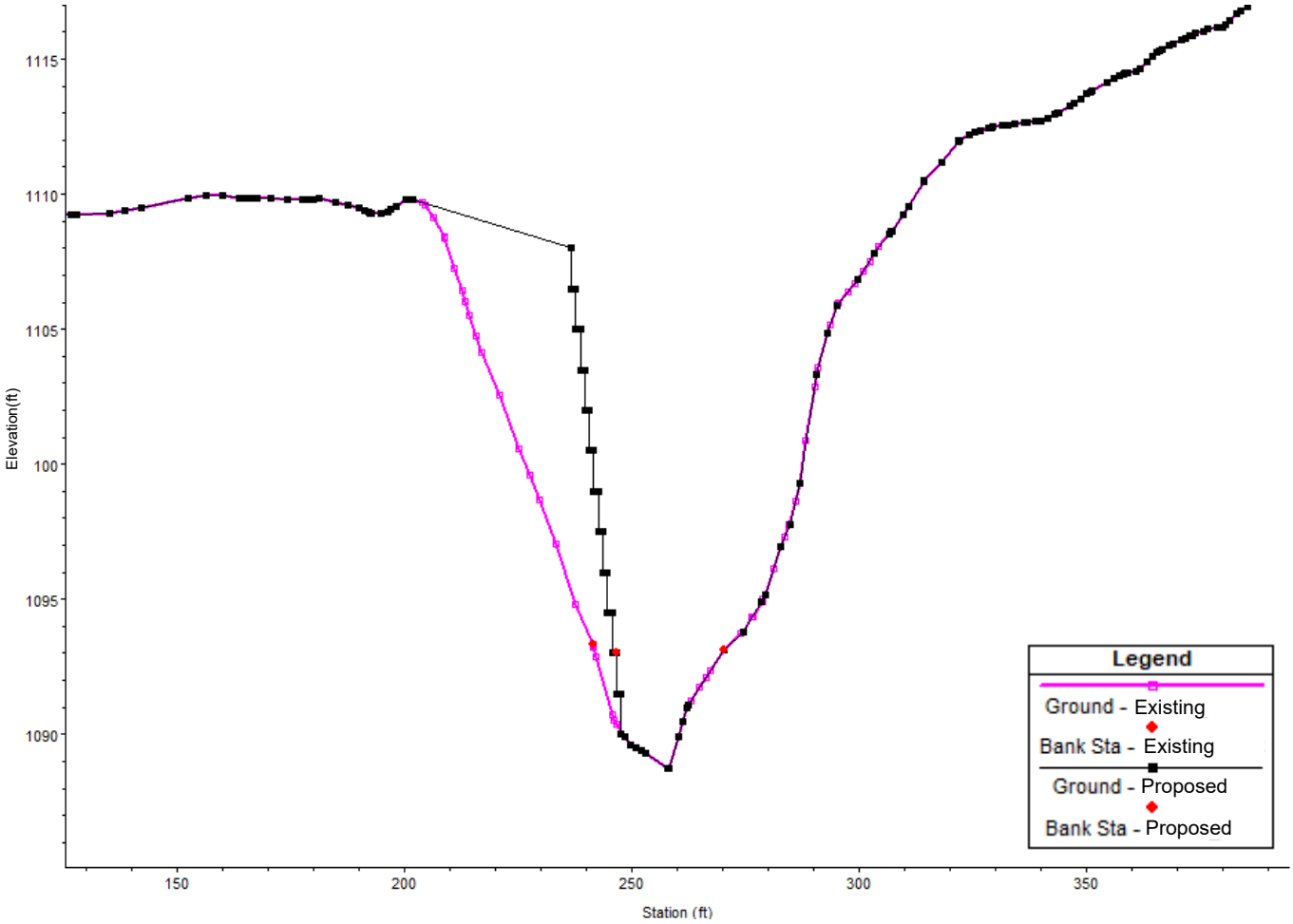


Figure 11: River Station 5405 Existing and Proposed Cross Section

RISE EVALUATION

Table 1 below shows the 1% annual chance water surface elevation comparison between the Effective, Corrected Effective, and Proposed Conditions for Imhoff Creek. The terrain updates between the Corrected Effective and Existing Conditions are between the end of the concrete channel (RS 7771) and Highway 9 (RS 3633), with the proposed improvements between RS 5698 and RS 4284.

The difference between the Proposed Conditions and the Effective shows rise and drop throughout the model, but the difference between the Corrected Effective and the Effective shows rise and drop throughout as well, showing that the rise is due to the updated modeling rather than the proposed project. The rise between the Existing Conditions and Proposed conditions in the project area directly downstream of Imhoff Road is expected due to the placement of fill in the floodway to restore and stabilize the east bank. Rather than comparing the Proposed to the Existing Conditions to evaluate rise, it was decided that due to the erosion between the date of the Effective mapping and today, it is more appropriate to use the Corrected Effective with the higher streambed profile as the basis against which to evaluate rise.

Table 1 - 1% Annual Chance Water Surface Elevation Comparison for Imhoff Creek

Cross Section River Station	Effective BFE*	Corrected Effective	Proposed	Difference Between Corrected Effective and Effective	Difference Between Proposed and Corrected Effective	Difference Between Proposed and Effective
20354 AG	-	1173.18	1173.17		-0.01	
20331	-	1173.13	1173.13		0	
20271	1171	1172.5	1172.5	1.5	0	1.5
20263	-	1172.46	1172.46		0	
20188	-	1167.64	1167.66		0.02	
20088 AF	-	1167.46	1167.46		0	
20001	1169	1167.3	1167.3	-1.7	0	-1.7
19932	-	1167.13	1167.13		0	
19909	-	1166.08	1166.08		0	
19827 AE	1167	1165.9	1165.9	-1.1	0	-1.1
19736	1166	1165.78	1165.78	-0.22	0	-0.22
19700	-	1165.63	1165.63		0	
19662 AD	-	1165.65	1165.65		0	
19628	-	1165.52	1165.52		0	
19608	-	1164.98	1164.98		0	
19574 AC	-	1164.9	1164.9		0	
19550	-	1164.9	1164.9		0	
19532	-	1164.75	1164.75		0	
19483 AB	1165	1164.77	1164.77	-0.23	0	-0.23
19442	-	1164.76	1164.76		0	
19415	-	1164.42	1164.42		0	
19354 AA	-	1164.12	1164.12		0	
19275	1164	1163.95	1163.95	-0.05	0	-0.05
19227	-	1163.46	1163.46		0	
19175 Z	-	1163.4	1163.4		0	
19033	-	1163.07	1163.07		0	
18984	-	1162.72	1162.72		0	
18901 Y	-	1162.59	1162.58		-0.01	
18825	-	1162.31	1162.31		0	
18757	1163	1161.86	1161.86	-1.14	0	-1.14
18688 X	-	1161.89	1161.89		0	
18606	-	1161.63	1161.63		0	
18530	-	1160.38	1160.39		0.01	
18467	-	1160.59	1160.6		0.01	

Cross Section River Station	Effective BFE*	Corrected Effective	Proposed	Difference Between Corrected Effective and Effective	Difference Between Proposed and Corrected Effective	Difference Between Proposed and Effective
18364	1160	1160.2	1160.2	0.2	0	0.2
18309 W	-	1160.05	1160.05		0	
18250	-	1159.67	1159.67		0	
18133	-	1159.46	1159.46		0	
18097	1159	1159.43	1159.43	0.43	0	0.43
18030	-	1158.47	1158.47		0	
18000 V	-	1158.65	1158.65		0	
17909	-	1158.72	1158.72		0	
17846	1158	1158.74	1158.74	0.74	0	0.74
17772 U	1158	1158.73	1158.73	0.73	0	0.73
17719	-	1158.73	1158.73		0	
17608	-	1158.36	1158.36		0	
17525 T	-	1158.39	1158.39		0	
17419	1157	1158.2	1158.2	1.2	0	1.2
17131	1156	1153.83	1153.83	-2.17	0	-2.17
17029 S	1155	1153.47	1153.47	-1.53	0	-1.53
16922	-	1153.19	1153.19		0	
16837	1153	1153.04	1153.04	0.04	0	0.04
16803	-	1153.03	1153.03		0	
16600	-	1153.06	1153.05		-0.01	
16380 R	1153	1152.89	1152.89	-0.11	0	-0.11
16173	-	1151.69	1151.69		0	
16022	1152	1151.32	1151.32	-0.68	0	-0.68
15954	1151	1150.96	1150.96	-0.04	0	-0.04
15806 Q	-	1150.96	1150.97		0.01	
15579	-	1150.34	1150.41		0.07	
15490	1151	1150.61	1150.61	-0.39	0	-0.39
15363 P	-	1150.53	1150.54		0.01	
15284	-	1150.51	1150.52		0.01	
15261	-	1150.49	1150.5		0.01	
15173 O	-	1150.39	1150.4		0.01	
15082	-	1150.38	1150.38		0	
15031	1151	1150.18	1150.18	-0.82	0	-0.82
14870	-	1150.06	1150.06		0	
14737 N	-	1149.95	1149.95		0	
14580	1150	1149.81	1149.81	-0.19	0	-0.19
14535	-	1149.34	1149.35		0.01	
14421	-	1148.98	1148.98		0	
14351 M	-	1148.92	1148.92		0	
14322	1149	1148.78	1148.79	-0.22	0.01	-0.21
14273	-	1147.62	1147.62		0	
14171	1148	1147.65	1147.65	-0.35	0	-0.35
13976 L	1148	1147.18	1147.18	-0.82	0	-0.82
13745	1147	1146.87	1146.87	-0.13	0	-0.13
13645	1146	1146.8	1146.81	0.8	0.01	0.81
13615	-	1146.26	1146.26		0	
13470	-	1146.19	1146.19		0	
13254 K	-	1146.02	1146.02		0	
13023	-	1145.79	1145.79		0	
12899	1146	1145.68	1145.68	-0.32	0	-0.32
12830	-	1142.85	1142.85		0	
12676	1143	1142.84	1142.84	-0.16	0	-0.16
12414	-	1142.37	1142.37		0	

Cross Section River Station	Effective BFE*	Corrected Effective	Proposed	Difference Between Corrected Effective and Effective	Difference Between Proposed and Corrected Effective	Difference Between Proposed and Effective
12140 J	1142	1141.66	1141.66	-0.34	0	-0.34
11903	-	1141.28	1141.28		0	
11671	-	1141.48	1141.48		0	
11495	1141	1141.25	1141.25	0.25	0	0.25
11419	1139	1141.37	1141.37	2.37	0	2.37
11280	1139	1141.25	1141.25	2.25	0	2.25
11119 I	1137	1141.26	1141.26	4.26	0	4.26
10821	1137	1140.78	1140.78	3.78	0	3.78
10462	1136	1140.53	1140.53	4.53	0	4.53
10428	-	1135.84	1135.84		0	
10312 H	1136	1135.04	1135.04	-0.96	0	-0.96
9995	1135	1133.7	1133.7	-1.3	0	-1.3
9742	-	1132.77	1132.77		0	
9391	1134	1131.43	1131.43	-2.57	0	-2.57
9081	1133	1130.34	1130.34	-2.66	0	-2.66
8864 G	-	1129.17	1129.17		0	
8472	1129	1126.12	1126.12		0	
8239	1126	1124.44	1124.44		0	
7985	1125	1122.7	1122.7	-2.3	0	-2.3
7751	1123	1121.72	1121.71		-0.01	
7771	-	1119.3	1119.08		-0.22	
7575 F	1115	1118.31	1117.97	3.31	-0.34	2.97
7408	-	1117.53	1116.78		-0.75	
7141	1114	1116.79	1115.31	2.79	-1.48	1.31
6831	-	1115.41	1113.81		-1.6	
6545	1114	1114.91	1113.74	0.91	-1.17	-0.26
6347 E	-	1114.12	1112.94		-1.18	
6204	1113	1113.28	1112.59	0.28	-0.69	-0.41
5951	-	1112.27	1112.36		0.09	
5833	-	1112.26	1112.22		-0.04	
5828	-	1112.23	1111.83		-0.4	
5808	1113	1112.07	1112.36	-0.93	0.29	-0.64
5721	1110	1106.86	1106.28	-3.14	-0.58	-3.72
5705	-	1106.84	1106.2		-0.64	
5698	-	1106.81	1106.11		-0.7	
5649	1108	1106.44	1105.59	-1.56	-0.85	-2.41
5603 D	-	1106.4	1106.22		-0.18	
5521	-	1106.25	1105.76		-0.49	
5487	1106	1106.17	1104.98	0.17	-1.19	-1.02
5405	-	1105.66	1104.74		-0.92	
5338	-	1105.44	1104.74		-0.7	
5208	-	1105.21	1103.9		-1.31	
5160	1104	1105	1104.14	1	-0.86	0.14
5070	-	1104.67	1103.44		-1.23	
4863	1104	1103.61	1102.55	-0.39	-1.06	-1.45
4723	1103	1103.17	1102.68	0.17	-0.49	-0.32
4484	-	1103.26	1102.79		-0.47	
4358	-	1103	1102.74		-0.26	
4284	-	1102.72	1102.45		-0.27	
4236	-	1102.7	1102.16		-0.54	
4101	-	1102.54	1102.23		-0.31	
3967	-	1102.31	1102.09		-0.22	
3830	-	1102	1101.97		-0.03	

Cross Section River Station	Effective BFE*	Corrected Effective	Proposed	Difference Between Corrected Effective and Effective	Difference Between Proposed and Corrected Effective	Difference Between Proposed and Effective
3633	1102	1102.08	1101.88	0.08	-0.2	-0.12
3322	-	1099.73	1099.57		-0.16	
3149 B	1100	1098.97	1099.29	-1.03	0.32	-0.71
2927	1099	1098.54	1098.45	-0.46	-0.09	-0.55
2706	1098	1098	1097.69	0	-0.31	-0.31
2672	-	1096.97	1097.01		0.04	
2544	-	1096.26	1096.31		0.05	
2446 A	-	1095.92	1095.95		0.03	
2410	-	1095.89	1095.93		0.04	
2325	-	1095.84	1095.87		0.03	
2245	-	1095.76	1095.75		-0.01	
2094	-	1095.61	1095.61		0	
1798	-	1095.44	1095.44		0	
1611	-	1095.36	1095.34		-0.02	
1336	-	1095.15	1095.14		-0.01	
1048	-	1094.61	1094.6		-0.01	
815	-	1094.54	1094.53		-0.01	
548	-	1094.31	1094.25		-0.06	
300	-	1094.15	1094.09		-0.06	

*Effective BFEs were reported at the closest cross section available

The cross sections with slight rise between the Proposed and the Corrected Effective were determined to be due to model instabilities rather than project effects. The model has many cross sections and structures and is sensitive to instabilities. The rise in the upper reaches is clearly due to instabilities as there are no differences between any modeling parameters upstream of river station 7771. The rise just upstream of Imhoff Road (RS 5951 and 5808) is due to an unstable jump in the proposed conditions, as well as the emergency repair which restored the original apron at a higher elevation than the Corrected Effective streambed elevation at that location. The rise between river stations 3149 and 2325 is also attributed to instability, as the structures at RS 3498 and RS 2688 are highly sensitive with complex ineffective areas through the reach. The flow hydrograph for the structure at RS 2688 shows the instabilities in the area through the peak.

CLOMR RISE EXEMPTION

FEMA guidance for a CLOMR request requires determination of whether the following situations occur:

- Projects that will have construction within the regulatory floodway that causes the BFEs to increase (more than 0.00 feet), or
- Projects that will have construction within the floodplain of streams that have a detailed effective study, but for which a regulatory floodway has not been established, which causes the BFEs to increase more than 1.0 foot (or any other more stringent requirement set by the community or State).

If either of these two situations occurs, then the conditions in the NFIP regulations at 44 CFR §65.12 must be met. The conditions of 44 CFR §65.12 include:

- An evaluation of alternatives that would not result in a BFE increase above that permitted, demonstrating why these alternatives are not feasible;
- Documentation of individual legal notice to all affected property owners within and outside of the community, explaining the impact of the proposed action on their property;
- Concurrence of the Chief Executive Officers of any communities affected by the proposed actions; and
- Certification that no structures are in areas that would be affected by the increased BFE.

Fill is proposed to be placed in the floodway due to the nature of bank restoration. Multiple designs were evaluated in the 2017 study to determine impact, rise and other factors. The final design was chosen to as a balance between protecting the bank and channel from further erosion and minimizing impact on the adjacent properties. It is the Design Consultant's conclusion that the reported results represent the best possible outcome for this proposed bank stabilization.

The map revision would add one structure to the floodplain due to the increased BFE and the updated terrain, but it would not be due to the project effects. The structure would be included in the Corrected Effective remap as well. The BFE of the Corrected Effective and Proposed Conditions is slightly higher than the Effective at the property location. The house was constructed between 1995 and 2003, so it is likely that the house was not present in the Effective mapping and the property had not yet been graded. In the 2007 contours, the property is flat graded at 1099 ft with the BFE also being 1099 towards the upstream end of the property. A remap of the Effective BFEs on updated terrain would likely also include the structure. The Corrected Effective and Proposed show an elevation of 1099.3 ft in the middle of the property. If allowed, the house could be removed from the remap manually due to shallow flooding, or the remap could possibly tie in within the Highway 9 structure and not include any of the area between Highway 9 and the confluence with the Canadian River.

The concurrence of the Chief Executive Officer is noted on Form 1 in Appendix 4 – Imhoff Creek CLOMR Application Forms, and the property owner notification letter is provided in Appendix 6 – Property Owner Notification.

FLOODPLAIN PLOTTING

For conventional 1D modeling, flood elevations are computed along a flooding source and the floodplains are linearly interpolated from cross-section to cross-section. The flood elevations for the small ditches, creeks and ponding areas beyond the 1-square-mile stream extents are not computed nor plotted, except as backwater, as they are considered to be localized flooding concerns.

The proposed 1% annual chance, 0.2% annual chance and floodway flood hazard areas are shown in Appendix 1 – Topographic Maps and Appendix 2 – Annotated FIRMS. The spatial data for the proposed floodplains, cross sections, and BFEs was provided in GIS format as an ArcGIS Pro map and associated shapefiles.

CONCLUSION

The proposed project improvement plans show a slight adverse impact to the water surface elevations or volume in the Proposed Conditions models compared to the Existing Conditions. This is a necessary result of constricting the channel to stabilize and protect the surrounding properties. There is no adverse impact compared to the Corrected Effective with an older streambed profile. It is the Design Consultant's conclusion that the proposed embankment stabilization will add zero additional structures to the 1% annual chance floodplain, though one would be added due to the remap and updated terrain data. Floodway data tables and profiles will be created for Imhoff Creek upon CLOMR approval. Documentation of ESA compliance can be found in Appendix 5 – ESA Compliance.

APPENDIX 1 – TOPOGRAPHIC MAPS

APPENDIX 2 – ANNOTATED FIRMS

APPENDIX 3 – PROPOSED PLANS

APPENDIX 4 – IMHOFF CREEK CLOMR APPLICATION FORMS

APPENDIX 5 – ESA COMPLIANCE

APPENDIX 6 – PROPERTY OWNER NOTIFICATION

SYMBOL LEGEND

- CONTROL POINT
- SURVEYED BENCHMARK
- AIR RELEASE VALVE
- ELECTRIC CONTROL BOX
- ELECTRIC METER
- FIRE HYDRANT
- FLAG POLE
- GATE POST
- GUARD RAIL POST
- GUY ANCHOR
- GUY POLE
- LIGHT POLE
- MAIL BOX
- POWER POLE/TELEPHONE POLE
- MANHOLE SANITARY, STORM
- SIGN
- SANITARY SEWER LAMPHOLE
- WATER VALVE
- WATER METER
- TELEPHONE BOX
- TELEPHONE RISER
- GAS METER
- GAS VALVE
- LARGE CONIFEROUS TREE
- SMALL DECIDUOUS TREE
- LARGE DECIDUOUS TREE
- Fence Line (All Types)
- Overhead Electric
- Underground Electric
- Overhead Telephone
- Underground Telephone
- Underground Cable Television
- Natural Gas Line
- Fiber Optic Cable
- Water Line
- Existing Storm Sewer
- Sanitary Sewer Line
- Proposed C.R.L.
- Existing Top of Bank
- Existing Toe of Bank
- Existing ℄ Channel

DRAWING REFERENCE LEGEND

- X/X — REFERS TO A PROFILE OR ELEVATION
- 7/8 — PROFILE NUMBER / SHEET NUMBER ON WHICH IT IS LOCATED
- 1 DETAIL DESCRIPTION — SCALE: 1"=XX'

DATUM INFORMATION

HORIZONTAL DATUM
NAD83 (2011) OKLAHOMA
SOUTH ZONE (3502)

VERTICAL DATUM
NAVD88 (GEOID 12B)

CONTACT INFORMATION

CITY OF NORMAN
PUBLIC WORKS
DEPARTMENT
225 N WEBSTER AVE
NORMAN, OK 73069
405-366-5453

NORMAN POLICE
201 WEST GRAY,
BLDG. B, NORMAN,
OK 73069

AT&T
CHRIS BURGESS
(405) 291-6569

COX
MARK BOWLING
(405) 417-4064

OG&E
800-522-6870

ONG
800-458-4251

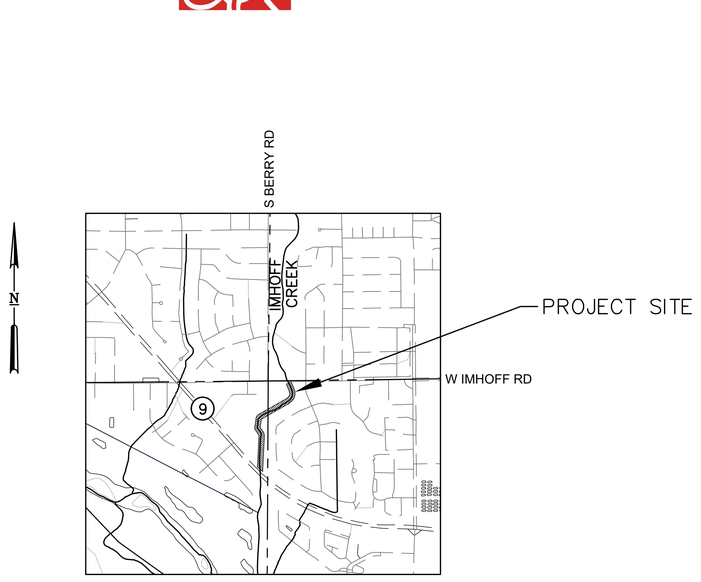
OKIE 811 — Know what's below. Call before you dig.

CITY OF NORMAN, OKLAHOMA

CONSTRUCTION PLANS FOR

IMHOFF CREEK BANK STABILIZATION

CLEVELAND COUNTY



APPLICABLE SPECIFICATIONS:

CITY OF NORMAN STANDARDS SPECIFICATIONS AND CONSTRUCTION DRAWINGS

CURRENT OKLAHOMA DEPARTMENT OF TRANSPORTATION LATEST EDITION (O.D.O.T.) STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION SHALL BE USED FOR THE TECHNICAL SPECIFICATIONS. (CITY OF NORMAN STANDARD SPECIFICATIONS AND CONSTRUCTION DRAWINGS TAKE PRECEDENTS OVER O.D.O.T.)

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ) REGULATIONS SHALL APPLY FOR ALL WASTE AND SEWER RELATED WORK.

ENTIRE PROJECT IS WITHIN CORPORATE LIMITS OF CITY OF NORMAN.

DRAWING INDEX

APPLICABLE STANDARDS:

ODOT

SSS-2-1	SOLID SLAB SODDING
TESCA-0	TEMPORARY SEDIMENT CONTROLS
TSD-0	TEMPORARY SILT DIKE
SPI-5-2	STANDARD PIPE INSTALLATION
PBB-1-2	STANDARD PIPE BEDDING

APPROVED BY

CITY ENGINEER DATE

ADVERTISEMENT DATE

Prepared By:
MESHEK & ASSOCIATES, L.L.C.

REGISTERED PROFESSIONAL ENGINEER — HARRIS C. WILSON — 19317 — OKLAHOMA

Harris C. Wilson — 3/22/24

HARRIS C. WILSON, P.E.
MESHEK & ASSOCIATES, L.L.C.

DATE

MESHEK & ASSOCIATES, L.L.C.
C.A. 1487 EXPIRES 6/30/25
1437 S. BOULDER AVE, STE. 1550
TULSA, OK 74119
(PH) 918-392-5620
(FAX) 918-392-5621

SHEET 1 OF 30 SHEETS

PRINT DATE: 03/22/2024 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_Cover.dwg

2024 CITY OF NORMAN, CLEVELAND COUNTY, OKLAHOMA – IMHOFF CREEK BANK STABILIZATION

GENERAL CONSTRUCTION NOTES

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THESE DRAWINGS, DETAILS, AND SPECIFICATIONS, IN ADDITION TO THE CURRENT CITY OF NORMAN'S STANDARD SPECIFICATIONS, STANDARD DETAILS, AND STANDARD DRAWINGS AS WELL AS THE 2019 OKLAHOMA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION.

2. THE CONTRACTOR SHALL COMPLY WITH ALL FEDERAL, STATE AND LOCAL LAWS GOVERNING SAFETY, HEALTH AND SANITATION. THE CONTRACTOR SHALL PROVIDE ALL SAFEGUARDS, SAFETY DEVICES AND PROTECTIVE EQUIPMENT, AND TAKE ANY OTHER NEEDED ACTION ON AS HIS OWN RESPONSIBILITY OR AS THE ENGINEER MAY DETERMINE REASONABLY NECESSARY TO PROTECT PROPERTY IN CONNECTION WITH THE PERFORMANCE OF WORK COVERED BY THE CONTRACT.

3. PAY ITEMS SHALL BE AS SPECIFIED ON THE CITY OF NORMAN OR ODOT STANDARD DRAWINGS EXCEPT AS MODIFIED BY THE CONTRACT.

4. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK IN EACH AREA. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT RESULT FROM HIS FAILURE TO LOCATE AND PRESERVE ANY AND ALL UTILITIES.

5. THE LOCATIONS OF THE UTILITIES ARE SHOWN ACCORDING TO ALL AVAILABLE INFORMATION. THE CONTRACTOR SHALL NOTIFY EACH UTILITY OWNER PRIOR TO COMMENCEMENT OF WORK TO VERIFY BOTH HORIZONTAL AND VERTICAL LOCATIONS. THE FOLLOWING IS A LIST OF UTILITY OWNERS; AT&T, OKLAHOMA ELECTRIC COOPERATIVE (OEC), OKLAHOMA NATURAL GAS (ONG), OG&E, AND THE CITY OF NORMAN. SEE TITLE SHEET FOR CONTACT INFORMATION.

6. THE CONTRACTOR SHALL GIVE THE NOTIFICATION CENTER OF OKLAHOMA ONE-CALL SYSTEM, INC. NOTICE OF ANY EXCAVATION NO SOONER THAN TEN DAYS NOR LATER THAN 48 HOURS, EXCLUDING SATURDAYS, SUNDAYS AND LEGAL HOLIDAYS, PRIOR TO THE COMMENCEMENT OF WORK. PHONE 1-811-522-6543.

7. THE CONTRACTOR SHALL PRESERVE THE INTEGRITY OF THE EXISTING STRUCTURES WITHIN THE PROJECT EXTENTS UNLESS OTHERWISE SHOWN TO BE REMOVED OR ADJUSTED.

9. ALL EXCAVATED MATERIAL NOT REQUIRED IN THE PROJECT AS FILL SHALL BECOME THE PROPERTY OF THE CONTRACTOR. WASTE MATERIAL, INCLUDING BROKEN CONCRETE, BRICKS, OLD PIPE AND OTHER DEBRIS SHALL ALSO BE REMOVED FROM THE WORK ZONE. THE CONTRACTOR SHALL DISPOSE OF ALL WASTE MATERIAL IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS. ALL COSTS FOR REMOVAL OF WASTE MATERIAL SHALL BE INCLUDED IN THE BID PRICING FOR THIS PROJECT. NO ADDITIONAL PAYMENT WILL BE MADE FOR THE DISPOSAL OF THIS MATERIAL.

10. ALL TREES, BRUSH AND OTHER DEBRIS THAT MIGHT INTERFERE WITH THE FLOW OF WATER ARE TO BE CLEANED OUT AS NOTED IN THE PLANS. DISPOSAL SHALL BE IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS. ALL COST TO BE INCLUDED IN THE PRICE BID FOR THE PROJECT. TREES OUTSIDE THE FILL SLOPES AND THE TOP OF CUT SLOPES SHALL NOT BE DISTURBED EXCEPT WITH THE WRITTEN APPROVAL OF THE ENGINEER.

11. WHERE MATERIALS ARE TRANSPORTED IN THE PROSECUTION OF WORK, VEHICLES SHALL NOT BE LOADED BEYOND THE CAPACITY RECOMMENDED BY THE VEHICLE MANUFACTURER OR AS PRESCRIBED BY ANY FEDERAL, STATE OR LOCAL LAW OR REGULATION.

12. ANY DAMAGE TO THE ROADWAY PAVEMENT, CURB, DRIVEWAYS OR SIDEWALK CAUSED BY THE CONTRACTOR'S OPERATION SHALL BE REPAIRED TO THE ENGINEER'S SATISFACTION AND SHALL BE ACCOMPLISHED AT THE CONTRACTOR'S SOLE EXPENSE. ALL DISTURBED ITEMS SHALL BE REPAIRED TO MATCH EXISTING MATERIALS AND PATTERNING.

13. PHYSICAL TESTING FOR QUALITY ASSURANCE SHALL BE FURNISHED BY THE CITY.

14. REFLECTORIZED SHEETING ON SIGNS AND BARRICADES SHALL BE OF A CUBIC PRISMATIC TYPE AND SHALL MEET THE SPECIFICATIONS ESTABLISHED FOR ASTM D 4956-01 TYPE IX RETROREFLECTIVE SHEETING. REFLECTORIZED SHEETING ON DRUMS AND TUBE CHANNELIZERS SHALL BE OF A HIGH-INTENSITY TYPE AND SHALL MEET THE SPECIFICATIONS ESTABLISHED FOR ASTM D 4956-01 TYPE III RETROREFLECTIVE SHEETING.

15. THE CONTRACTOR SHALL REPLACE ANY SECTION CORNERS OR OTHER PERMANENT RIGHT OF WAY MARKERS REMOVED OR DISTURBED AS A RESULT OF THE CONSTRUCTION OF THIS PROJECT. REPLACEMENT OF SECTION CORNERS OR ANY OTHER MONUMENTS SHALL BE PERFORMED BY A LICENSED LAND SURVEYOR AUTHORIZED TO PERFORM WORK IN THE STATE OF OKLAHOMA.

16. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTROL AND MAINTENANCE OF STORMWATER DRAINAGE.

17. STRAW OR HAY BALES AS STORMWATER BEST MANAGEMENT PRACTICES ARE NO LONGER ALLOWED ON CONSTRUCTION PROJECTS.

18. THE CONTRACTOR MUST CALL 1-800-458-4251 IMMEDIATELY IF A NATURAL GAS PIPELINE IS CUT, DAMAGED, OR OTHERWISE DISTURBED.

19. THE CONTRACTOR IS RESPONSIBLE TO COMPLY WITH THE REQUIREMENTS OF THE 404 PERMIT ISSUED BY THE ACOE FOR THIS PROJECT, IDENTIFICATION NUMBER SWT-2022-73. A COPY OF THE PERMIT IS AVAILABLE FROM THE CITY.

20. **AS-BUILTS:** THE CONTRACTOR SHALL KEEP ON SITE A CURRENT SET OF THE APPROVED CONSTRUCTION WORKING DRAWINGS AT ALL TIMES. THE CONTRACTOR SHALL MARK (IN RED INK) ALL APPROVED CHANGES INCURRED FOLLOWING PUBLIC WORKS DEPARTMENT APPROVAL OF THE INITIAL DRAWINGS. THESE CHANGES MAY BE INITIATED FROM FIELD CONDITIONS OR CHANGES MADE BY THE DESIGN ENGINEER OR THE PUBLIC WORKS ENGINEER. EXCEPT FOR MINOR FIELD ADJUSTMENTS, ALL CHANGES SHALL BE REVIEWED AND AGREED TO BY THE DESIGN ENGINEER AND THE PUBLIC WORKS ENGINEER PRIOR TO FINAL APPROVAL OF THE PROJECT. THE CONTRACTOR SHALL SUBMIT THE WORKING DRAWINGS TO THE ENGINEER OF RECORD (DESIGN ENGINEER) AFTER FINAL INSPECTION OF THE PROJECT TO SERVE AS A BASIS FOR DEVELOPMENT OF FINAL AS-BUILT RECORD DRAWINGS.

21. THE CONTRACTOR SHALL MONITOR THE WEATHER AND FORECASTS. ALL EQUIPMENT SHALL BE REMOVED FROM THE CREEK PRIOR TO SEVERE WEATHER/RAIN CAUSING THE CREEK TO RISE.

SPECIAL PAY ITEM NOTES:

1. ALL COSTS FOR REMOVING SHRUBS, STUMPS, POSTS, AND ALL OTHER DEBRIS AND/OR OBSTRUCTIONS NOT COVERED BY A SEPARATE PAY ITEM ARE INCLUDED IN THE PRICE BID.

2. ITEM TO INCLUDE ALL COSTS FOR REMOVING TREES AND SHRUBS IN THE CREEK BED AND ON THE CREEK EMBANKMENTS THAT ARE TO BE STABILIZED. THIS INCLUDES TREE FALLS ACROSS THE CREEK.

3. CONSTRUCTION STAKING SHALL INCLUDE SURVEYING AND THE FURNISHING, PLACING, AND MAINTAINING OF THE CONSTRUCTION LAYOUT STAKES NECESSARY FOR THE PROPER COMPLETION AND INSPECTION OF THE ENTIRE PROJECT.

4. EROSION PROTECTION SHALL BE PLACED AS NECESSARY TO PREVENT EROSION WASH TO ADJACENT PROPERTY. EROSION PROTECTION SHALL BE REMOVED AT THE END OF THE PROJECT AS DIRECTED BY THE ENGINEER, COST TO BE INCLUDED IN THE PRICE BID. THE PRICE INCLUDES THE COST OF SEDIMENT REMOVAL PER THE STORMWATER MANAGEMENT PLAN. COST SHALL BE INCLUDED IN THE PRICE BID.

5. THE PAY ITEM FOR SOLID SLAB SODDING INCLUDES QUANTITIES FOR PLACEMENT AND COMPACTION OF SUITABLE BACKFILL AND SOD AT EXISTING GRASS AREAS WHICH MAY BE DAMAGED DURING CONSTRUCTION ACTIVITY OF THE CONTRACTOR ACCESSING THE WORK ZONE FROM IMHOFF ROAD, BACK YARDS AFFECTED BY THE CONSTRUCTION OF THE WALL, AND OTHER MISCELLANEOUS AREAS DAMAGED BY CONSTRUCTION ACTIVITIES.

6. COST OF WATERING AND FERTILIZING SHALL BE INCLUDED. FERTILIZERS SHALL BE 10-20-10 AND SHALL BE APPLIED AT THE RATE OF 1.5 LBS PER 10 SQ YDS. FERTILIZER SHALL BE APPLIED PER SECTION 230.04H OF ODOT STANDARD SPECIFICATIONS. WATERING SHALL BE APPLIED AS NECESSARY UNTIL VEGETATION IS ESTABLISHED OR UNTIL THE WORK IS ACCEPTED AS COMPLETE.

7. THE CONTRACTOR SHALL BE PAID FOR UNCLASSIFIED EXCAVATION ON THE BASIS OF PLAN QUANTITY.

8. SILT FROM DISCHARGE SHALL BE MANAGED, REMOVED & DISPOSED OF AS REQUIRED BY THE STORMWATER MANAGEMENT PLAN.

9. STREET WASH DOWN SHALL BE INCLUDED IN THE PRICE FOR UNCLASSIFIED EXCAVATION.

10. PRICE TO INCLUDE ALL COSTS, LABOR, AND MATERIALS REQUIRED FOR A COMPLETE INSTALLATION. SEE DETAIL 1 ON SHEET 26.

11. PAY ITEM REFERS TO EMBANKMENT FILL BEHIND REINFORCED FILL IN REINFORCED SOIL SLOPE (RSS) WALL AND FILL ABOVE RSS WALL TYING INTO EXISTING GROUND. SEE DETAIL 1 ON SHEET 26.

12. REFER TO SHEET 27, NOTE 2.4 FOR REINFORCED FILL MATERIAL DEFINITION.

13. NOT USED

14. PAY ITEM IS FOR DIVERSION OF WATER THROUGH CONSTRUCTION AREA. TO INCLUDE THE COST OF FLEXIBLE PIPES, INLETS, OUTLETS, AND DIVERSION DIKES. SEE ODOT ROADWAY DESIGN STANDARD DETAIL SD-0-0 (R-12).

15. PAY ITEM INCLUDES ROCK, WIRE MESH, AND ALL OTHER INCIDENTALS REQUIRED FOR CONSTRUCTION AND REMOVAL. SEE DETAIL 3 ON SHEET 26.

16. THESE PAY ITEMS ARE FOR THE ROCK TOE REVETMENT. SEE DETAIL ON SHEET 30 FOR ROCK TOE REVETMENT.

17. THESE PAY ITEMS ARE FOR THE REINFORCED SOIL SLOPE (RSS) RETAINING WALL.

18. THESE PAY ITEMS ARE FOR THE CROSS VANES. SEE DETAIL ON SHEET 30.

19. THESE PAY ITEMS ARE FOR CONSTRUCTION ACCESS AND ANY TEMPORARY WORK PLATFORMS AND SHALL INCLUDE REMOVAL AFTER CONSTRUCTION.

20. PAY ITEM TO INCLUDE TRENCH EXCAVATION, CONNECTION TO EXISTING PIPES, FITTINGS, AND ALL OTHER INCIDENTALS FOR INSTALL.

21. PAY ITEMS ARE FOR REESTABLISHING EXISTING DRAINAGE CONDUIT FROM PROPERTIES ALONG THE EAST EMBANKMENT WITHIN THE LIMITS OF THE WORK AREA.

22. PAY ITEM IS FOR THE REMOVAL OF DEBRIS IN WORK AREA.

23. PAY ITEM TO INCLUDE TRAFFIC CONTROL PLAN PROVIDED BY CONTRACTOR.

24. CONTRACTOR SHALL INCLUDE THE COST OF THE FOLLOWING ITEMS IN URBAN R/W RESTORATION:

    24.1. REPAIR OF IRRIGATION SYSTEMS
    24.2. ANY ITEMS DAMAGED DURING CONSTRUCTION. REPAIRED ITEMS SHALL BE TO THE SATISFACTION OF THE ENGINEER.
    24.3. THE CONTRACTOR SHALL INCLUDE THE COST OF FLEXAMAT SHOWN ON SHEET 14 WITH THIS PAY ITEM.

25. PAY ITEM SHALL INCLUDE ALL NECESSARY PUMPING OF POOLED WATER TO ESTABLISH WORK AREAS FOR INSTALLATION OF RSS RETAINING WALL.

26. LIVES STAKES SHALL BE INSTALLED ACCORDING TO DETAIL 5 ON SHEET 26 WITHIN THE EXTENTS OF THE ROCK TOE REVETMENT AS INDICATED ON PLANS.

27. PAY ITEM INCLUDES RIPRAP PLACEMENT ON END SECTIONS OF RSS WALL AS DESCRIBED ON THE P&P SHEETS.

PAY QUANTITIES

ITEM	DESCRIPTION	PAY ITEM NOTES	UNITS	QUANTITY
201(A)1200	CLEARING AND GRUBBING	1	AC	2.5
202(A)2200	UNCLASSIFIED EXCAVATION	7,9	CY	11,807.1
202(F)2700	EMBANKMENTS (FILL)	11	CY	11,362.7
205(A)6210	TYPE A-SALVAGED TOPSOIL	N/A	CY	246.9
220 1100	SWPPP DOCUMENTATION AND MANAGEMENT	N/A	EA	1.0
221(A)2200	TEMPORARY SLOPE DRAIN	14	LF	625.0
221(B)2300	TEMPORARY SILT FENCE	4,8	LF	210.0
221(F)2720	TEMPORARY ROCK FILTER DAM TYPE 3	15	CY	109.7
228 5100	EROSION CONTROL BLANKET (700 SERIES COIR)	16	SY	775.0
230(A)7200	SOLID SLAB SODDING	5,6	SY	1,860.0
240(A)	SELECTIVE TREE & SHRUB REMOVAL	2	AC	2.5
242 4101	STABILIZED CONSTRUCTION EXIT	N/A	EA	1.0
303(G)1510	AGGREGATE BASE TYPE D (NO. 57 STONE) (WORK PLATFORM 8" LAYER)	19	CY	485.9
303(G)1510	AGGREGATE BASE TYPE D (NO. 57 STONE) (FILL FOR RSS WALL)	17	CY	2,700.0
325 0100	SEPARATOR FABRIC (WORK PLATFORM)	19	SY	925.9
514(I)6000	SHEET PILING, DRIVEN (CROSS VANE)	18	SY	66.7
601(A)1100	TYPE I-A PLAIN RIPRAP (CROSS VANE)	18	TON	35.8
601(A)1110	TYPE I PLAIN RIPRAP (ROCK TOE REVETMENT)	16,27	TON	1,378.4
602(A)2200	GABIONS (CROSS VANE)	18	CY	4.0
612(A)3200	MANHOLES ADJUST TO GRADE	N/A	EA	1.0
613(B)5500	12" CORR. GALV. STEEL PIPE	20,21	LF	280.0
613(L)6700	12" PREFAB. CULVERT END SEC., ROUND	21	EA	14.0
613(T)7800	STANDARD BEDDING MATERIAL, CLASS C	21	CY	70.0
619(A)6210	REMOVAL OF STRUCTURES & OBSTRUCTIONS	22	CY	1,000.0
619(B)6352	REMOVAL OF FENCE	N/A	LF	1,200.0
619(B)6440	REMOVAL OF EXISTING PIPE	21	LF	100.0
619(B)6452	REMOVAL OF EXISTING RETAINING WALL	N/A	LF	80.0
624 3110	(PL) WOOD PRIVACY FENCE (6-FT STOCKADE)	N/A	LF	1,275.0
641 2100	MOBILIZATION	23	EA	1.0
642(A)3200	CONSTRUCTION STAKING LEVEL I	3	ACRE	2.5
880(J)7100	(SP) CONSTRUCTION TRAFFIC CONTROL	N/A	SD	360.0
SPECIAL	TREES - LIVE STAKING (3/4 TO 1 1/2 DIA.)	16,26	EA	1,395.0
SPECIAL	NATIVE SHRUB & GRASS PLANTING	16	SY	516.7
SPECIAL	REINFORCED SOIL SLOPE (RSS) RETAINING WALL	10,17	SF	22,407.0
SPECIAL	REINFORCED FILL (FOR RSS WALL)	12,17	CY	9,034.5
SPECIAL	URBAN R/W RESTORATION	24	ACRE	2.5
SPECIAL	PUMPING	25	DAY	35.0

PAY ITEM AND CONSTRUCTION NOTES

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

PLANS AND ESTIMATES PREPARED BY:
MESHEK & ASSOCIATES, L.L.C.
1437 S. BOULDER AVENUE, SUITE 1550 TULSA, OK 74119 (918)392-5620
2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594-0127

REVISION	BY	DATE

DRAWN	CGH	12/2023
DESIGNED	HCW	12/2023
SURVEY	MR	7/2021

C.A. 1487 EXPIRES 6/30/25

STORM WATER MANAGEMENT PLAN

SITE DESCRIPTION

PROJECT LIMITS: EAST AND WEST EMBANKMENT OF IMHOFF CREEK. LOCATED SOUTH OF IMHOFF ROAD AND NORTH OF HIGHWAY 9.

PROJECT DESCRIPTION: APPLICATION FOR A NATIONWIDE PERMIT AND THE DEVELOPMENT OF CONSTRUCTION PLANS TO INSTALL WIRE FORMED RETAINING WALL WITH NATURAL VEGETATED FACE TO ADDRESS BANK EROSION OF IMHOFF CREEK AND FUTURE LOSS OF PROPERTY.

SUGGESTED SEQUENCE OF EROSION CONTROL ACTIVITIES:

1. TEMPORARY EROSION CONTROL.
2. PERMANENT EROSION CONTROL.

SOIL TYPE: PORT SILT LOAM, HYDROLOGIC GROUP B

TOTAL AREA OF THE CONSTRUCTION SITE: 2.85 ACRES

ESTIMATED AREA TO BE DISTURBED: 2.5 ACRES

OFFSITE AREA TO BE DISTURBED: (FOR CONTRACTOR USE)

TOTAL IMPERVIOUS AREA PRE-CONSTRUCTION: 0 ACRES

TOTAL IMPERVIOUS AREA POST-CONSTRUCTION: 0 ACRES

POST-CONSTRUCTION RUNOFF COEFFICIENT OF THE SITE: N/A

LATITUDE & LONGITUDE OF CENTER OF PROJECT: 35°11'16.42"N , 97°27'30.27"W

PROJECT WILL DISCHARGE TO:

NAME OF RECEIVING WATERS: CANADIAN RIVER

SENSITIVE WATERS OR WATERSHEDS: YES [ ] NO [X]

303 IMPAIRED WATERS: YES [ ] NO [X]

IF YES, LIST IMPAIRMENT:

LOCATED IN A TMDL: YES [ ] NO [X]

LAKE THUNDERBIRD TMDL: YES [ ] NO [X]

MS4 ENTITY YES [X] NO [ ]

IF YES, LOCATION: NEIGHBORHOOD STORM DRAINS, CITY OF NORMAN

NOTE:
THIS SHEET SHOULD BE USED IN CONJUNCTION WITH A DRAINAGE MAP THAT ILLUSTRATES THE DRAINAGE PATTERNS/PATHWAYS AND RECEIVING WATERS FOR THIS PROJECT. THIS SHEET SHOULD ALSO BE USED WITH THE EROSION CONTROL SUMMARIES, PAY ITEMS, & NOTES.

REVISED 08 / 18 / 2017

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

- [ ] TEMPORARY SEEDING
- [X] PERMANENT SODDING, SPRIGGING OR SEEDING
- [ ] VEGETATIVE MULCHING
- [X] SOIL RETENTION BLANKET
- [X] PRESERVATION OF EXISTING VEGETATION

NOTE: TEMPORARY EROSION CONTROL METHODS MUST BE USED ON ALL DISTURBED AREAS WHERE CONSTRUCTION ACTIVITIES HAVE CEASED FOR OVER 14 DAYS. METHODS USED WILL BE AS SHOWN ON PLANS, OR AS DIRECTED BY THE ENGINEER.

STRUCTURAL PRACTICES:

- [X] STABILIZED CONSTRUCTION EXIT
- [ ] TEMPORARY SILT FENCE
- [X] TEMPORARY SILT DIKES
- [ ] TEMPORARY FIBER LOG
- [ ] DIVERSION, INTERCEPTOR OR PERIMETER DIKES
- [ ] DIVERSION, INTERCEPTOR OR PERIMETER SWALES
- [X] ROCK FILTER DAMS
- [ ] TEMPORARY SLOPE DRAIN
- [ ] PAVED DITCH W/ DITCH LINER PROTECTION
- [ ] TEMPORARY DIVERSION CHANNELS
- [ ] TEMPORARY SEDIMENT BASINS
- [ ] TEMPORARY SEDIMENT TRAPS
- [X] TEMPORARY SEDIMENT FILTERS
- [X] TEMPORARY SEDIMENT REMOVAL
- [X] RIP RAP
- [ ] INLET SEDIMENT FILTER
- [ ] TEMPORARY BRUSH SEDIMENT BARRIERS
- [ ] SANDBAG BERMS
- [X] TEMPORARY STREAM CROSSINGS

OFFSITE VEHICLE TRACKING:

- [X] HAUL ROADS DAMPENED FOR DUST CONTROL
- [X] LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- [X] EXCESS DIRT ON ROAD REMOVED DAILY

NOTES:

THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR THE FOLLOWING:

MAINTENANCE AND INSPECTION:

ALL EROSION AND SEDIMENT CONTROLS WILL BE MAINTAINED IN GOOD WORKING ORDER FROM THE BEGINNING OF CONSTRUCTION UNTIL AN ACCEPTABLE VEGETATIVE COVER IS ESTABLISHED. INSPECTION BY THE CONTRACTOR AND ANY NECESSARY REPAIRS SHALL BE PERFORMED ONCE EVERY 7 CALENDAR DAYS AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.5 INCH AS RECORDED BY A NON-FREEZING RAIN GAUGE TO BE LOCATED ON SITE. POTENTIALLY ERODIBLE AREAS, DRAINAGEWAYS, MATERIAL STORAGE, STRUCTURAL DEVICES, CONSTRUCTION ENTRANCES AND EXITS ALONG WITH EROSION AND SEDIMENT CONTROL LOCATIONS ARE EXAMPLES OF SITES THAT NEED TO BE INSPECTED.

WASTE MATERIALS:

PROPER MANAGEMENT AND DISPOSAL OF CONSTRUCTION WASTE MATERIAL IS REQUIRED BY THE CONTRACTOR. MATERIALS INCLUDE STOCKPILES, SURPLUS, DEBRIS AND ALL OTHER BY-PRODUCTS FROM THE CONSTRUCTION PROCESS. PRACTICES INCLUDE DISPOSAL, PROPER MATERIALS HANDLING, SPILL PREVENTION AND CLEANUP MEASURES. CONTROLS AND PRACTICES SHALL MEET THE REQUIREMENTS OF ALL FEDERAL, STATE AND LOCAL AGENCIES.

HAZARDOUS MATERIALS:

PROPER MANAGEMENT AND DISPOSAL OF HAZARDOUS WASTE MATERIALS IS REQUIRED. THE CONTRACTOR IS RESPONSIBLE FOR FOLLOWING MANUFACTURER'S RECOMMENDATIONS, STATE AND FEDERAL REGULATIONS TO ENSURE CORRECT HANDLING, DISPOSAL, SPILL PREVENTION AND CLEANUP MEASURES. EXAMPLES INCLUDE BUT ARE NOT LIMITED TO: PAINTS, ACIDS, CLEANING SOLVENTS, CHEMICAL ADDITIVES, CONCRETE CURING COMPOUNDS AND CONTAMINATED SOILS.

GENERAL NOTES:

THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP), THE NOTICE OF INTENT, & THE NOTICE OF TERMINATION FOR THIS PROJECT. THE SWPPP IS REQUIRED TO COMPLY WITH THE OKLAHOMA POLLUTION DISCHARGE ELIMINATION SYSTEM (OPDES) REGULATIONS. THIS PLAN IS INITIATED PRIOR TO MOBILIZATION, CONFIRMED IN THE PRE-WORK MEETINGS AND AVAILABLE ON THE JOB SITE ALONG WITH COPIES OF THE NOTICE OF INTENT (NOI) FORM AND PERMIT CERTIFICATE THAT HAVE BEEN FILED WITH THE OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY (ODEQ). THE PLAN MUST BE KEPT CURRENT WITH UP-TO-DATE AMENDMENTS DURING THE PROGRESSION OF THE PROJECT. ALL CONTRACTOR OFF-SITE OPERATIONS ASSOCIATED WITHTHE PROJECT MUST BE DOCUMENTED IN THE SWPPP, I.E., BORROW PITS, WORK ROADS, DISPOSAL SITES, ASPHALT/CONCRETE PLANTS, ETC. THE BASIC GOAL OF STORM WATER MANAGEMENT IS TO IMPROVE WATER QUALITY BY REDUCING POLLUTANTS IN STORM WATER DISCHARGES. RUNOFF FROM CONSTRUCTION SITES HAS A POTENTIAL FOR POLLUTION DUE TO EXPOSED SOILS AND THE PRESENCE OF HAZARDOUS MATERIALS USED IN THE CONSTRUCTION PROCESS. THE PREVENTION OF SOIL EROSION, CONTAINMENT OF HAZARDOUS MATERIALS AND/OR THE INTERCEPTION OF THESE POLLUTANTS BEFORE LEAVING THE CONSTRUCTION SITE ARE THE BEST PRACTICES FOR CONTROLLING STORM WATER POLLUTION.

THE FOLLOWING SECTIONS OF THE 2009 ODOT STANDARD SPECIFICATIONS SHOULD BE NOTED:

103.05 BONDING REQUIREMENTS
104.10 FINAL CLEANING UP
104.12 CONTRACTOR'S RESPONSIBILITY FOR WORK
104.13 ENVIRONMENTAL PROTECTION
106.08 STORAGE AND HANDLING OF MATERIAL
107.01 LAWS, RULES AND REGULATIONS TO BE OBSERVED
107.20 STORM WATER MANAGEMENT
220 MANAGEMENT OF EROSION, SEDIMENTATION AND STORM WATER POLLUTION PREVENTION AND CONTROL
221 TEMPORARY SEDIMENT CONTROL

IN ADDITION:

"ODEQ GENERAL PERMIT (OKR10) FOR STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES WITHIN THE STATE OF OKLAHOMA." ODEQ, WATER QUALITY DIVISION, SEPTEMBER 13, 2017.

SWMP

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

PLANS AND ESTIMATES PREPARED BY:
MESHEK & ASSOCIATES, L.L.C.
1437 S. BOULDER AVENUE, SUITE 1550 TULSA, OK 74119 (918)392-5620
2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594-0127

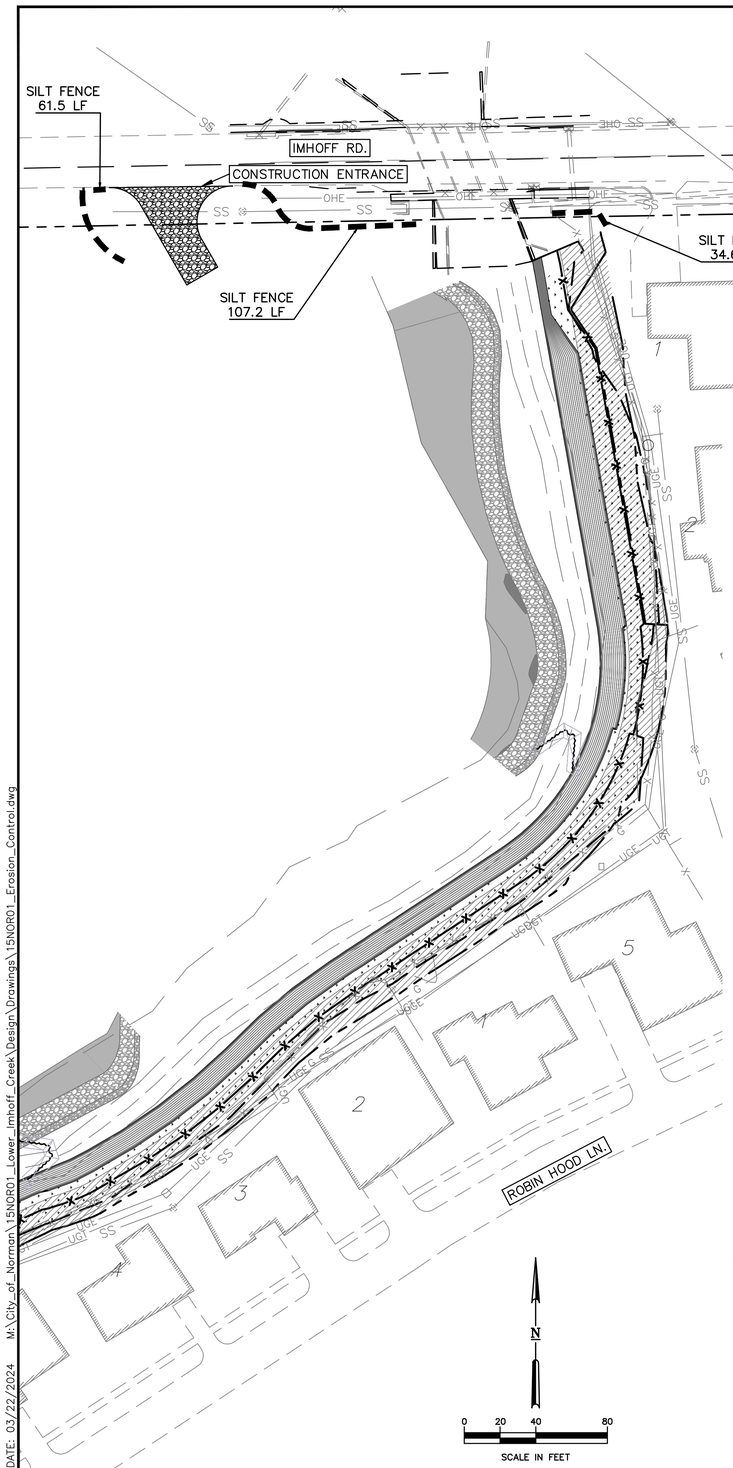
REVISION	BY	DATE

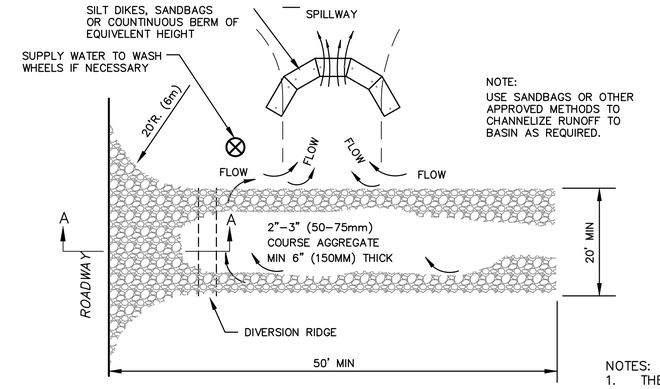
DRAWN	CGH	12/2023
DESIGNED	HCW	12/2023
SURVEY	MR	7/2021

C.A. 1487 EXPIRES 6/30/25

SHEET: 3 OF 30

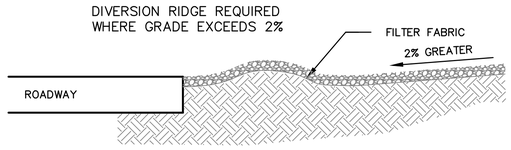
PRINT DATE: 3/22/24 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_SWMP.dwg



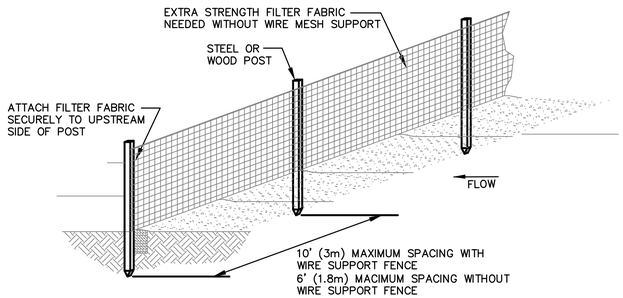


NOTE:
USE SANDBAGS OR OTHER APPROVED METHODS TO CHANNELIZE RUNOFF TO BASIN AS REQUIRED.

CONSTRUCTION ENTRANCE DETAIL



SECTION A–A



SILT FENCE DETAIL

EROSION CONTROL NOTES

1. STABILIZATION MEASURES MUST BE COMPLETED WITHIN 7 DAYS.
2. ALL GRADING AND EROSION CONTROL SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CURRENT CITY OF OKC STANDARD SPECIFICATIONS.
3. ALL EROSION CONTROL CONSTRUCTION SHALL BE INSPECTED BY THE CONTRACTOR OR CONTRACTORS REPRESENTATIVE.
4. EROSION CONTROL SHALL START WITH INITIAL CONSTRUCTION AND BE PRACTICED THROUGHOUT THE PROJECT.
5. SEDIMENT CONTROL DEVICES SUCH AS FIBER ROLLS, TRIANGULAR SILT DIKES, AND SILT FENCES SHALL BE CONSTRUCTED ADJACENT TO ALL DRAINAGE–WAYS, AND IN ALL AREAS THAT WILL ERODE INTO THE STORM SEWER SYSTEM.
6. WHERE CONSTRUCTION ACTIVITY TEMPORARILY CEASES FOR 14 DAYS, THE DISTURBED AREAS SHALL BE STABILIZED WITH SEED AND MULCH.
7. THE CONTRACTOR SHALL RE–SEED ALL AREAS DISTURBED DURING CONSTRUCTION AND CONTRACTOR SHALL BE RESPONSIBLE FOR SEEDED AREAS UNTIL GROWTH IS ESTABLISHED TO A UNIFORM HEIGHT OF TWO (2) INCHES.
8. THERE ARE NO OFFSITE MATERIAL, WASTE, BORROW OR EQUIPMENT STORAGE AREAS.
9. THE STORM WATER PREVENTION POLLUTION PLAN SHALL BE UPDATED AS NECESSARY TO REMAIN CONSISTENT WITH ANY CHANGES APPLICABLE TO PROTECT SURFACE WATER RESOURCES IN SEDIMENT EROSION SITE PLANS OR SITE PLANS OR SITE PERMITS OR STORM WATER MANAGEMENT SITE PLANS OR SITE PERMITS APPROVED BY STATE OR LOCAL OFFICIALS FOR WHICH PERMITEE RECEIVES WRITTEN NOTICE.

NOTES:
1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT–OF–WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT–OF–WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABLIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

LEGEND

SOLID SLAB SOD

TEMPORARY SILT FENCE

SOIL STABILIZATION PRACTICES

1. ALL EROSION AND SEDIMENT CONTROLS WILL BE MAINTAINED IN GOOD WORKING ORDER FROM THE BEGINNING OF CONSTRUCTION UNTIL AN ACCEPTABLE VEGETATIVE COVER IS ESTABLISHED.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OR REPLACEMENT OF ALL EROSION CONTROL DEVICES DAMAGED DUE TO CONSTRUCTION OR INCLEMENT WEATHER CONDITIONS.
3. A COPY OF THE EROSION CONTROL SITE PLAN MUST BE ON SITE AT ALL TIMES AND MADE AVAILABLE TO THE INSPECTOR UPON REQUEST.
4. PROPER MANAGEMENT AND DISPOSAL OF CONSTRUCTION WASTE MATERIAL IS REQUIRED.

SOD AND SEED

1. THE CONTRACTOR SHALL ESTABLISH A VEGETATIVE COVER OVER ALL SOIL SURFACES DISTURBED DURING CONSTRUCTION.THE CONTRACTOR SHALL BE RESPONSIBLE FOR ASSURING ALL VEGETATION COVERS ARE WELL ESTABLISHED PRIOR TO FINAL COMPLETION OF PROJECT.
2. THE CONTRACTOR SHALL PROVIDE A 3' WIDE SOD STRIP AT THE EDGE OF ALL NEW PAVEMENT SURFACES AND AT THE TOP OF THE GABION WALL IF NOT DEPICTED OTHERWISE ON PLANS.

OKIE 811 Know what's below. Call before you dig.

EROSION CONTROL

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

PLANS AND ESTIMATES PREPARED BY:
MESHEK & ASSOCIATES, L.L.C.
1437 S. BOULDER AVENUE, SUITE 1550 TULSA, OK 74119 (918)392–5620
2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594–0127

REVISION	BY	DATE

DRAWN	CGH	12/2023
DESIGNED	HCW	12/2023
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C.A. 1487 EXPIRES 6/30/25		
SHEET: 4 OF 30		

PRINT DATE: 03/22/2024 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_Erosion_Control.dwg

OWNER:
CEREBRAL PROFESSIONAL SYSTEMS
BK 2688 PG 592

TURN BACK RSS WALL BASKET FACE PER DETAIL 5 ON SHEET 28

TEMPORARY ROCK FILTER DAM SEE DETAIL 3 ON SHEET 26

SEE SHEET 13 FOR C.R.L. DATA

20'x20' TYPE I PLAIN RIPRAP (3' DEPTH) TO TIE INTO EDGE OF RSS WALL

33' STATUTORY R/W

EAST LINE SEC 12

WEST LINE SECTION 7

GRADING EDGE

SSMH E4
TR=1106.66
FL=1100.31 8" CLAY S
FL=1100.31 8" CLAY NE

50' U/E & D/E

WOODEN FENCE

CHAIN LINK FENCE

EX. SHED

STA. 19+80

STA. 23+20

SCALE IN FEET 0 10 20 40

LEGEND

- RSS WALL FACE
- RIPRAP/ROCK TOE REVETMENT SEE DETAIL SHEET 30
- PROPOSED SOD
- TCE — TEMPORARY CONSTRUCTION EASEMENT
- TOB — EXISTING TOP OF BANK
- EX–TOE — EXISTING TOE OF BANK
- EX CL CHANNEL
- CRL CHANNEL
- PROPOSED FENCE
- EXISTING FENCE
- G — EXISTING GAS (APPROX.)
- UGT — EX UNDRGND TELE (APPROX.)
- UGE — EX UNDRGND ELEC (APPROX.)
- SS — EX SAN. SEWER (APPROX.)

E1 SOD AREA

E2 SILT FENCE

E3 ROCK FILTER DAM SEE DETAIL 3 – SHEET 26

E4 PROTECT DURING CONSTRUCTION

CAUTION
SANITARY SEWER
GAS
U/T
U/E

TEMPORARY ROCK FILTER DAM SEE DETAIL 3 ON SHEET 26

TYPE I PLAIN RIPRAP (3' DEPTH) TO TIE INTO EDGE OF RSS WALL. PLACE RIPRAP FROM EXISTING 30" RCP TO EDGE OF RSS WALL, 20' TOP TO TOE.

TURN BACK RSS WALL BASKET FACE PER DETAIL 5 ON SHEET 28

TURN BACK RSS WALL BASKET FACE PER DETAIL 5 ON SHEET 28

20'x20' TYPE I PLAIN RIPRAP (3' DEPTH) TO TIE INTO EDGE OF RSS WALL

EAST LINE SEC 12

SECTION LINE

WEST LINE SECTION 7

33' STATUTORY R/W

33' U/E & D/E

GRADING EDGE

E4 GRATE INLET
TG=1102.15
FL=1094.55 30" RCP W
FL=1094.55 30" RCP E

E4 GRATE INLET
TG=1102.85
FL=1095.35 30" RCP W
FL=1095.35 30" RCP E

E4 30" RCP E
FL=1093.48

WOODEN FENCE

CHAIN LINK FENCE

EX. SHED

STA. 15+00

STA. 19+80

SCALE IN FEET 0 10 20 40

OKIE 811 Know what's below. Call before you dig.

EROSION CONTROL PLAN 2

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

PLANS AND ESTIMATES PREPARED BY:
MESHEK & ASSOCIATES, L.L.C.
1437 S. BOULDER AVENUE, SUITE 1550 TULSA, OK 74119 (918)392-5620
2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594-0127

REVISION	BY	DATE		
			DRAWN	CGH 12/2023
			DESIGNED	HCW 12/2023
			SURVEY	MR 7/2021
			C.A. 1487 EXPIRES 6/30/25	
			SHEET: 5 OF 30	

PRINT DATE: 03/22/2024 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_EROSION.dwg

STA. 27+60

ROCK TOE REVETMENT
SEE DETAIL 2 SHEET 30

PROPOSED CROSS VANE
SEE DETAIL 1 SHEET 30
STATION=28+40
NORTHING=675596.49
EASTING=2130651.18

EASEMENT GRANTED FROM LEVEE TO LIMITS OF FLOOD PLAIN BOOK 265 PAGE 420 LOCATION OF LEVEE UNDEFINED

GRADING TO TIE INTO EXISTING TOP OF BANK

AS-BUILT WINGWALL

28+00

29+00

30+00

31+00

STA. 31+60

CURRENT TOE DUE TO WASHOUT

ORIGINAL TOE

WASHOUT

GRADING EDGE

50' U/E & D/E

10' U/E

25' B/L

SEE DETAIL 2 SHEET 26

EX CHAIN LINK

EX ORNAMENTAL FENCE

EX CONC. WALL W/ SPLIT-RAIL FENCE

EX WOOD FENCE

EX CHANNEL WITH FENCE

ELECTRIC 10" UG 48" 120/208

SSMH TR=1112.22 FL=1106.07 8" CLAY SSE FL=1106.07 8" CLAY N

SSMH TR=1118.22 FL=1112.92 8" CLAY S

SSMH TR=1107.21 FL=1101.71 8" CLAY SW FL=1101.71 8" CLAY NE

12'x20' RCB N FL=1097.81

12'x20' RCB N FL=1097.73

12'x20' RCB FL=1097.74

30" RCP E FL=1109.70

20' R/W BY PLAT

NORTHING=21288
EASTING=21306

0 10 20 40
SCALE IN FEET

N

LEGEND

- RSS WALL FACE
- RIPRAP/ROCK TOE REVETMENT SEE DETAIL SHEET 30
- PROPOSED SOD
- TCE — TEMPORARY CONSTRUCTION EASEMENT
- TOB — EXISTING TOP OF BANK
- EX–TOE — EXISTING TOE OF BANK
- EX CL CHANNEL
- CRL CHANNEL
- PROPOSED FENCE
- X — X — EXISTING FENCE
- G — EXISTING GAS (APPROX.)
- UGT — EX UNDRGND TELE (APPROX.)
- UGE — EX UNDRGND ELEC (APPROX.)
- SS — EX SAN. SEWER (APPROX.)

E1 SOD AREA

E2 SILT FENCE

E3 ROCK FILTER DAM
SEE DETAIL 3 – SHEET 26

E4 PROTECT DURING CONSTRUCTION

CAUTION
SANITARY SEWER
GAS
U/T
U/E

STA. 23+20

24+00

25+00

26+00

27+00

STA. 27+60

EX ORNAMENTAL FENCE

EX WOOD FENCE

EX CONC. WALL W/ SPLIT-RAIL FENCE

EX CHAIN LINK UNDER FENCE

PROPOSED CROSS VANE
SEE DETAIL 1 SHEET 30
STATION=24+60
NORTHING=675363.92
EASTING=2130361.98

ROCK TOE REVETMENT
SEE DETAIL 2 SHEET 30

0 10 20 40
SCALE IN FEET

N

OKIE 811 Know what's below. Call before you dig.

EROSION CONTROL PLAN 3

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

PLANS AND ESTIMATES PREPARED BY:
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1437 S. BOULDER AVENUE, SUITE 1550 TULSA, OK 74119 (918)392-5620
2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594-0127

REVISION	BY	DATE

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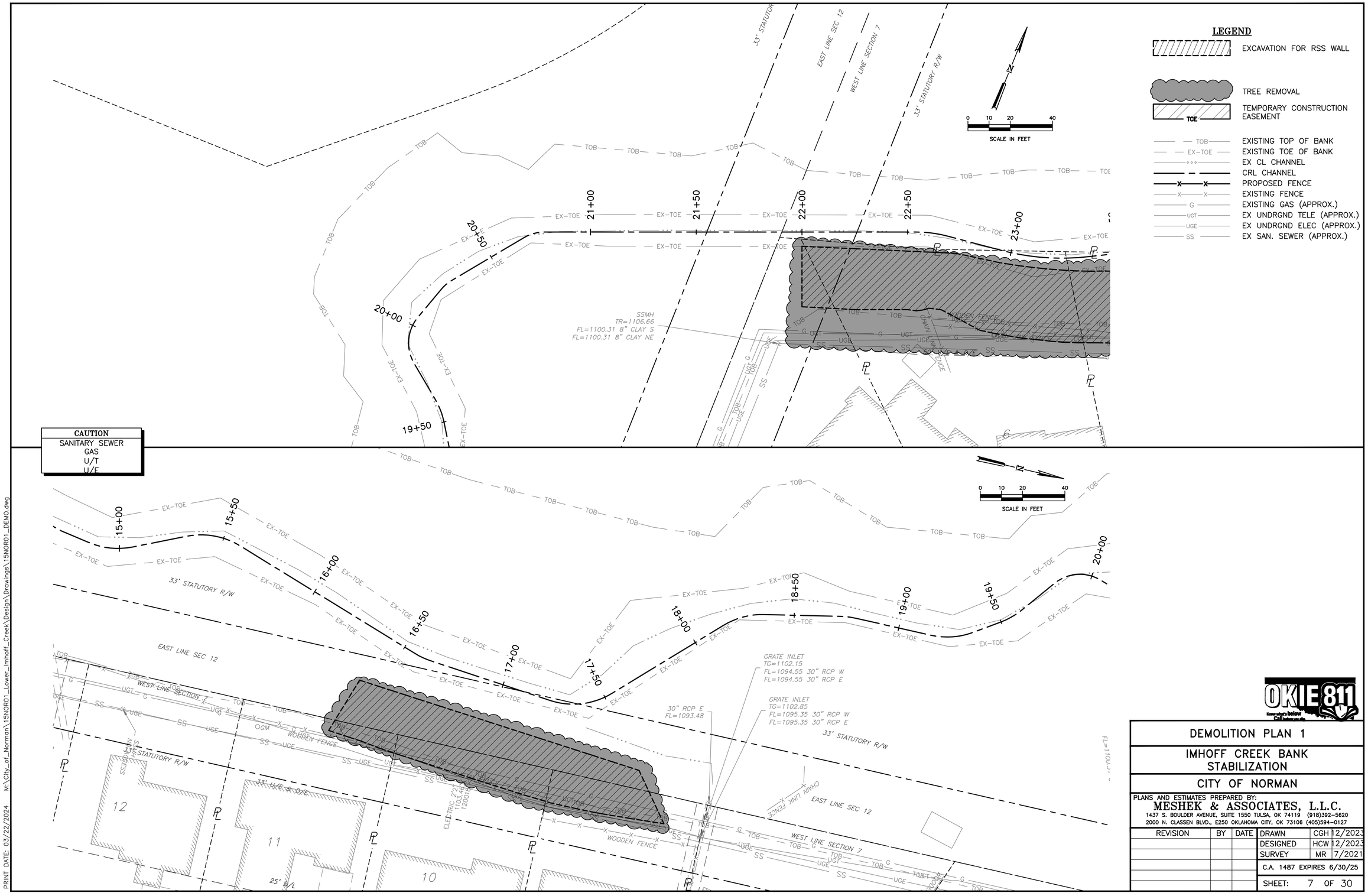
DESIGNED	HCW	12/2023
SURVEY	MR	7/2021

C.A. 1487 EXPIRES 6/30/25

SHEET: 6 OF 30

PRINT DATE: 03/22/2024 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_EROSION.dwg



OKIE 811 Know what's below. Call before you dig.

DEMOLITION PLAN 1

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

PLANS AND ESTIMATES PREPARED BY:
MESHEK & ASSOCIATES, L.L.C.
1437 S. BOULDER AVENUE, SUITE 1550 TULSA, OK 74119 (918)392-5620
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C.A. 1487 EXPIRES 6/30/25		
SHEET: 7 OF 30		

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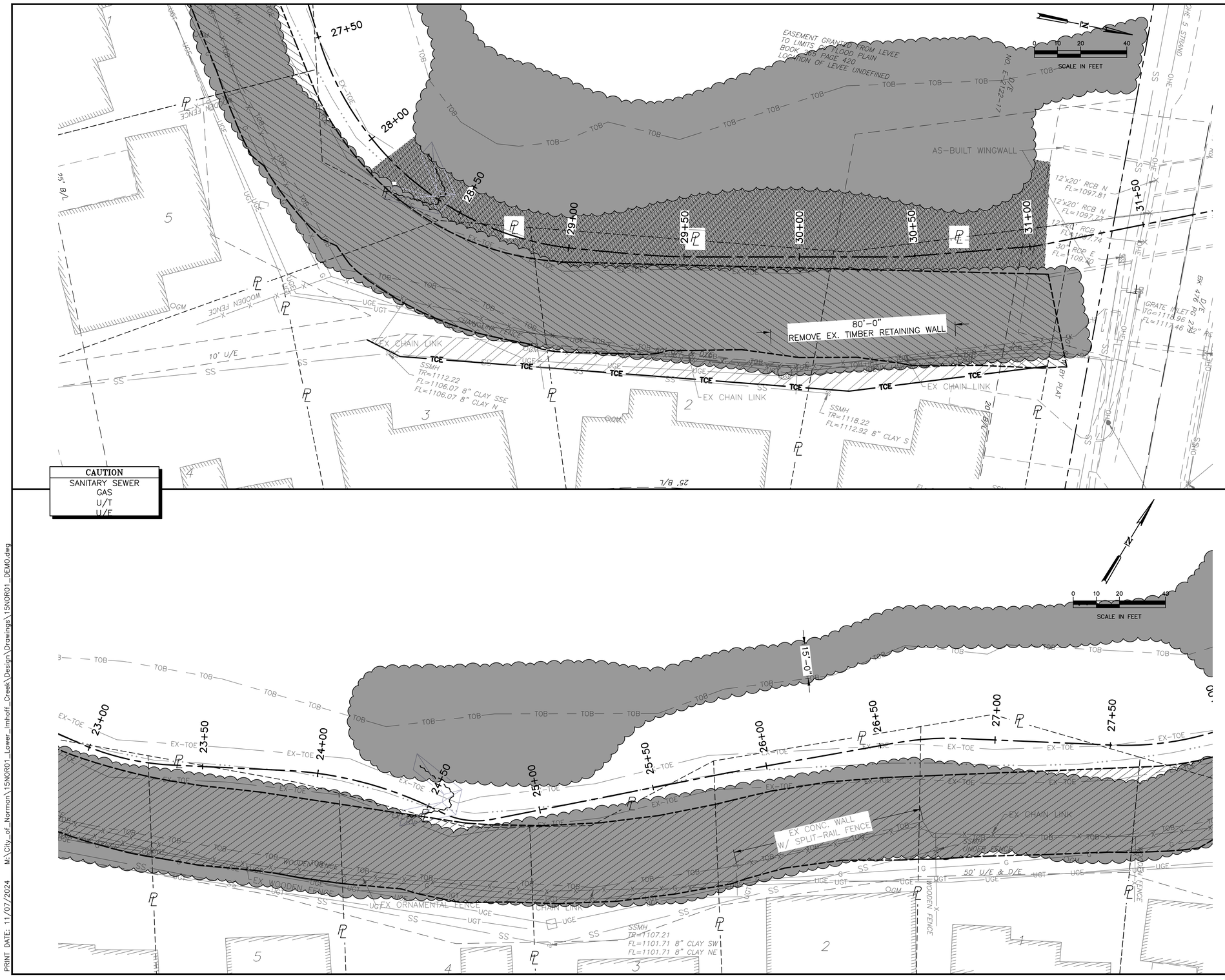

CAUTION
SANITARY SEWER
GAS
U/T
U/E

LEGEND

- EXCAVATION FOR RSS WALL
- CLEARING (RUBBLE & DEBRIS)
- TREE REMOVAL
- TCE — TEMPORARY CONSTRUCTION EASEMENT
- TOB — EXISTING TOP OF BANK
- EX-TOE — EXISTING TOE OF BANK
- EX CL CHANNEL
- CRL CHANNEL
- PROPOSED FENCE
- X — EXISTING FENCE
- G — EXISTING GAS (APPROX.)
- UGT — EX UNDRGND TELE (APPROX.)
- UGE — EX UNDRGND ELEC (APPROX.)
- SS — EX SAN. SEWER (APPROX.)

OKIE 811 Know what's below. Call before you dig.

DEMOLITION PLAN 2

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

PLANS AND ESTIMATES PREPARED BY:
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2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594-0127

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C.A. 1487 EXPIRES 6/30/25

SHEET: 8 OF 30

PRINT DATE: 11/07/2024 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_DEMO.dwg

WALL BEGIN/END
STATION=16+40
OFFSET=24.4R
NORTHING=674838.24
EASTING=2130091.76

WALL BEGIN/END
STATION=17+50
OFFSET=38.1R
NORTHING=674976.57
EASTING=2130103.29

STA. 15+00

STA. 19+80

16+00

17+00

18+00

19+00

0 10 20 40
SCALE IN FEET

TURN BACK RSS WALL BASKET FACE PER DETAIL 5 ON SHEET 28

20'x20' TYPE I PLAIN RIPRAP (3' DEPTH) TO TIE INTO EDGE OF RSS WALL

TYPE I PLAIN RIPRAP (3' DEPTH) TO TIE INTO EDGE OF RSS WALL.
PLACE RIPRAP FROM EXISTING 30" RCP TO EDGE OF RSS WALL, 20' TOP TO TOE.

GRADING EDGE

3 GRATE INLET
TG=1102.15
FL=1094.55 30" RCP W
FL=1094.55 30" RCP E

3 GRATE INLET
TG=1102.85
FL=1095.35 30" RCP W
FL=1095.35 30" RCP E

3 30" RCP E
FL=1093.48

EX. SHED

33' STATUTORY R/W

EAST LINE SEC 12

WEST LINE SECTION 7

CHAIN LINK FENCE

WOODEN FENCE

OHE PED. ATT

UGE PED.

OGM

25' B/L

25' U/E & D/E

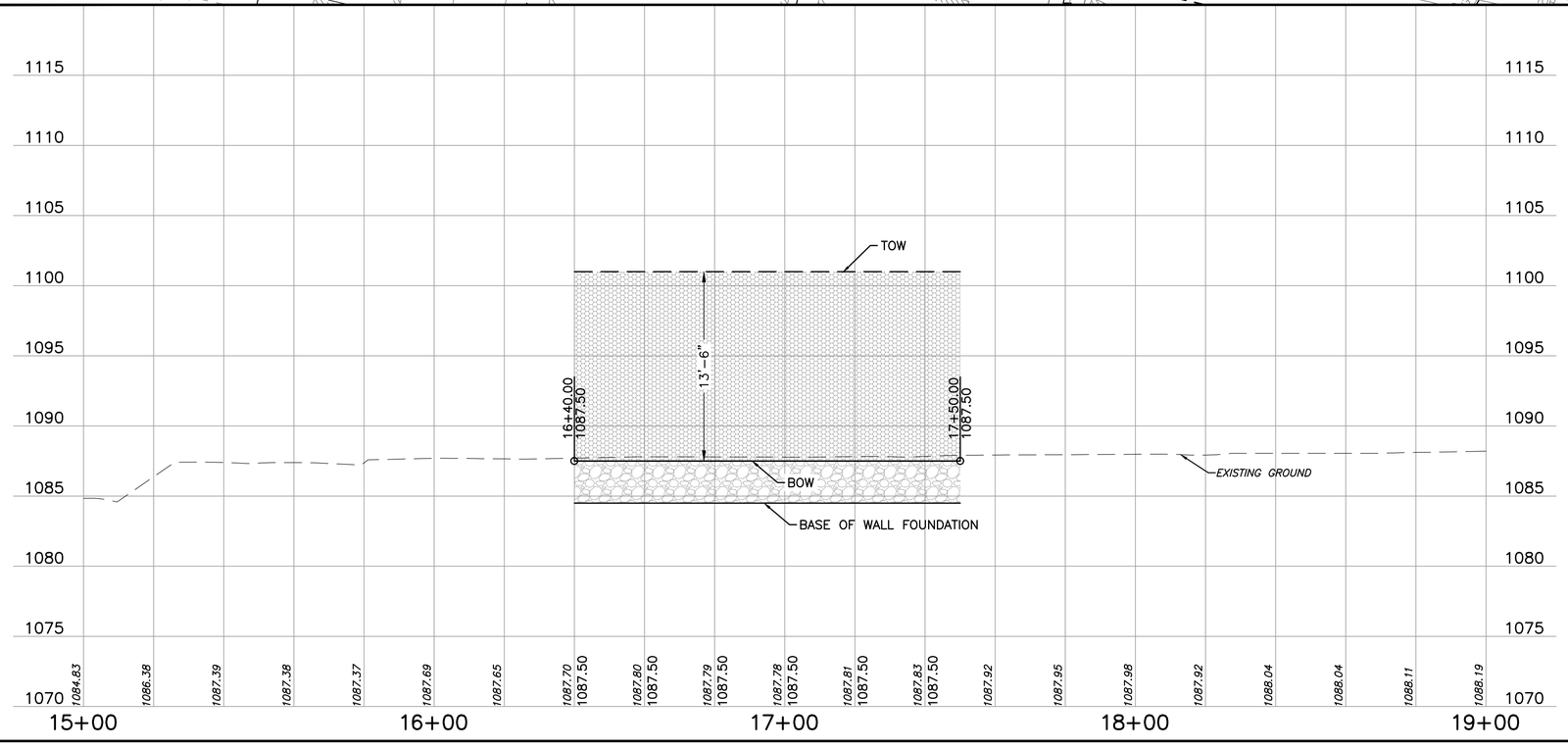
CAUTION
SANITARY SEWER
GAS
U/T
U/E

LEGEND

- RSS WALL FACE
- ROCK TOE REVETMENT SEE DETAIL 2 SHEET 30
- EXCAVATION AREA
- TCE — TEMPORARY CONSTRUCTION EASEMENT
- TOB — EXISTING TOP OF BANK
- EX–TOE — EXISTING TOE OF BANK
- EX CL CHANNEL
- CRL CHANNEL
- PROPOSED FENCE
- X X — EXISTING FENCE
- G — EXISTING GAS (APPROX.)
- UGT — EX UNDRGND TELE (APPROX.)
- UGE — EX UNDRGND ELEC (APPROX.)
- SS — EX SAN. SEWER (APPROX.)

1. REPLACE EXISTING FENCE (6' STOCKADE)
2. RELOCATE GAS. LOCATE BY POTHOLING
3. PROTECT DURING CONSTRUCTION
4. REMOVE TREE
5. RESET U/E BOX. (BY OTHERS)
6. RESET U/T PEDESTAL. (BY OTHERS)
7. RELOCATE U/E. (BY OTHERS)
8. RELOCATE U/T. (BY OTHERS)
9. RESET SS MH
10. SHEET PILE CROSS VANE SEE DETAIL 1 SHEET 30

OKIE 811 Know what's below. Call before you dig.



Wall Toe Line and Curve Table

Line #/Curve #	Length	Bearing/Chord	Radius	Start Coord.
L60	75.61	N70° 39' 35.17"E		N: 675266.98 E: 2130119.66
L61	96.13	N67° 31' 06.32"E		N: 675321.05 E: 2130282.11
C61	117.68	Chord Length: 117.12' Chord Direction: N53° 59' 50"E	346.97	N: 675357.81 E: 2130370.93
C62	64.37	Chord Length: 64.24' Chord Direction: N50° 25' 38"E	300.00	N: 675426.65 E: 2130465.68
L62	109.40	N56° 34' 25.92"E		N: 675467.58 E: 2130515.20
C63	152.47	Chord Length: 143.27' Chord Direction: N24° 50' 55"E	125.56	N: 675527.85 E: 2130606.51
L63	206.45	N10° 01' 04.28"W		N: 675657.86 E: 2130666.71
L50	138.84	N4° 45' 31.03"E		N: 674838.25 E: 2130091.82

RSS WALL P&P 2

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

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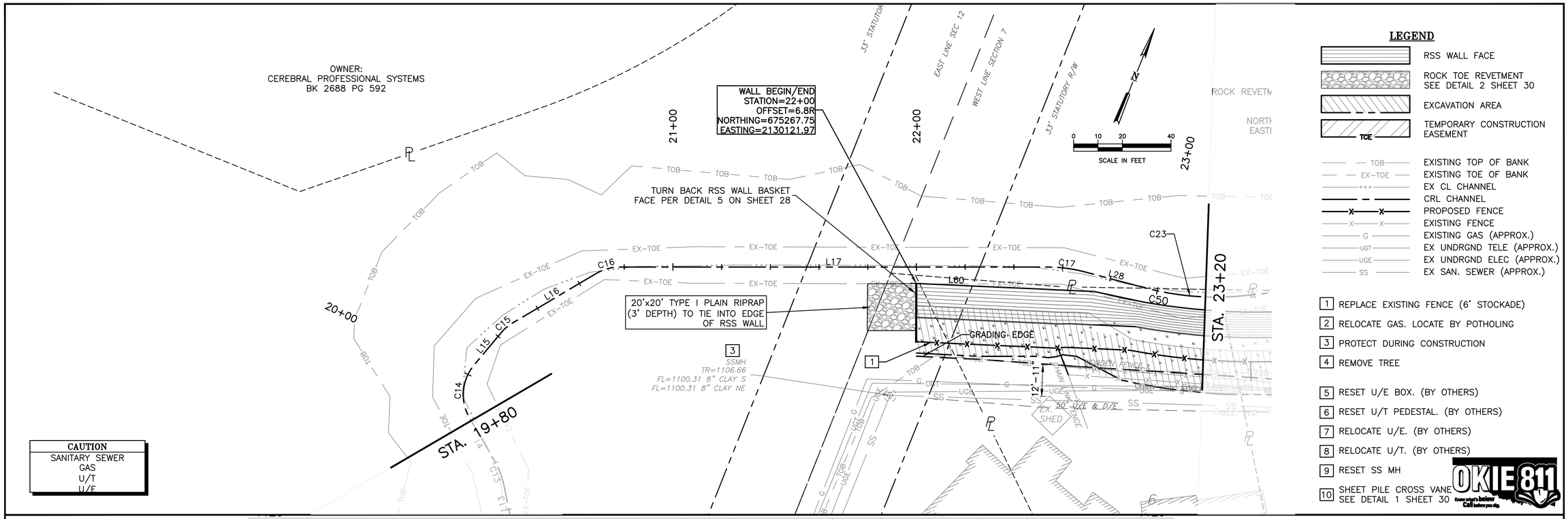
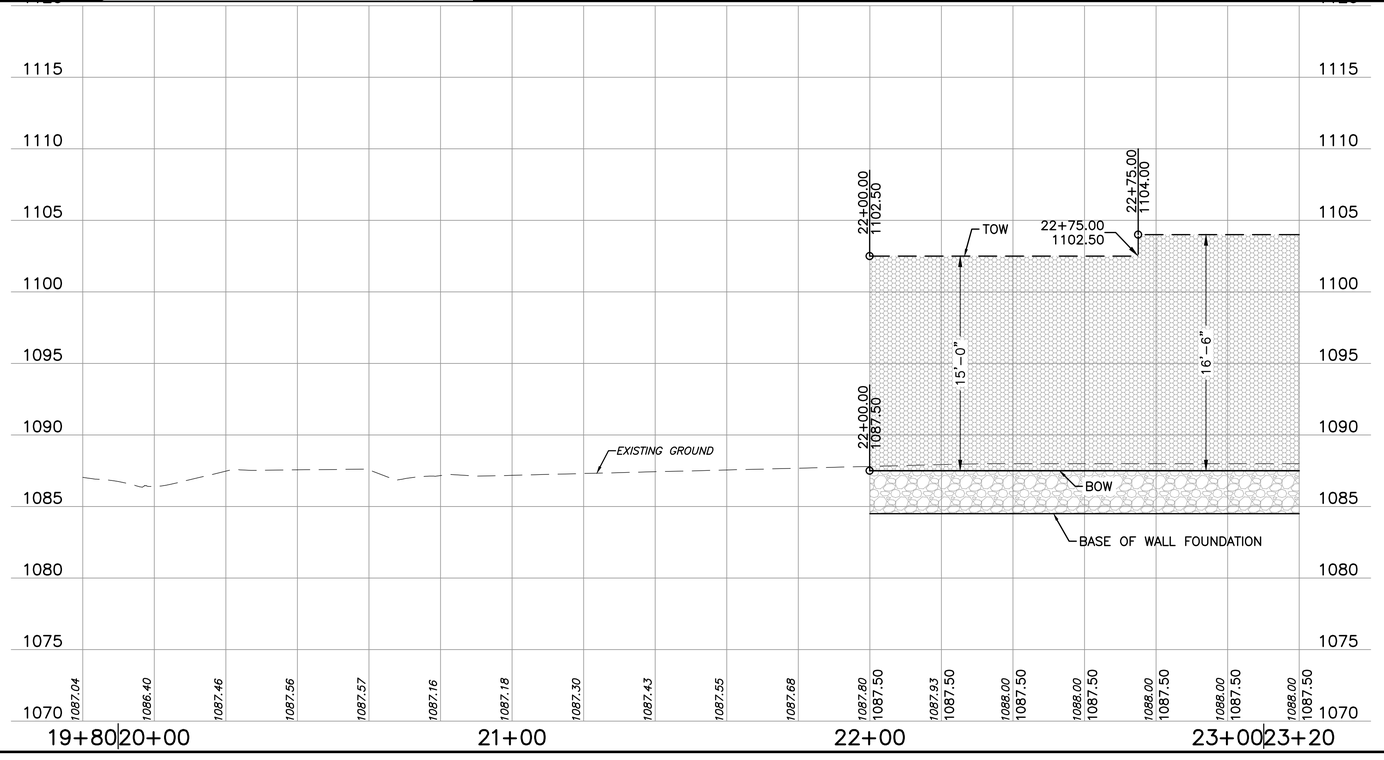


LEGEND

- RSS WALL FACE
- ROCK TOE REVETMENT SEE DETAIL 2 SHEET 30
- EXCAVATION AREA
- TEMPORARY CONSTRUCTION EASEMENT (TCE)
- TOB — EXISTING TOP OF BANK
- EX-TOE — EXISTING TOE OF BANK
- EX CL CHANNEL
- CRL CHANNEL
- PROPOSED FENCE
- X — X — EXISTING FENCE
- G — EXISTING GAS (APPROX.)
- UGT — EX UNDRGND TELE (APPROX.)
- UGE — EX UNDRGND ELEC (APPROX.)
- SS — EX SAN. SEWER (APPROX.)

1. REPLACE EXISTING FENCE (6' STOCKADE)
2. RELOCATE GAS. LOCATE BY POTHOLING
3. PROTECT DURING CONSTRUCTION
4. REMOVE TREE
5. RESET U/E BOX. (BY OTHERS)
6. RESET U/T PEDESTAL. (BY OTHERS)
7. RELOCATE U/E. (BY OTHERS)
8. RELOCATE U/T. (BY OTHERS)
9. RESET SS MH
10. SHEET PILE CROSS VANE SEE DETAIL 1 SHEET 30

OKIE 811 Know what's below. Call before you dig.



Wall Toe Line and Curve Table

Line #/Curve #	Length	Bearing/Chord	Radius	Start Coord.
L60	75.61	N70° 39' 35.17"E		N: 675266.98 E: 2130119.66
L61	96.13	N67° 31' 06.32"E		N: 675321.05 E: 2130282.11
C61	117.68	Chord Length: 117.12' Chord Direction: N53° 59' 50"E	346.97	N: 675357.81 E: 2130370.93
C62	64.37	Chord Length: 64.24' Chord Direction: N50° 25' 38"E	300.00	N: 675426.65 E: 2130465.68
L62	109.40	N56° 34' 25.92"E		N: 675467.58 E: 2130515.20
C63	152.47	Chord Length: 143.27' Chord Direction: N24° 50' 55"E	125.56	N: 675527.85 E: 2130606.51
L63	206.45	N10° 01' 04.28"W		N: 675657.86 E: 2130666.71
L50	138.84	N4° 45' 31.03"E		N: 674838.25 E: 2130091.82

RSS WALL P&P 2

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

PLANS AND ESTIMATES PREPARED BY:
MESHEK & ASSOCIATES, L.L.C.
1437 S. BOULDER AVENUE, SUITE 1550 TULSA, OK 74119 (918)392-5620
2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594-0127

REVISION	BY	DATE		
			DRAWN	CGH 12/2023
			DESIGNED	HCW 12/2023
			SURVEY	MR 7/2021
			C.A. 1487 EXPIRES 6/30/25	
			SHEET:	10 OF 30

PRINT DATE: 03/22/2024 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_PnP.dwg

ROCK REVETMENT BEGIN/END
STATION=24+08
OFFSET=16.1L
NORTHING=675361.33
EASTING=2130306.86

TURN ENDS OF ROCK TOE REVETMENT INTO EMBANKMENT

AFTER PUMPING, CONTRACTOR SHALL COORDINATE EXACT CROSS VANE LOCATION WITH ENGINEER.

PROPOSED CROSS VANE
SEE DETAIL 1 SHEET 30
STATION=24+60
NORTHING=675363.92
EASTING=2130361.98

ROCK REVETMENT BEGIN/END
STATION=25+43
OFFSET=25.3L
NORTHING=675427.17
EASTING=2130410.89

TURN ENDS OF ROCK TOE REVETMENT INTO EMBANKMENT

ROCK REVETMENT BEGIN/END
STATION=28+02
OFFSET=14.6L
NORTHING=675572.96
EASTING=2130621.27

SCALE IN FEET
0 10 20 40

STA. 23+20

STA. 27+60

GRADING EDGE

EX CONC. WALL W/ SPLIT-RAIL FENCE

EX CHAIN LINK FENCE UNDER FENCE

50' U/E & D/E

EX WOODEN FENCE

EX ORNAMENTAL FENCE

CHAIN LINK

SSMH
TR=1107.27
FL=1101.71 8" CLAY SW
FL=1101.71 8" CLAY NE

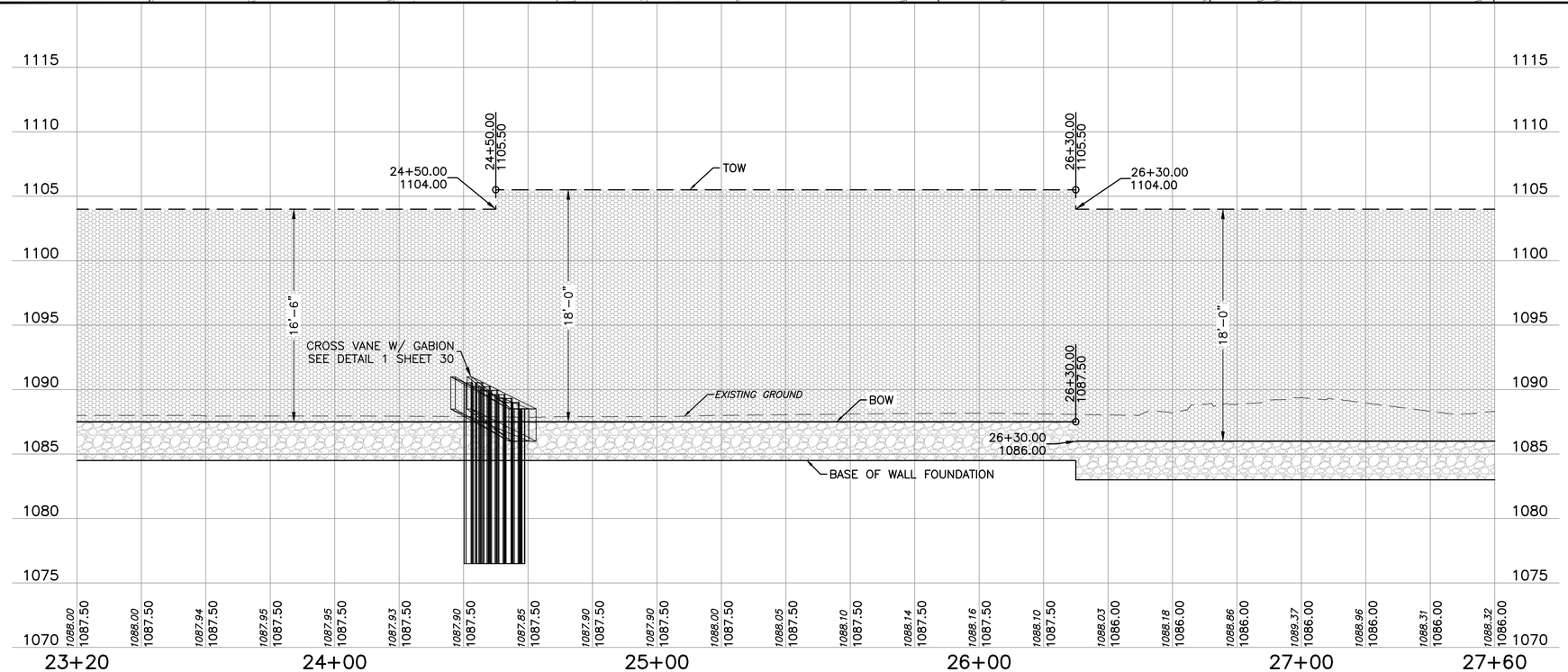
LEGEND

- RSS WALL FACE
- ROCK TOE REVETMENT SEE DETAIL 2 SHEET 30
- EXCAVATION AREA
- TEMPORARY CONSTRUCTION EASEMENT
- TOB — EXISTING TOP OF BANK
- EX–TOE — EXISTING TOE OF BANK
- EX CL CHANNEL
- CRL CHANNEL
- PROPOSED FENCE
- X–X — EXISTING FENCE
- G — EXISTING GAS (APPROX.)
- UGT — EX UNDRGND TELE (APPROX.)
- UGE — EX UNDRGND ELEC (APPROX.)
- SS — EX SAN. SEWER (APPROX.)

1. REPLACE EXISTING FENCE (6' STOCKADE)
2. RELOCATE GAS. LOCATE BY POTHOLING
3. PROTECT DURING CONSTRUCTION
4. REMOVE TREE
5. RESET U/E BOX. (BY OTHERS)
6. RESET U/T PEDESTAL. (BY OTHERS)
7. RELOCATE U/E. (BY OTHERS)
8. RELOCATE U/T. (BY OTHERS)
9. RESET SS MH
10. SHEET PILE CROSS VANE SEE DETAIL 1 SHEET 30

OKIE 811 Know what's below. Call before you dig.

CAUTION
SANITARY SEWER
GAS
U/T
U/E



Wall Toe Line and Curve Table

Line #/Curve #	Length	Bearing/Chord	Radius	Start Coord.
L60	75.61	N70° 39' 35.17"E		N: 675266.98 E: 2130119.66
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C61	117.68	Chord Length: 117.12' Chord Direction: N53° 59' 50"E	346.97	N: 675357.81 E: 2130370.93
C62	64.37	Chord Length: 64.24' Chord Direction: N50° 25' 38"E	300.00	N: 675426.65 E: 2130465.68
L62	109.40	N56° 34' 25.92"E		N: 675467.58 E: 2130515.20
C63	152.47	Chord Length: 143.27' Chord Direction: N24° 50' 55"E	125.56	N: 675527.85 E: 2130606.51
L63	206.45	N10° 01' 04.28"W		N: 675657.86 E: 2130666.71
L50	138.84	N4° 45' 31.03"E		N: 674838.25 E: 2130091.82

RSS WALL P&P 3

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

PLANS AND ESTIMATES PREPARED BY:
MESHEK & ASSOCIATES, L.L.C.
1437 S. BOULDER AVENUE, SUITE 1550 TULSA, OK 74119 (918)392–5620
2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594–0127

REVISION	BY	DATE

DRAWN	CGH	12/2023
DESIGNED	HCW	12/2023
SURVEY	MR	7/2021
C.A. 1487 EXPIRES 6/30/25		
SHEET:	11 OF 30	

PRINT DATE: 03/22/2024 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_PnP.dwg

ROCK REVETMENT BEGIN/END
STATION=28+02
OFFSET=14.6L
NORTHING=675572.96
EASTING=2130621.27

TURN ENDS OF ROCK TOE REVETMENT INTO EMBANKMENT

1.5H:1V TIE-BACK TO EX SURFACE

PROPOSED CROSS VANE
SEE DETAIL 1 SHEET 30
STATION=28+40
NORTHING=675596.49
EASTING=2130651.18

ROCK REVETMENT BEGIN/END
STATION=31+10
OFFSET=29.1L
NORTHING=675849.30
EASTING=2130590.09

EASEMENT GRANTED FROM LEVEE TO LIMITS OF FLOOD PLAIN BOOK 265 PAGE 420 LOCATION OF LEVEE UNDEFINED

TURN ENDS OF ROCK TOE REVETMENT INTO EMBANKMENT. TIE INTO EXISTING RIPRAP

WALL BEGIN/END
STATION=31+05
OFFSET=12.9R
NORTHING=675861.11
EASTING=2130630.66

AFTER PUMPING, CONTRACTOR SHALL COORDINATE EXACT CROSS VANE LOCATION WITH ENGINEER.

SCALE IN FEET 0 10 20 40

LEGEND

- RSS WALL FACE
- ROCK TOE REVETMENT SEE DETAIL 2 SHEET 30
- EXCAVATION AREA
- TCE — TEMPORARY CONSTRUCTION EASEMENT
- TOB — EXISTING TOP OF BANK
- EX-TOE — EXISTING TOE OF BANK
- EX CL CHANNEL
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- G — EXISTING GAS (APPROX.)
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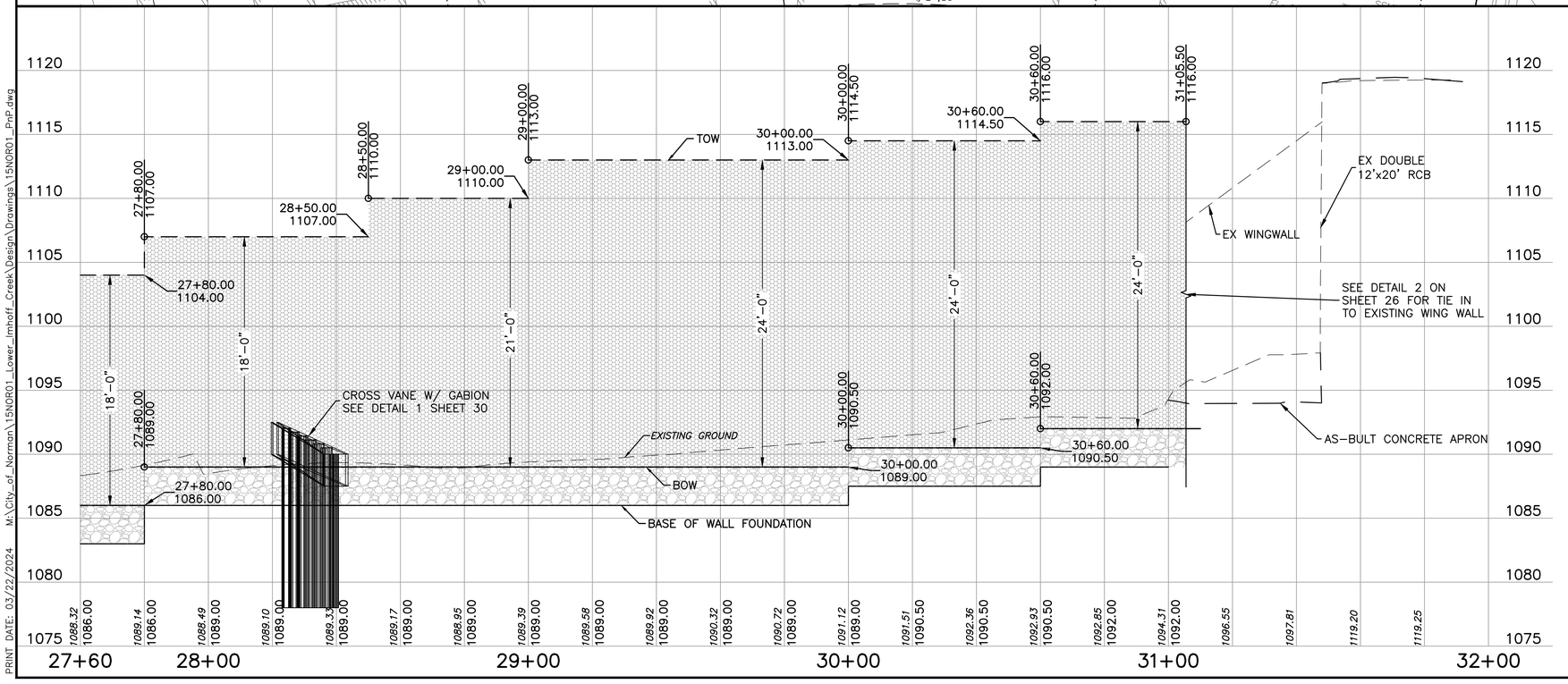
8 RELOCATE U/T. (BY OTHERS)
9 RESET SS MH
10 SHEET PILE CROSS VANE SEE DETAIL 1 SHEET 30

CAUTION
SANITARY SEWER
GAS
U/T
U/E

OKIE 811 Know what's below. Call before you dig.



Wall Toe Line and Curve Table

Line #/Curve #	Length	Bearing/Chord	Radius	Start Coord.
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C61	117.68	Chord Length: 117.12' Chord Direction: N53° 59' 50"E	346.97	N: 675357.81 E: 2130370.93
C62	64.37	Chord Length: 64.24' Chord Direction: N50° 25' 38"E	300.00	N: 675426.65 E: 2130465.68
L62	109.40	N56° 34' 25.92"E		N: 675467.58 E: 2130515.20
C63	152.47	Chord Length: 143.27' Chord Direction: N24° 50' 55"E	125.56	N: 675527.85 E: 2130606.51
L63	206.45	N10° 01' 04.28"W		N: 675657.86 E: 2130666.71
L50	138.84	N4° 45' 31.03"E		N: 674838.25 E: 2130091.82

RSS WALL P&P 4

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

PLANS AND ESTIMATES PREPARED BY:
MESHEK & ASSOCIATES, L.L.C.
1437 S. BOULDER AVENUE, SUITE 1550 TULSA, OK 74119 (918)392-5620
2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594-0127

REVISION	BY	DATE

DRAWN	CGH 12/2023
DESIGNED	HCW 12/2023
SURVEY	MR 7/2021
C.A. 1487 EXPIRES 6/30/25	
SHEET:	12 OF 30

PRINT DATE: 03/22/2024 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_PnP.dwg

PR. CRL					
Number	Radius	Length	Line/Chord Direction	Start Coord.	Start Station
L1		167.26	N1° 47' 47.69"W	N: 674217.38 E: 2130062.48	10+00.00
C1	100.00	6.79	N0° 08' 55.21"E	N: 674384.56 E: 2130057.24	11+67.26
L2		63.70	N2° 05' 38.12"E	N: 674391.35 E: 2130057.25	11+74.06
C2	176.24	25.84	N2° 06' 24.43"W	N: 674455.01 E: 2130059.58	12+37.76
L3		132.87	N6° 18' 26.97"W	N: 674480.81 E: 2130058.63	12+63.60
C3	100.00	13.29	N10° 06' 57.38"W	N: 674612.88 E: 2130044.04	13+96.47
L4		0.20	N13° 55' 27.80"W	N: 674625.96 E: 2130041.70	14+09.77
C4	36.72	20.82	N2° 19' 12.73"E	N: 674626.15 E: 2130041.65	14+09.96
L5		36.53	N18° 33' 53.25"E	N: 674646.68 E: 2130042.49	14+30.78
C5	36.72	5.80	N14° 02' 29.28"E	N: 674681.30 E: 2130054.12	14+67.31
L6		12.23	N9° 31' 05.30"E	N: 674686.92 E: 2130055.52	14+73.11
C6	35.30	20.88	N7° 25' 26.83"W	N: 674698.98 E: 2130057.54	14+85.33
L7		26.02	N24° 21' 58.95"W	N: 674719.38 E: 2130054.88	15+06.21
C7	35.30	26.40	N2° 56' 38.36"W	N: 674743.09 E: 2130044.15	15+32.24
L8		97.10	N18° 28' 42.24"E	N: 674768.84 E: 2130042.82	15+58.64
C8	35.30	8.15	N11° 51' 48.64"E	N: 674860.94 E: 2130073.60	16+55.74
L9		59.38	N5° 14' 55.04"E	N: 674868.90 E: 2130075.27	16+63.89
C9	35.30	30.67	N19° 38' 14.76"W	N: 674928.03 E: 2130080.70	17+23.27
L10		61.55	N44° 31' 24.56"W	N: 674956.01 E: 2130070.72	17+53.94
C10	35.30	20.20	N28° 08' 01.83"W	N: 674999.90 E: 2130027.55	18+15.50

PR. CRL					
Number	Radius	Length	Line/Chord Direction	Start Coord.	Start Station
L11		36.47	N11° 44' 39.09"W	N: 675017.47 E: 2130018.16	18+35.69
C11	35.30	7.02	N6° 02' 55.25"W	N: 675053.18 E: 2130010.74	18+72.17
L12		36.26	N0° 21' 11.41"W	N: 675060.15 E: 2130010.00	18+79.18
C12	35.30	20.49	N16° 58' 41.89"W	N: 675096.41 E: 2130009.77	19+15.45
L13		13.97	N33° 36' 12.36"W	N: 675115.73 E: 2130003.87	19+35.93
C13	35.30	11.51	N42° 56' 46.31"W	N: 675127.37 E: 2129996.14	19+49.91
L14		19.96	N52° 17' 20.27"W	N: 675135.76 E: 2129988.33	19+61.42
C14	18.90	23.15	N17° 12' 32.29"W	N: 675147.96 E: 2129972.55	19+81.38
L15		17.21	N17° 52' 15.69"E	N: 675168.72 E: 2129966.12	20+04.52
C15	18.90	6.44	N27° 38' 04.15"E	N: 675185.10 E: 2129971.40	20+21.73
L16		39.88	N37° 23' 52.62"E	N: 675190.78 E: 2129974.37	20+28.17
C16	18.90	10.11	N52° 43' 12.26"E	N: 675222.46 E: 2129998.59	20+68.06
L17		175.70	N68° 02' 31.90"E	N: 675228.51 E: 2130006.54	20+78.17
C17	58.88	15.20	N75° 26' 21.09"E	N: 675294.21 E: 2130169.50	22+53.86
L24		26.15	N82° 50' 10.28"E	N: 675298.02 E: 2130184.17	22+69.07
C23	112.44	41.63	N72° 13' 44.42"E	N: 675301.28 E: 2130210.12	22+95.22
L25		48.67	N61° 37' 18.55"E	N: 675313.92 E: 2130249.54	23+36.85
C24	164.85	69.84	N73° 45' 32.03"E	N: 675337.05 E: 2130292.36	23+85.52
L23		0.88	N85° 53' 45.52"E	N: 675356.44 E: 2130358.91	24+55.36
C18	34.17	22.74	N66° 50' 02.11"E	N: 675356.50 E: 2130359.79	24+56.24

PR. CRL					
Number	Radius	Length	Line/Chord Direction	Start Coord.	Start Station
L22		103.40	N47° 46' 18.70"E	N: 675365.28 E: 2130380.31	24+78.98
L26		74.48	N48° 49' 13.61"E	N: 675434.77 E: 2130456.87	25+82.38
C25	130.19	28.63	N55° 07' 09.66"E	N: 675483.81 E: 2130512.93	26+56.86
L27		65.50	N61° 25' 05.71"E	N: 675500.15 E: 2130536.37	26+85.48
C19	129.26	152.28	N27° 40' 05.25"E	N: 675531.49 E: 2130593.89	27+50.99
L20		22.77	N6° 04' 55.21"W	N: 675658.69 E: 2130660.58	29+03.27
C20	325.12	30.52	N8° 46' 16.74"W	N: 675681.33 E: 2130658.17	29+26.04
L21		87.41	N11° 27' 38.28"W	N: 675711.48 E: 2130653.52	29+56.56
C21	18.90	1.53	N13° 46' 51.79"W	N: 675797.15 E: 2130636.15	30+43.97
L18		55.70	N16° 06' 05.31"W	N: 675798.64 E: 2130635.78	30+45.50
C22	18.90	2.19	N19° 25' 20.92"W	N: 675852.16 E: 2130620.33	31+01.20
L19		89.97	N22° 44' 36.54"W	N: 675854.22 E: 2130619.61	31+03.39

PR CRL DATA

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

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REVISION	BY	DATE

DRAWN	CGH	12/2023
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C.A. 1487 EXPIRES 6/30/25		
SHEET: 13 OF 30		

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LEGEND

- RSS WALL FACE
- ROCK TOE REVETMENT SEE DETAIL 2 SHEET 30
- EXCAVATION AREA
- TCE — TEMPORARY CONSTRUCTION EASEMENT
- TOB — EXISTING TOP OF BANK
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END

PROPOSED FLEXAMAT ACCESS PATH

56'-0"

12'-0"

42'-0"

EXISTING RIPRAP

EXISTING WINGWALL

TIE IN ROCK TOE REVETMENT TO EXISTING RIPRAP.

EXISTING RIPRAP

EXISTING CONC. APRON

EX TRIPLE 12'x20' RCB

EXISTING WINGWALL

SEE DETAIL 2 ON SHEET 26 FOR WALL TRANSITION AND EXTENSION BEHIND WINGWALL.

30+00

31+00

31+93

WASHOUT AREA

W IMHOFF RD

L18 L19 L20 L25 C20 C21 C22

TCE

SCALE IN FEET 0 5 10 20

CAUTION
SANITARY SEWER
GAS
U/T
U/E

PRINT DATE: 11/7/24 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek_Design\Drawings\15NOR01_GRADING.dwg

NORTH GRADING

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

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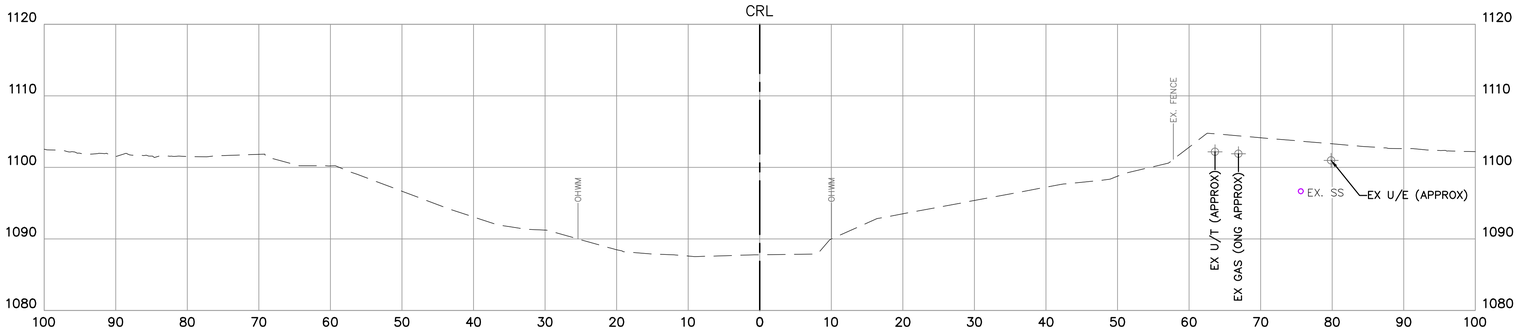
SURVEY	MR	7/2021

C.A. 1487 EXPIRES 6/30/25

SHEET: 14 OF 30



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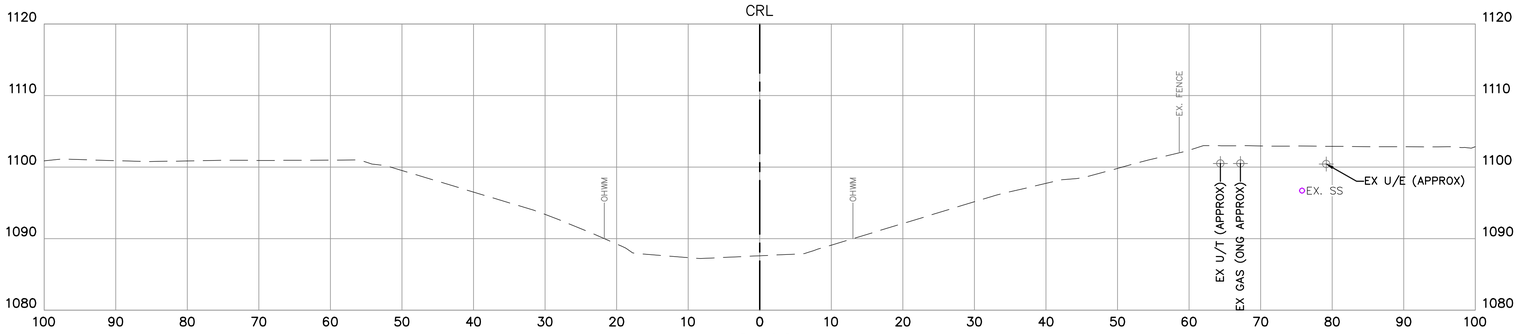

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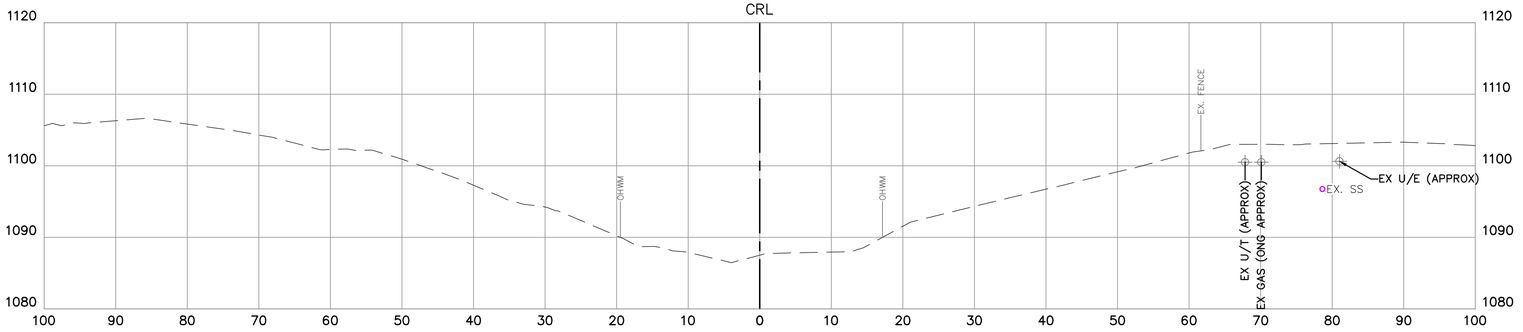

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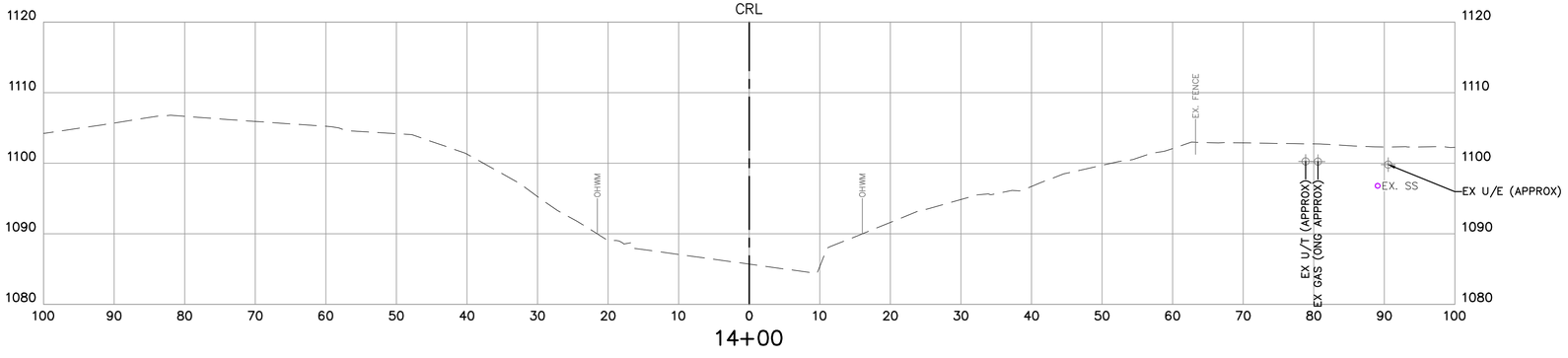

14+00

LEGEND

- EMBANKMENT FILL (NATIVE SOIL)
- REINFORCED FILL
- ODOT TYPE 'D' AGGREGATE

SECTION SHEET – (1)					
IMHOFF CREEK BANK STABILIZATION					
CITY OF NORMAN					
PLANS AND ESTIMATES PREPARED BY: MESHEK & ASSOCIATES, L.L.C. 1437 S. BOULDER AVENUE, SUITE 1550 TULSA, OK 74119 (918)392-5620 2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594-0127					
REVISION	BY	DATE	DRAWN	CGH	12/2023
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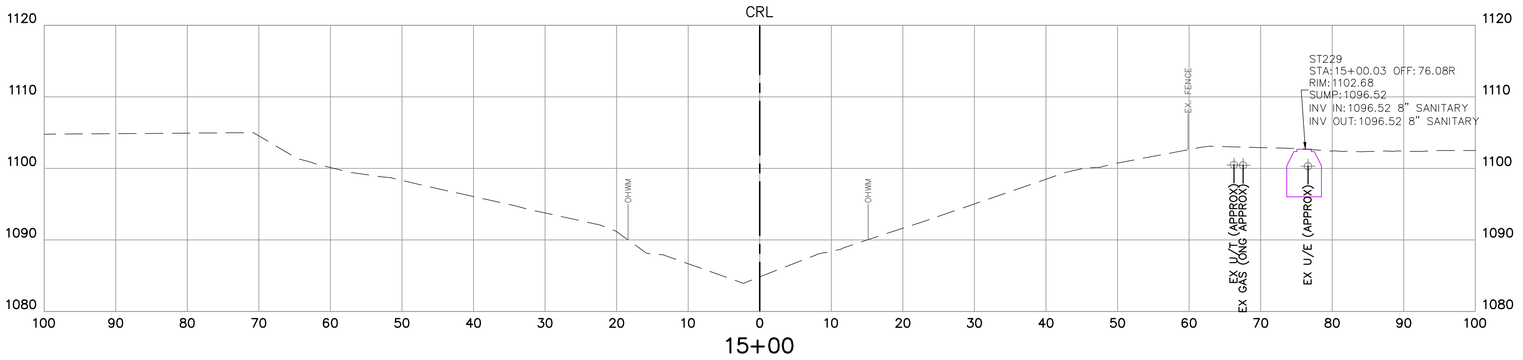
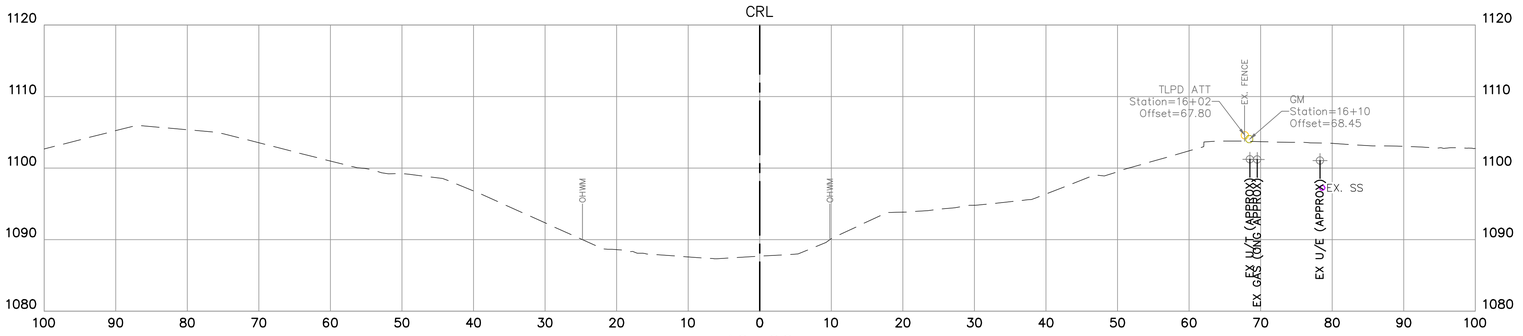
			SHEET: 15 OF 30		

PRINT DATE: 3/22/24 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_SECTIONS.dwg



15+00



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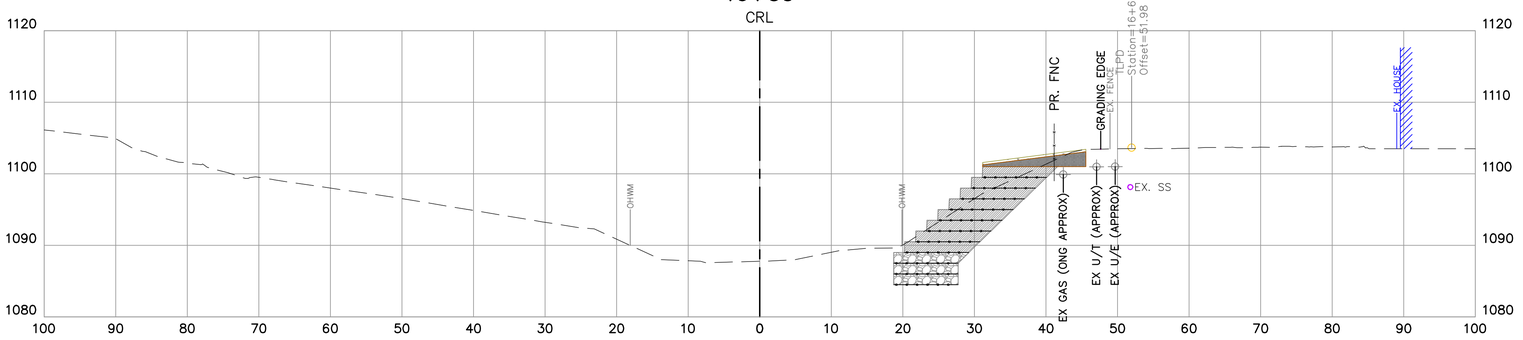

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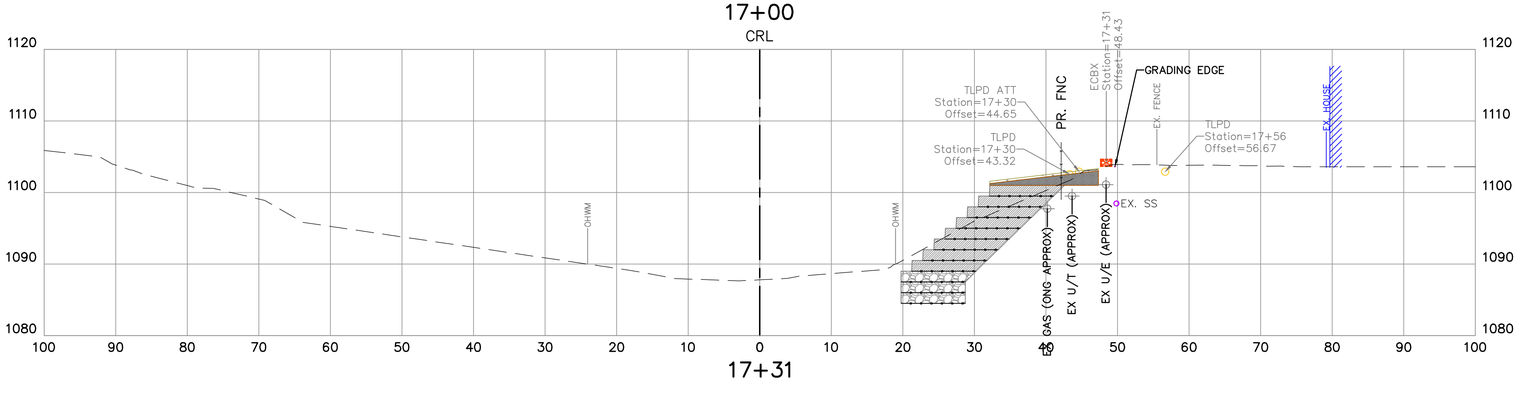


17+31

LEGEND

- EMBANKMENT FILL (NATIVE SOIL)
- REINFORCED FILL
- ODOT TYPE 'D' AGGREGATE

SECTION SHEET – (2)

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

PLANS AND ESTIMATES PREPARED BY:
MESHEK & ASSOCIATES, L.L.C.
1437 S. BOULDER AVENUE, SUITE 1550 TULSA, OK 74119 (918)392-5620
2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594-0127

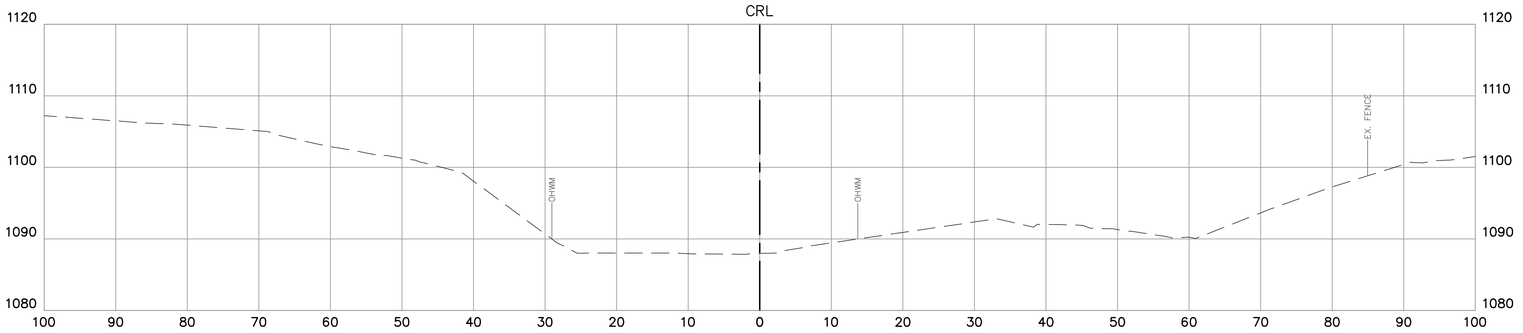
REVISION	BY	DATE

DRAWN	CGH	12/2023
DESIGNED	HCW	12/2023
SURVEY	MR	7/2021

C.A. 1487 EXPIRES 6/30/25

SHEET: 16 OF 30

PRINT DATE: 3/22/24 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_SECTIONS.dwg



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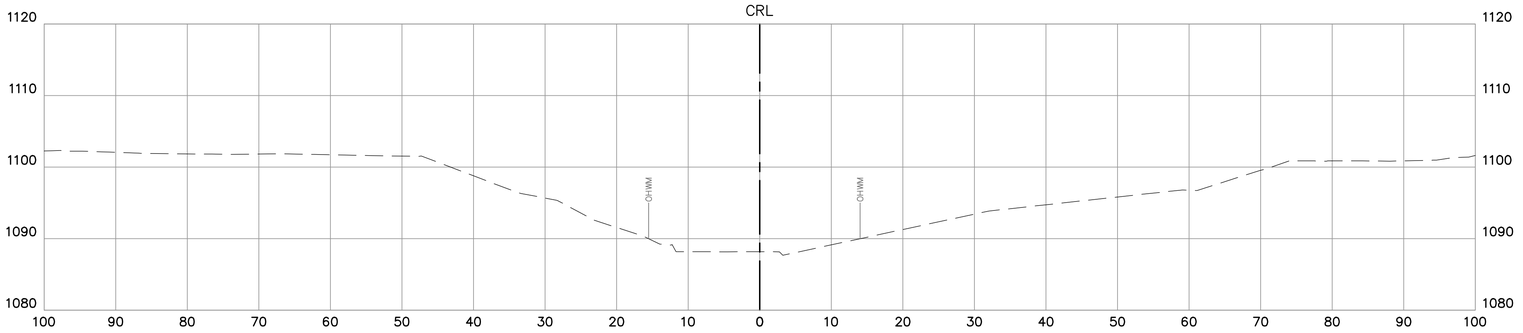

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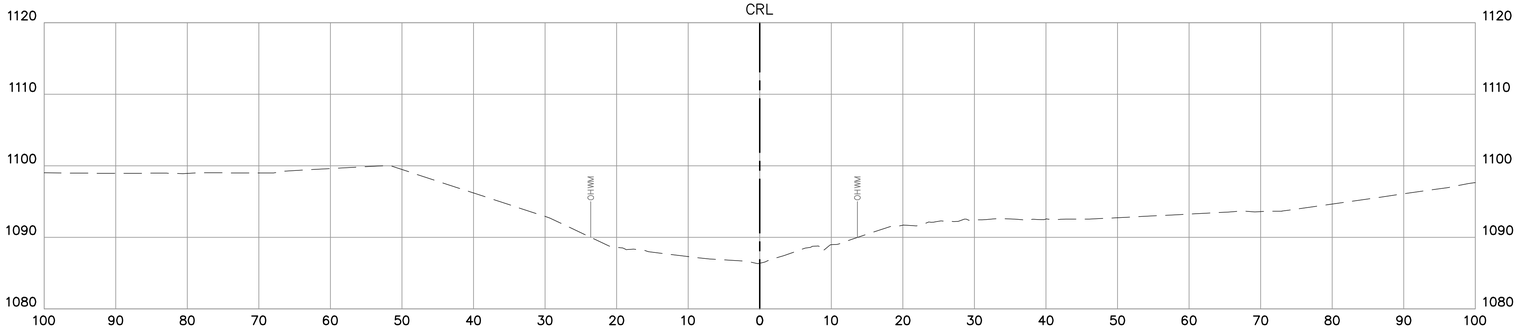

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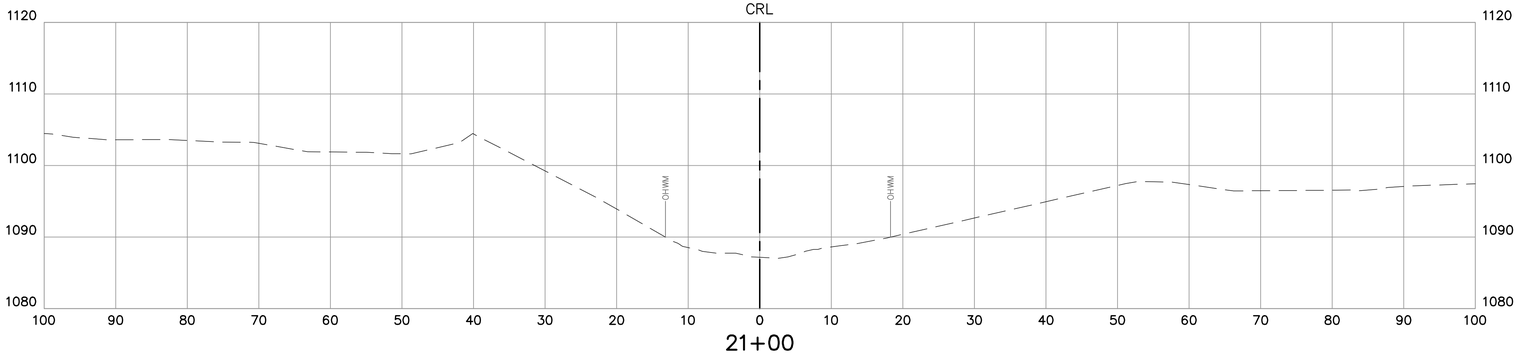

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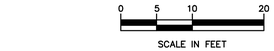


LEGEND

- EMBANKMENT FILL (NATIVE SOIL)
- REINFORCED FILL
- ODOT TYPE 'D' AGGREGATE

SECTION SHEET – (3)

IMHOFF CREEK BANK STABILIZATION

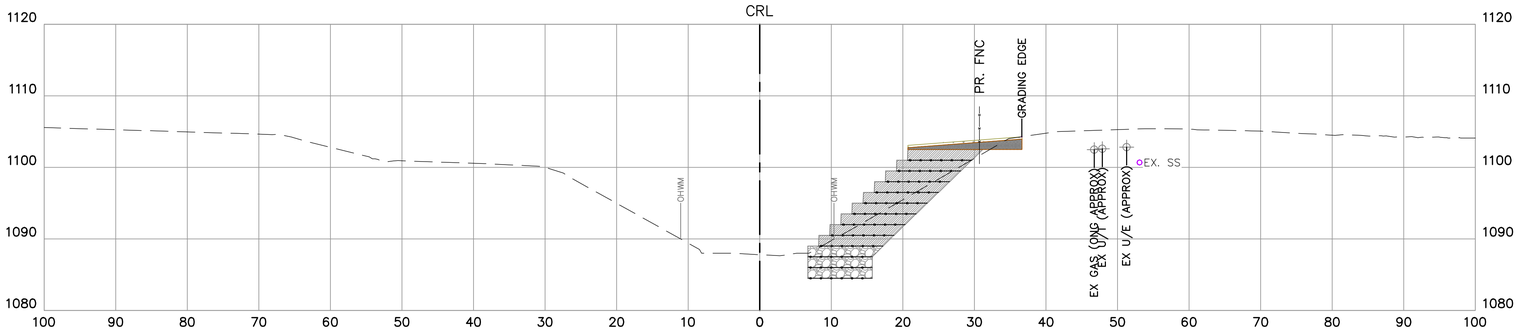
CITY OF NORMAN

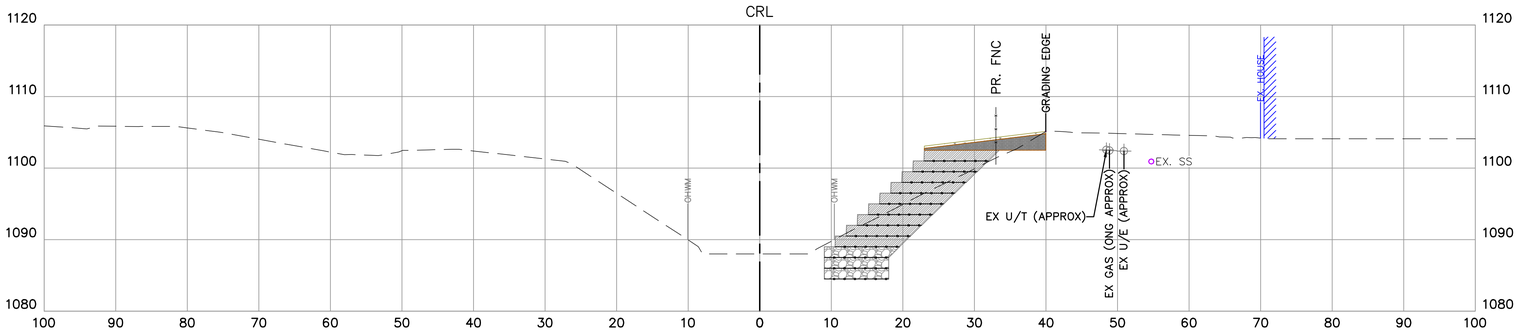
PLANS AND ESTIMATES PREPARED BY:
MESHEK & ASSOCIATES, L.L.C.
1437 S. BOULDER AVENUE, SUITE 1550 TULSA, OK 74119 (918)392-5620
2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594-0127

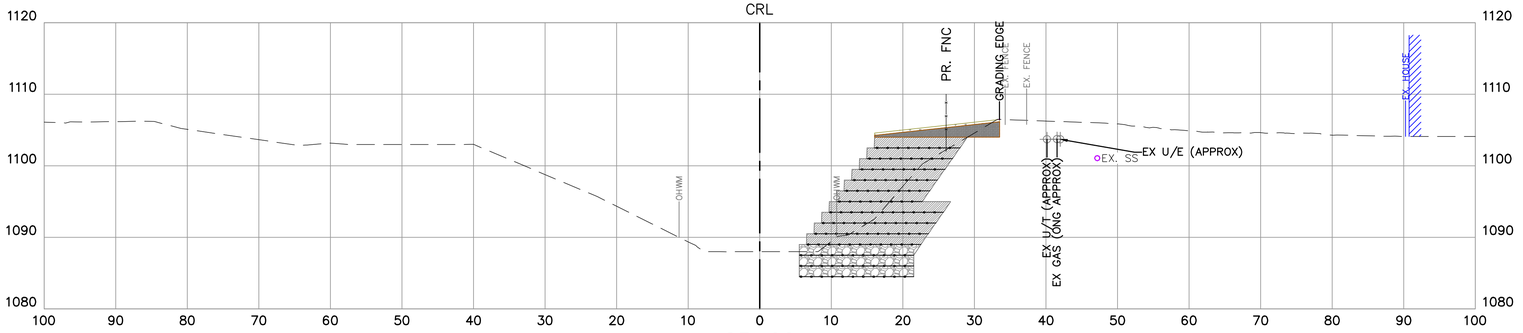
REVISION	BY	DATE

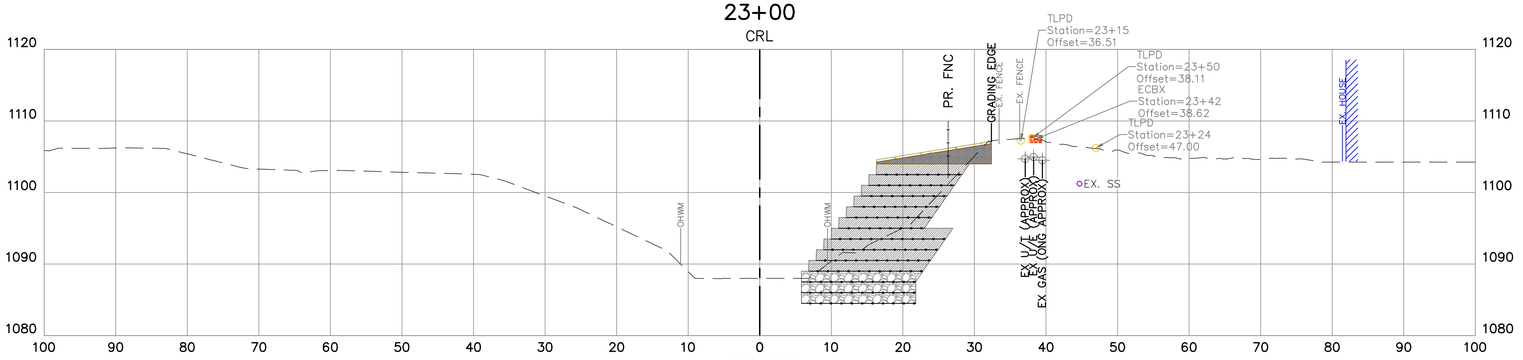
DRAWN	CGH	12/2023
DESIGNED	HCW	12/2023
SURVEY	MR	7/2021
C.A. 1487 EXPIRES 6/30/25		
SHEET:	17 OF 30	

PRINT DATE: 3/22/24 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_SECTIONS.dwg









0 5 10 20

SCALE IN FEET

LEGEND

- EMBANKMENT FILL (NATIVE SOIL)
- REINFORCED FILL
- ODOT TYPE 'D' AGGREGATE

SECTION SHEET – (4)

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

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2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594-0127

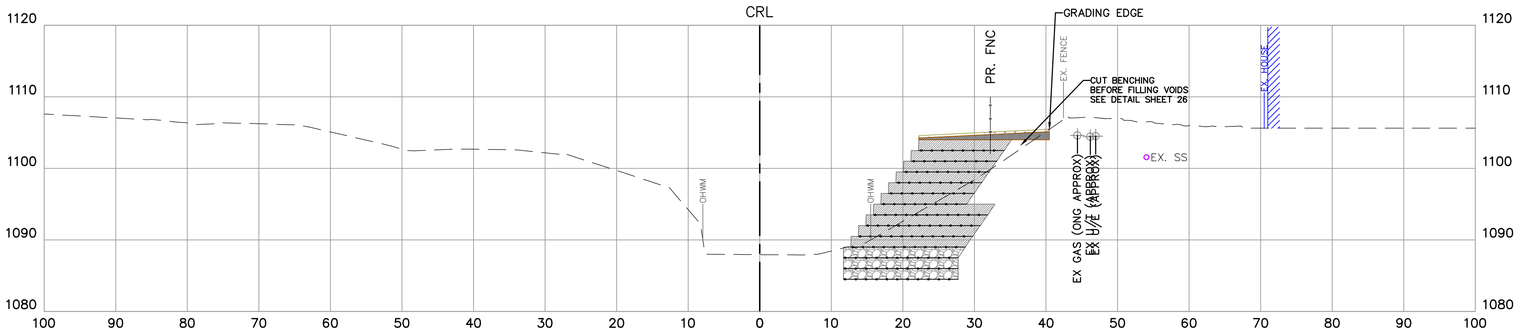
REVISION	BY	DATE

DRAWN	CGH	12/2023
DESIGNED	HCW	12/2023
SURVEY	MR	7/2021

C.A. 1487 EXPIRES 6/30/25

SHEET: 18 OF 30

PRINT DATE: 3/22/24 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_SECTIONS.dwg



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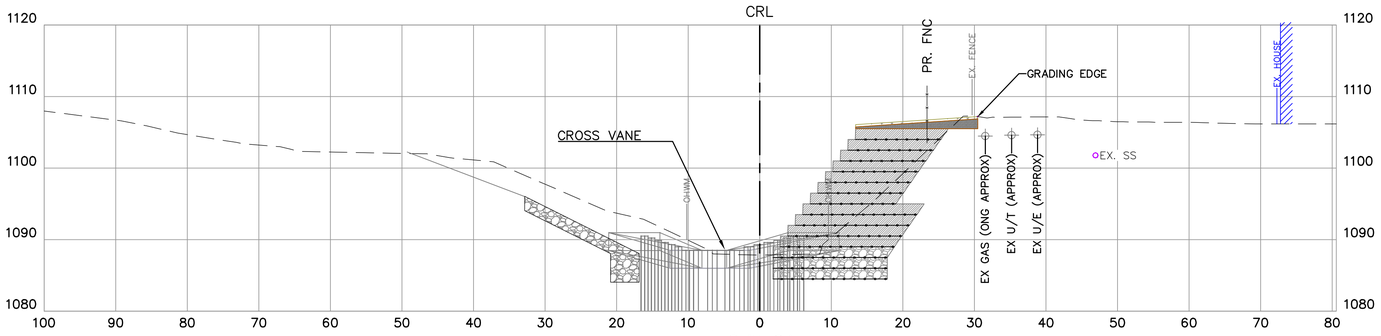

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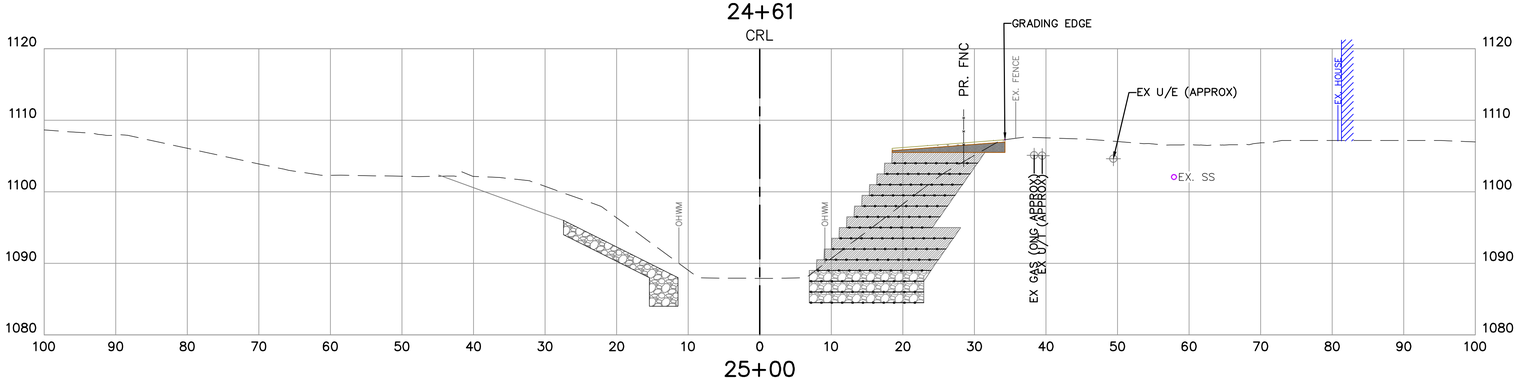

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LEGEND

- EMBANKMENT FILL (NATIVE SOIL)
- REINFORCED FILL
- ODOT TYPE 'D' AGGREGATE

PRINT DATE: 3/22/24 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_SECTIONS.dwg

SECTION SHEET – (5)

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

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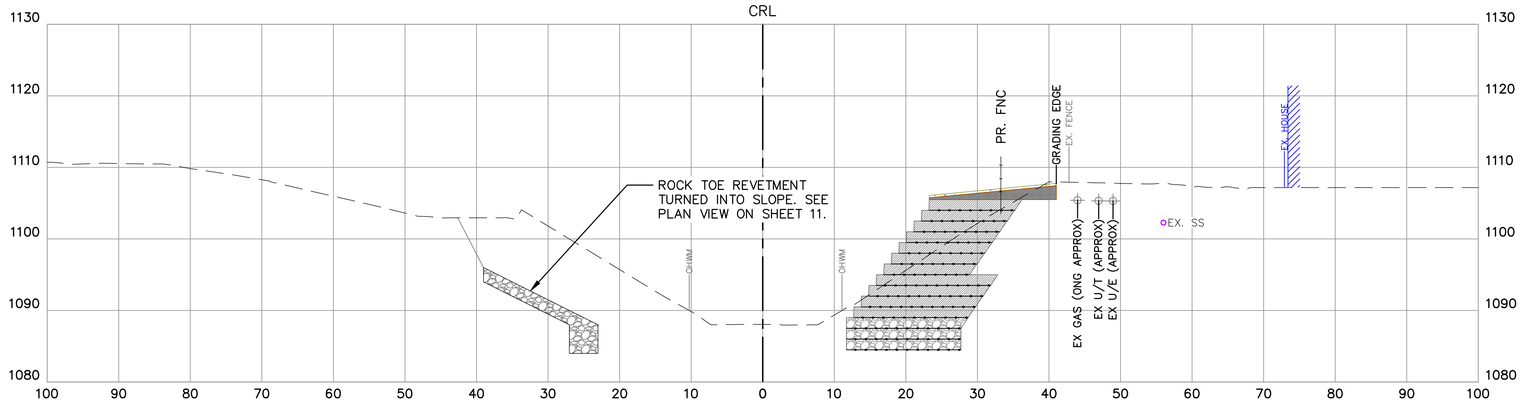
REVISION	BY	DATE

DRAWN	CGH	12/2023
DESIGNED	HCW	12/2023
SURVEY	MR	7/2021

C.A. 1487 EXPIRES 6/30/25

SHEET: 19 OF 30



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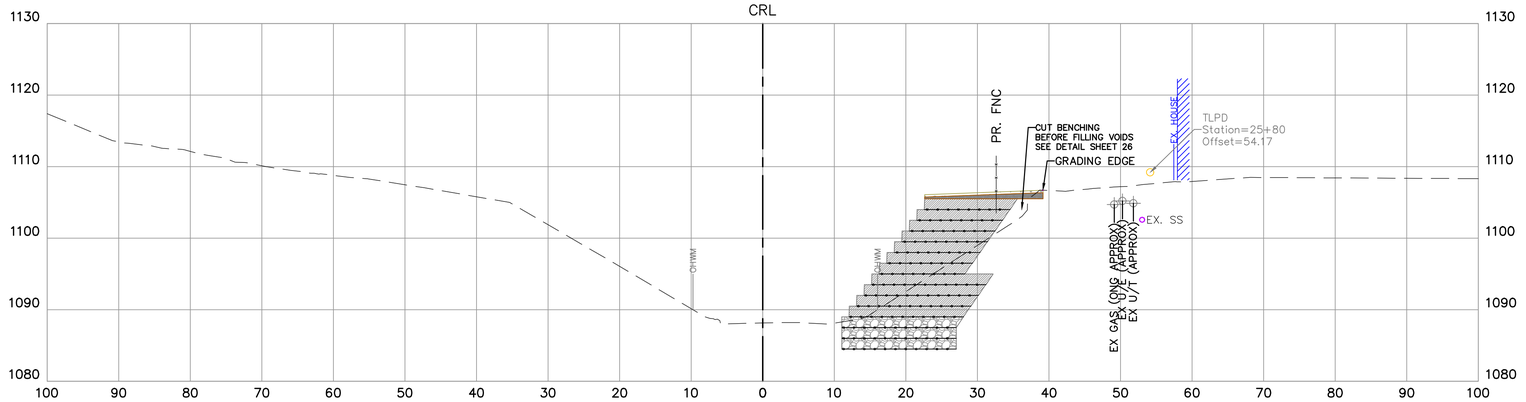

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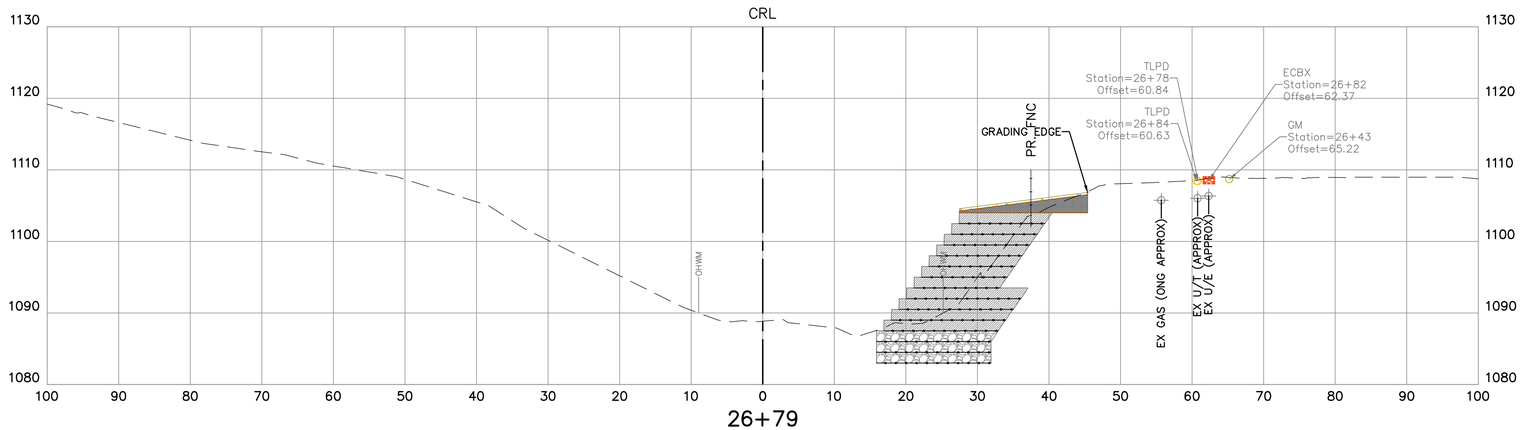

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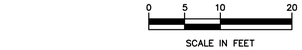

LEGEND

- EMBANKMENT FILL (NATIVE SOIL)
- REINFORCED FILL
- ODOT TYPE 'D' AGGREGATE

PRINT DATE: 3/22/24 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_SECTIONS.dwg

SECTION SHEET – (6)

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

PLANS AND ESTIMATES PREPARED BY:
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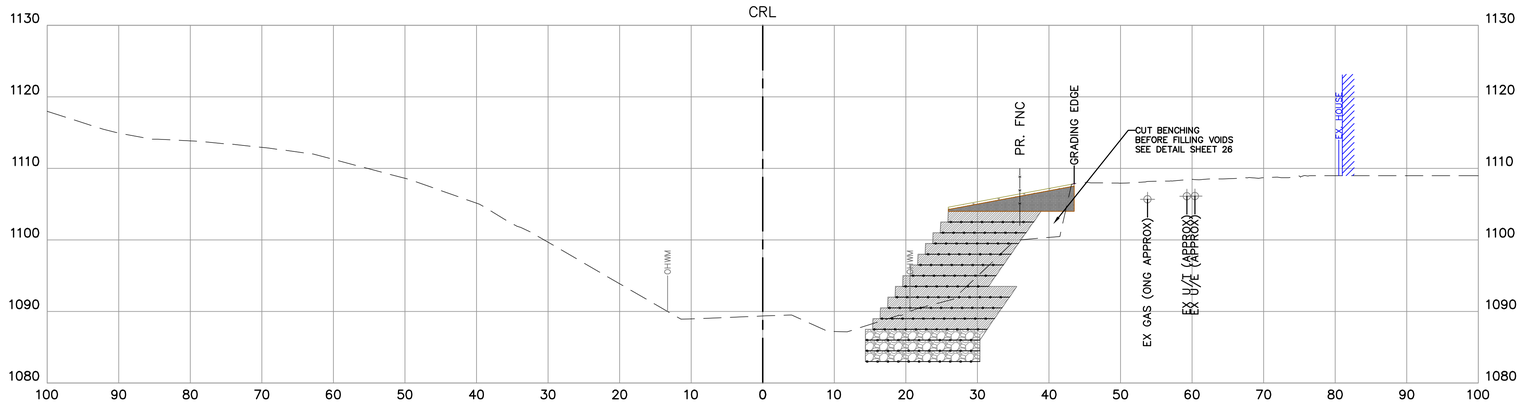
2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594-0127

REVISION	BY	DATE

DRAWN	CGH	12/2023
DESIGNED	HCW	12/2023
SURVEY	MR	7/2021
C.A. 1487 EXPIRES 6/30/25		
SHEET: 20 OF 30		



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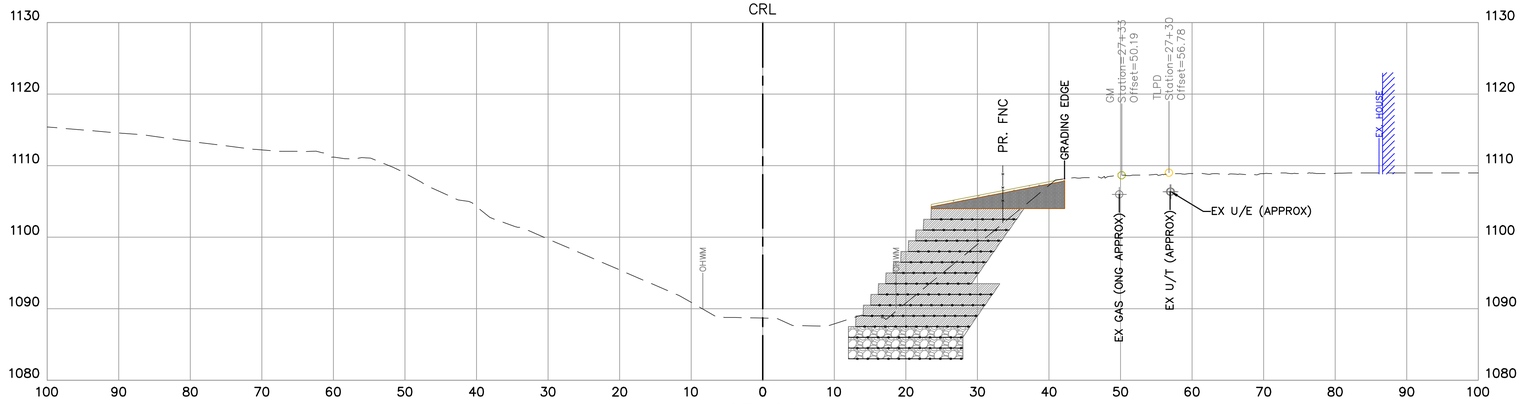

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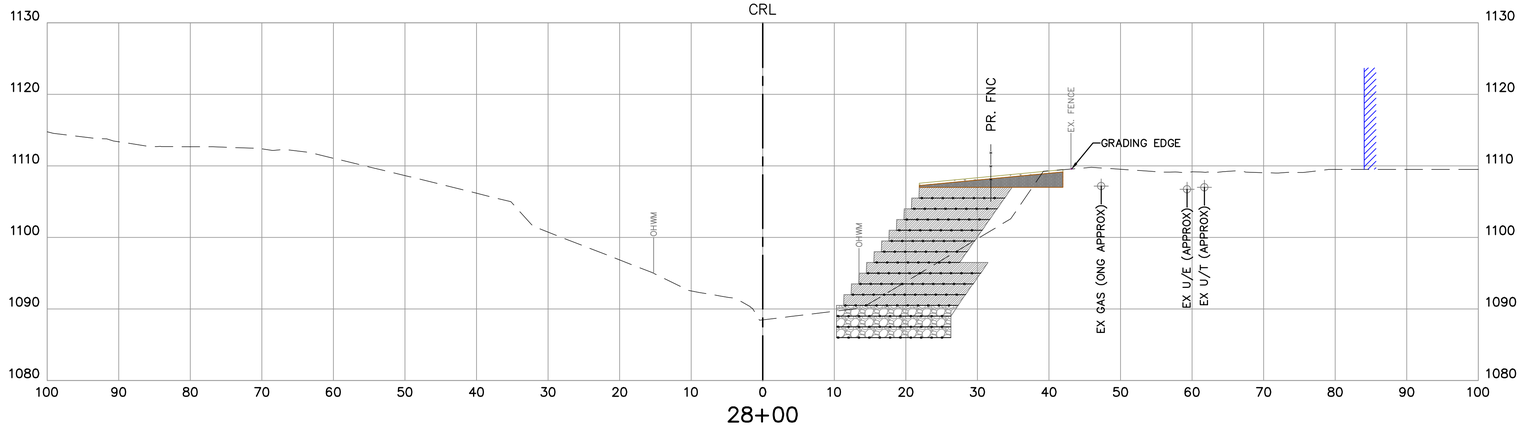


28+00

0 5 10 20
SCALE IN FEET

LEGEND

- EMBANKMENT FILL (NATIVE SOIL)
- REINFORCED FILL
- ODOT TYPE 'D' AGGREGATE

SECTION SHEET – (7)

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

PLANS AND ESTIMATES PREPARED BY:
MESHEK & ASSOCIATES, L.L.C.
1437 S. BOULDER AVENUE, SUITE 1550 TULSA, OK 74119 (918)392-5620
2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594-0127

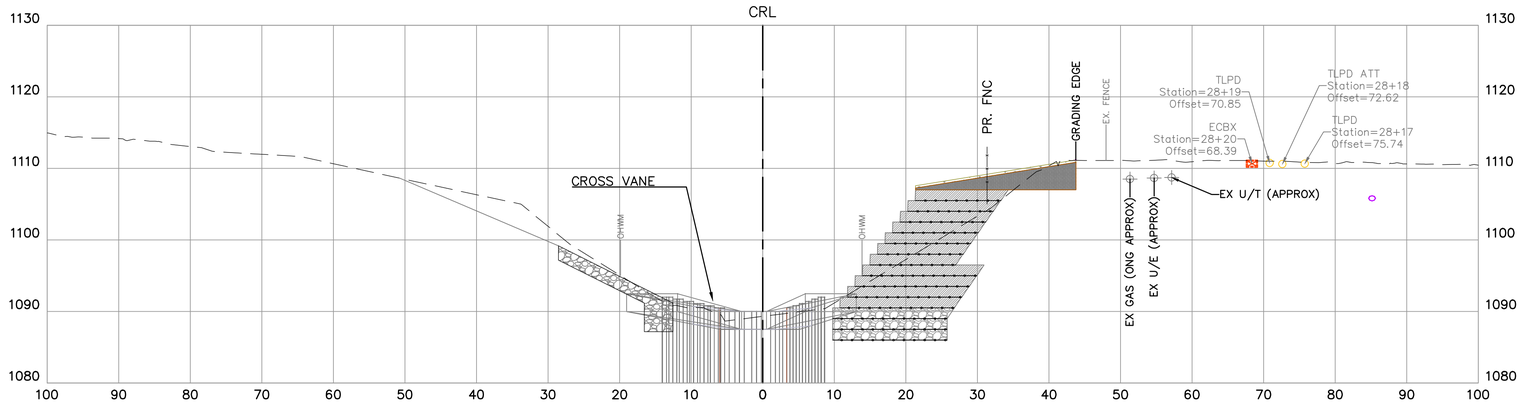
REVISION	BY	DATE

DRAWN	CGH	12/2023
DESIGNED	HCW	12/2023
SURVEY	MR	7/2021

C.A. 1487 EXPIRES 6/30/25

SHEET: 21 OF 30

PRINT DATE: 3/22/24 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_SECTIONS.dwg



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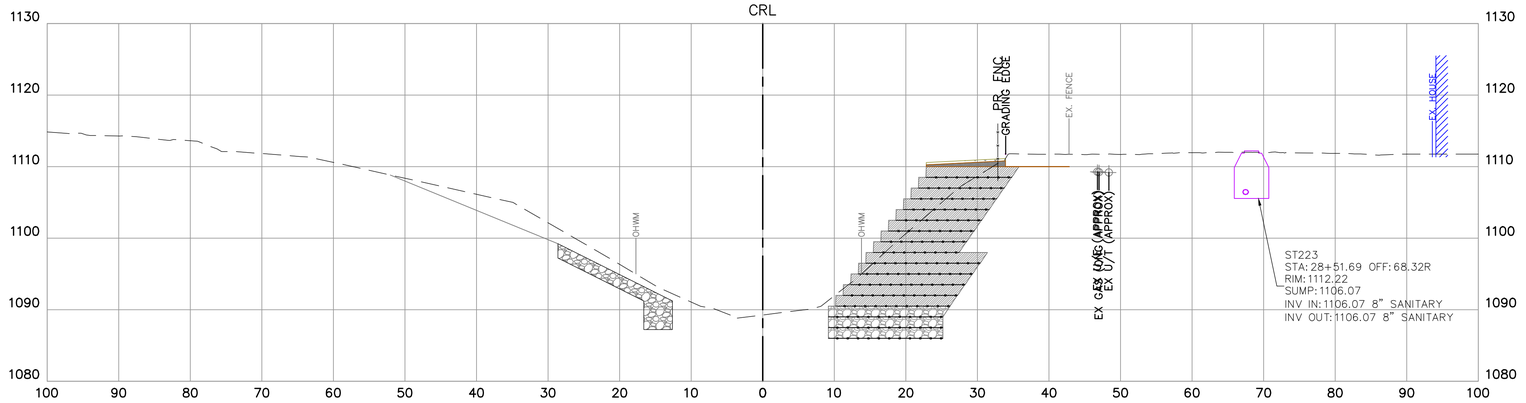

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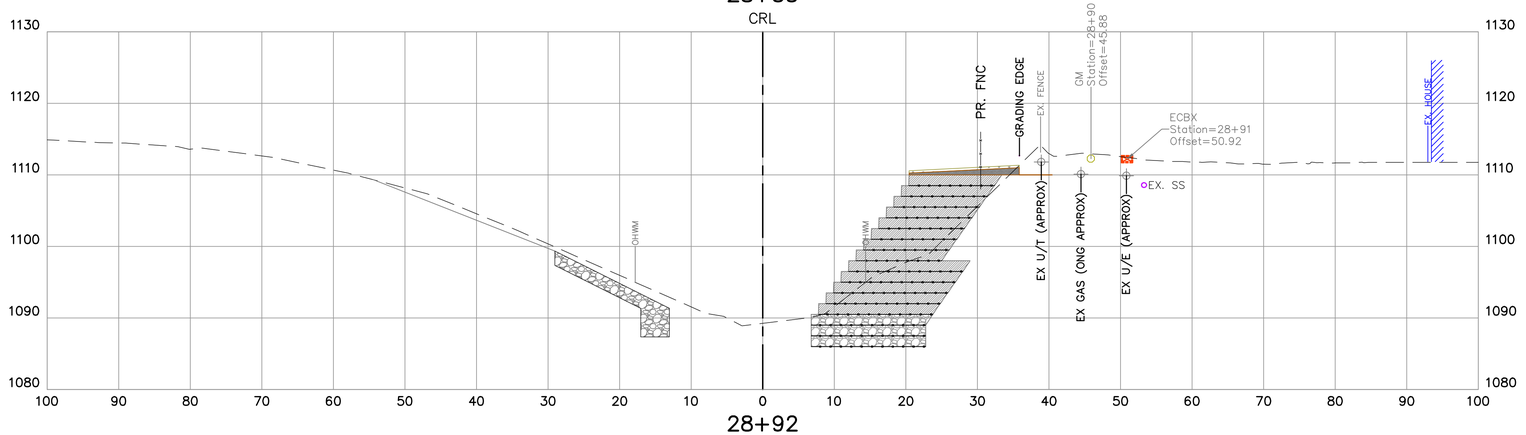

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0 5 10 20
SCALE IN FEET

LEGEND

- EMBANKMENT FILL (NATIVE SOIL)
- REINFORCED FILL
- ODOT TYPE 'D' AGGREGATE

SECTION SHEET – (8)

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

PLANS AND ESTIMATES PREPARED BY:
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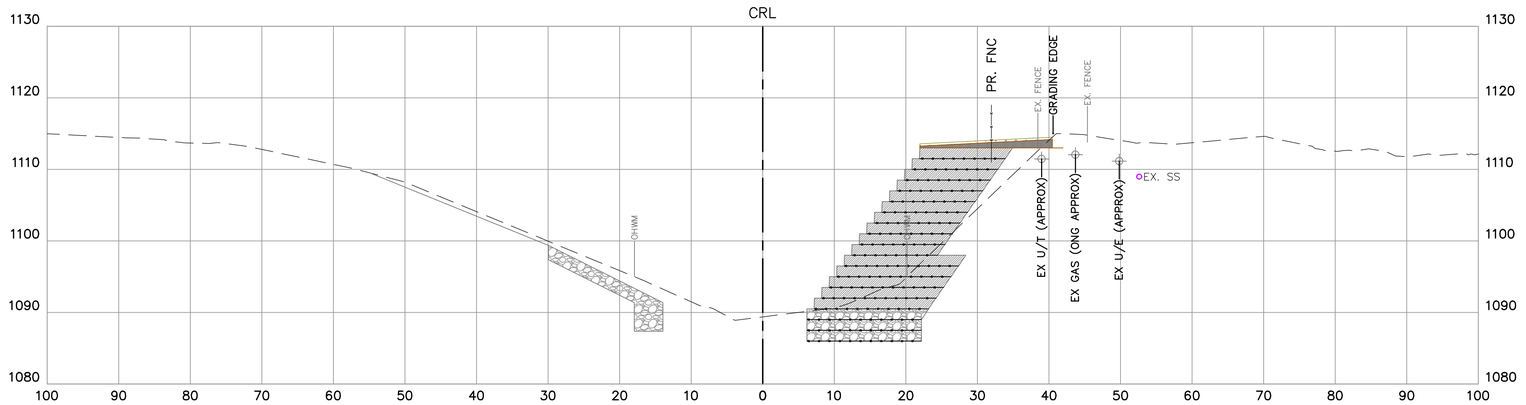
1437 S. BOULDER AVENUE, SUITE 1550 TULSA, OK 74119 (918)392-5620
2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594-0127

REVISION	BY	DATE

DRAWN	CGH	12/2023
DESIGNED	HCW	12/2023
SURVEY	MR	7/2021
C.A. 1487 EXPIRES 6/30/25		
SHEET: 22 OF 30		

PRINT DATE: 3/22/24 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_SECTIONS.dwg



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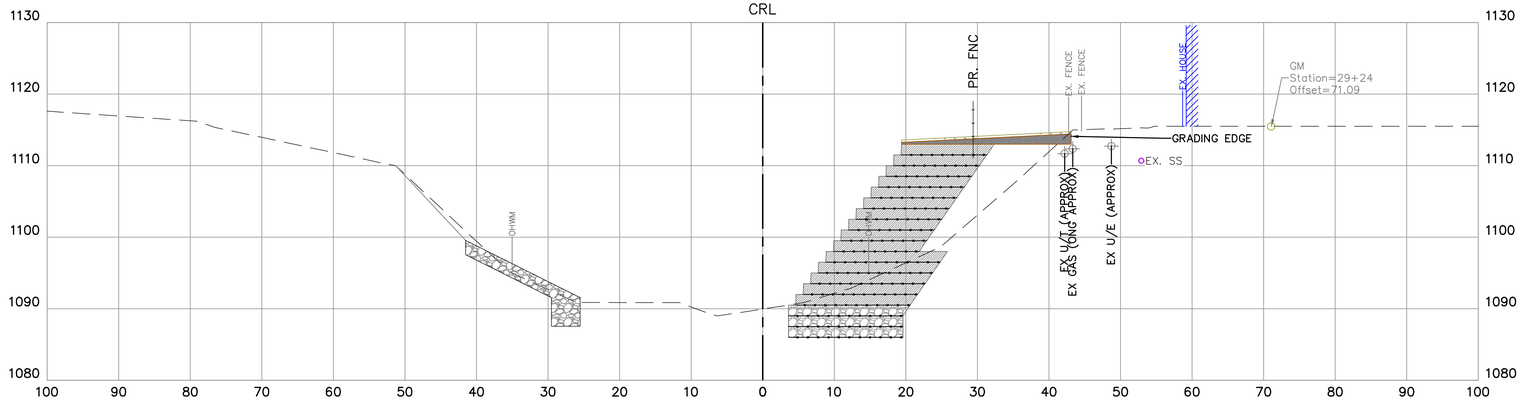

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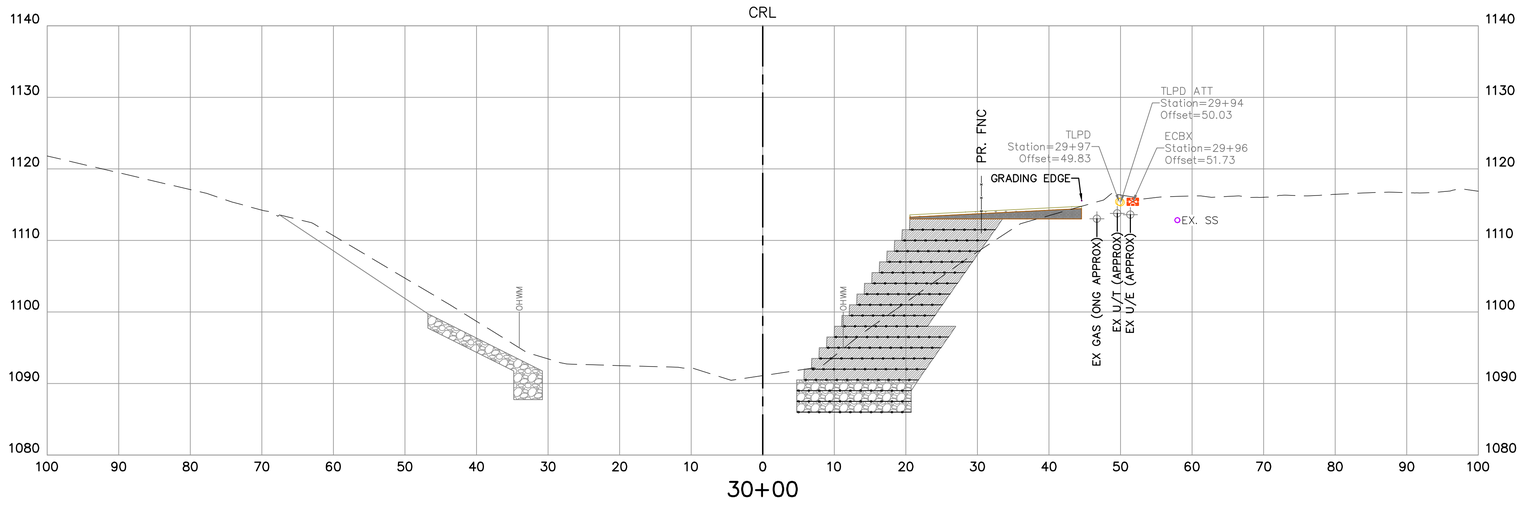

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SCALE IN FEET

LEGEND

- EMBANKMENT FILL (NATIVE SOIL)
- REINFORCED FILL
- ODOT TYPE 'D' AGGREGATE

SECTION SHEET – (9)

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

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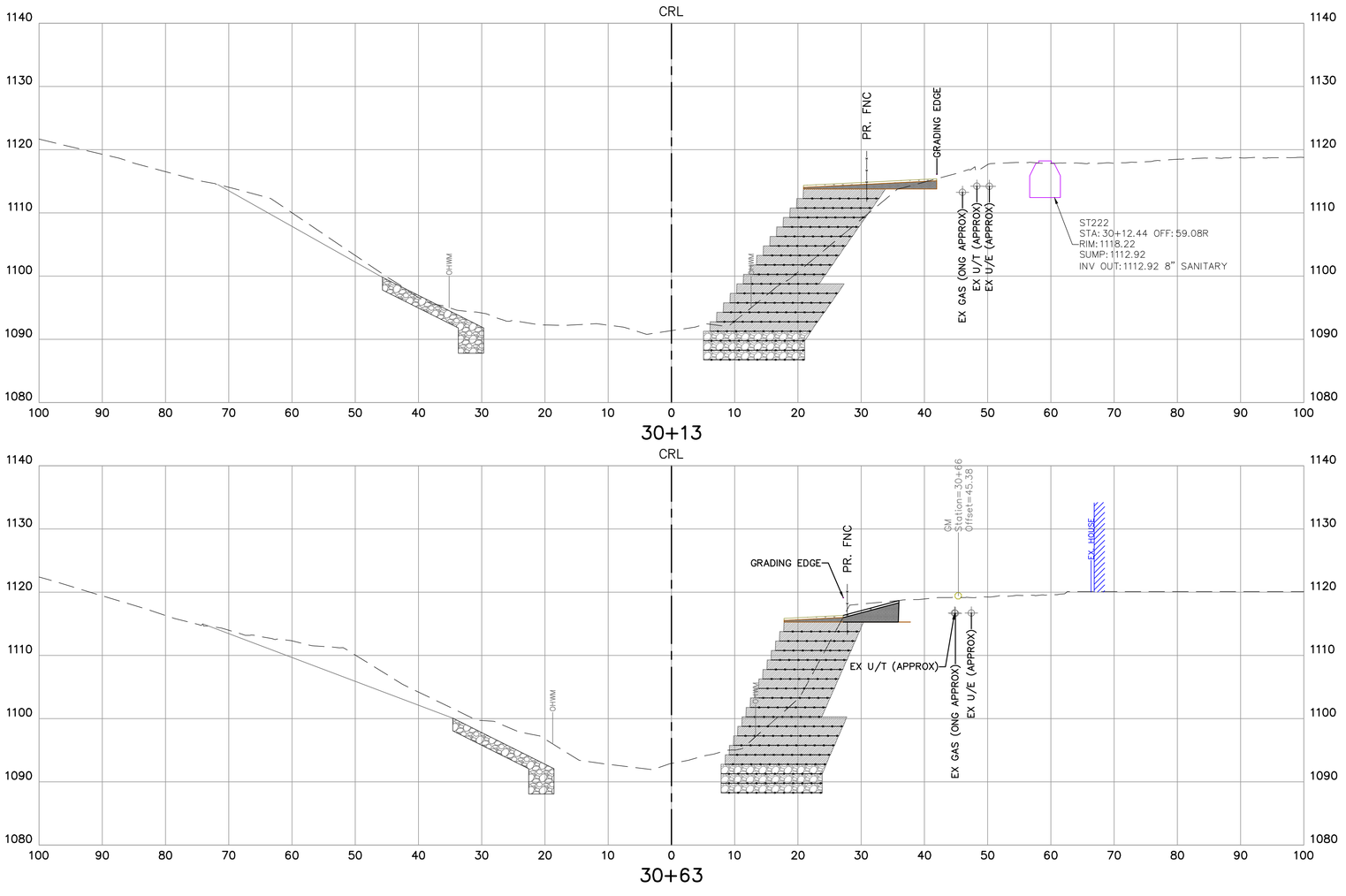
REVISION	BY	DATE

DRAWN	CGH	12/2023
DESIGNED	HCW	12/2023
SURVEY	MR	7/2021
C.A. 1487 EXPIRES 6/30/25		
SHEET: 23 OF 30		

PRINT DATE: 3/22/24 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_SECTIONS.dwg



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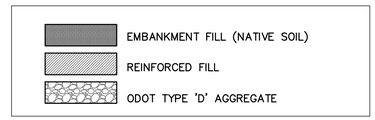
30+63

LEGEND



PRINT DATE: 3/22/24 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_SECTIONS.dwg

SECTION SHEET – (10)

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

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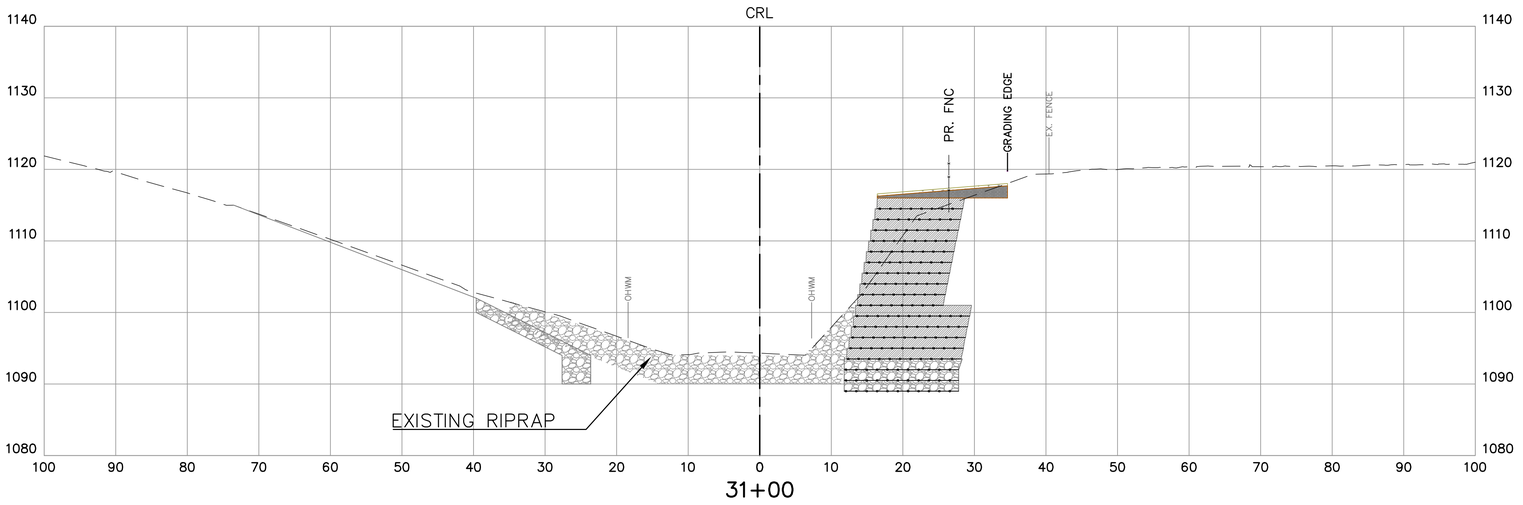
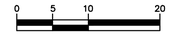
REVISION	BY	DATE

DRAWN	CGH	12/2023
DESIGNED	HCW	12/2023
SURVEY	MR	7/2021
C.A. 1487 EXPIRES 6/30/25		
SHEET: 24 OF 30		





LEGEND

- EMBANKMENT FILL (NATIVE SOIL)
- REINFORCED FILL
- ODOT TYPE 'D' AGGREGATE

PRINT DATE: 3/22/24 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_SECTIONS.dwg

SECTION SHEET – (11)

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

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2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594-0127

REVISION	BY	DATE

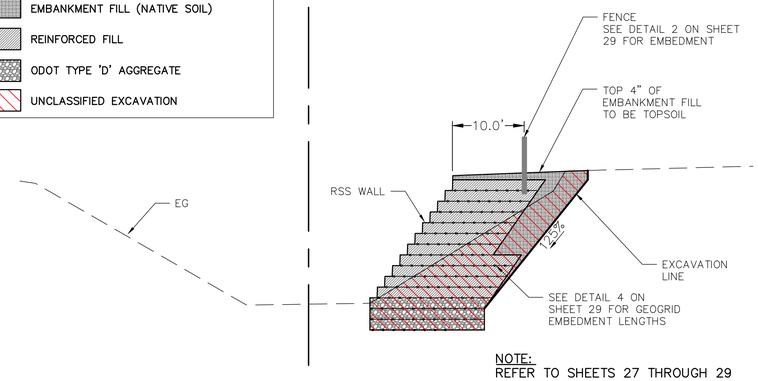
DRAWN	CGH	12/2023
DESIGNED	HCW	12/2023
SURVEY	MR	7/2021

C.A. 1487 EXPIRES 6/30/25

SHEET: 25 OF 30

LEGEND

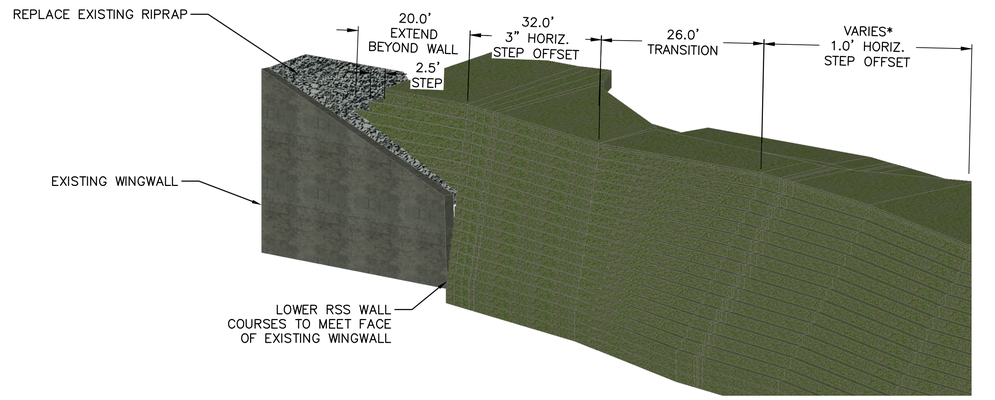
- EMBANKMENT FILL (NATIVE SOIL)
- REINFORCED FILL
- ODOT TYPE 'D' AGGREGATE
- UNCLASSIFIED EXCAVATION



NOTE:
REFER TO SHEETS 27 THROUGH 29 FOR STRUCTURAL DETAILS.

1 EXCAVATION DETAIL

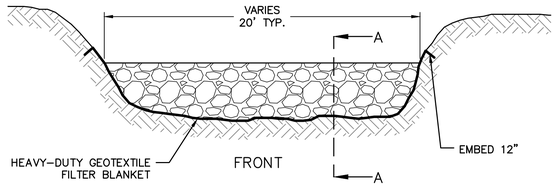
SCALE: NONE

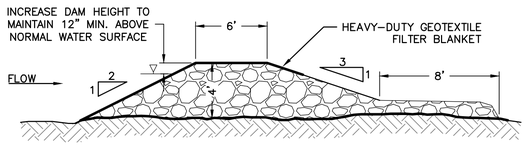


* SEE PLAN & PROFILE SHEETS FOR LENGTH

2 WALL TIE-IN DETAIL

SCALE: NONE
STA. 31+05

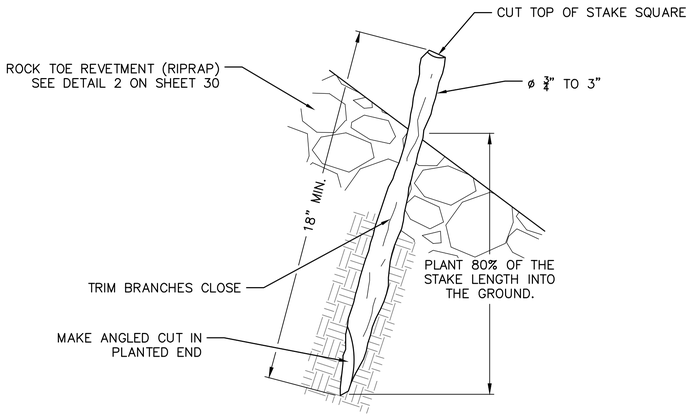




SECTION A-A

3 ROCK FILTER DAM

SCALE: NONE

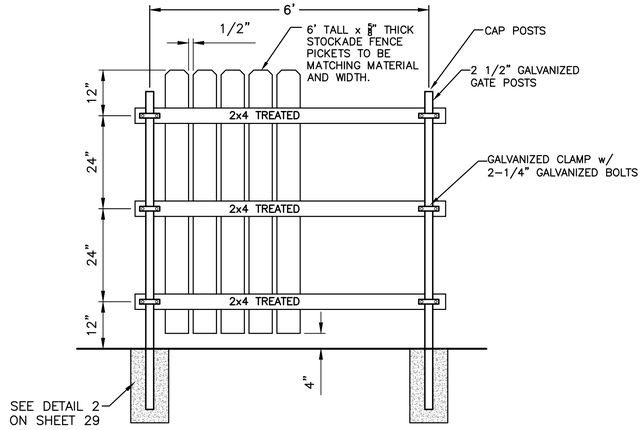


LIVE STAKING NOTES:

1. AVOID PLANTING DURING SUMMER MONTHS
2. STAKES ARE TO BE PLANTED AFTER THE RIPRAP IS PLACED.
3. LIVE STAKES ARE TO BE INSTALLED IN ROCK TOE REVETMENT 2' ABOVE CHANNEL BASE FLOW.
4. INSTALL 3 STAKES PER LINEAR FOOT ALONG ROCK TOE REVETMENT.
5. USE HEALTHY, STRAIGHT AND LIVE WOOD AT LEAST 1 YEAR OLD.
6. MAKE CLEAN CUTS AND DO NOT DAMAGE STAKES OR SPLIT ENDS DURING INSTALLATION; USE AN IRON BAR TO MAKE A PILOT HOLE PRIOR TO DRIVING THE STAKE. DRIVE THE STAKE USING A RUBBER MALLET TO REDUCE SPLITTING DAMAGE TO THE STAKE.
7. SOAK CUTTINGS FOR AT LEAST 24 HOURS PRIOR TO INSTALLATION. (5-7 DAYS RECOMMENDED)
8. KEEP STAKES MOIST AND COVERED AT ALL TIMES: FROM HARVEST, THROUGH STORAGE AND TRANSPORT, TO INSTALLATION.
9. TAMP THE SOIL AROUND THE STAKE.
10. 2 TO 5 BUDS SCARS SHALL BE ABOVE GROUND.
11. CONTACT MISSOURI DEPARTMENT OF CONSERVATION (573-674-3229) FOR PURCHASING LIVE PLANTING STAKES. OTHER SOURCES ARE ACCEPTABLE.
12. CONTRACTOR MUST PROVIDE PROOF OF PURCHASE AND SPECIES TYPE PURCHASED TO THE ENGINEER AND CITY.
13. SPECIES TO BE SANDBAR WILLOW (SALIX INTERIOR ROWLEE). ALTERNATIVES INCLUDE BLACK WILLOW AND WEEPING WILLOW.

5 LIVE STAKING DETAIL

SCALE: NONE



4 6' PRIVACY FENCE

SCALE: NONE

MESHEK DETAILS

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN

PLANS AND ESTIMATES PREPARED BY:
MESHEK & ASSOCIATES, L.L.C.
1437 S. BOULDER AVENUE, SUITE 1550 TULSA, OK 74119 (918)392-5620
2000 N. CLASSEN BLVD., E250 OKLAHOMA CITY, OK 73106 (405)594-0127

REVISION	BY	DATE

DRAWN	CGH	12/2023
DESIGNED	HCW	12/2023
SURVEY	MR	7/2021
C.A. 1487 EXPIRES 6/30/25		
SHEET: 26 OF 30		

PRINT DATE: 3/22/24 M:\City_of_Norman\15NOR01_Lower_Imhoff_Creek\Design\Drawings\15NOR01_MESHEK_DETAILS.dwg

REINFORCED SOIL SLOPE (RSS)

PART 1 GENERAL

1.1 DEFINITIONS

A. MINIMUM AVERAGE ROLL VALUE (MARV): PROPERTY VALUE CALCULATED AS TYPICAL MINUS TWO STANDARD DEVIATIONS. STATISTICALLY, IT YIELDS A 97.7 PERCENT DEGREE OF CONFIDENCE THAT ANY SAMPLE TAKEN DURING QUALITY ASSURANCE TESTING WILL EXCEED VALUE REPORTED.

B. CURRENT CERTIFICATION: A CERTIFICATION DATED WITHIN THE LAST CALENDAR YEAR, ATTESTED BY A PERSON HAVING LEGAL AUTHORITY FOR THE MANUFACTURER.

C. LONG-TERM DESIGN STRENGTH (LTDS)

1.2 THE OVERALL STABILITY OF THE RETAINING WALL SYSTEM IS BASED ON THE STRUCTURAL INTEGRITY OF THE GEOGRID REINFORCEMENT. PROPERTY OWNERS SHOULD BE MADE AWARE THAT DISTURBANCE OF THE GEOGRID REINFORCEMENT WILL IMPACT THE STABILITY OF THE WALL.

1.3 SUBMITTALS: PROVIDE SUBMITTALS TO ENGINEER ON THE SCHEDULE INDICATED FOR EACH ITEM FOR APPROVAL.

A. SUBMIT QUALITY CONTROL ITEMS WITHIN 15 BUSINESS DAYS FOR APPROVAL AS FOLLOWS:

1. PROVIDE CURRENT CERTIFICATION THAT EACH GEOSYNTHETIC MATERIAL MEETS MARV REQUIREMENTS OF THE SPECIFICATION AS EVALUATED UNDER THE MANUFACTURER'S QUALITY CONTROL PROGRAM.
   a. EACH CERTIFICATION SHALL INCLUDE:
      THE NAME OF THE MANUFACTURER
      PRODUCT NAME
      STYLE NUMBER
      BATCH NUMBER
      CHEMICAL COMPOSITION OF THE FILAMENTS OR YARNS
2. PROVIDE TO THE WALL ENGINEER THE MANUFACTURER'S CURRENT QUALITY CONTROL PLAN CERTIFICATIONS FOR A2LA, GAI-LAP, OR ISO 9001.

B. PROVIDE CURRENT CERTIFICATION OF MILL REPORTS FOR STEEL PRODUCTS.

C. PROVIDE CURRENT CERTIFICATION OF GALVANIZATION PRODUCTS AND PROCEDURES.

1.4 QUALITY CONTROL

A. GEOSYNTHETIC MANUFACTURING QUALITY CONTROL: CERTIFY THAT GEOSYNTHETIC MATERIAL TESTING PERFORMED BY A LABORATORY ACCREDITED BY GAI-LAP OR A2LA FOR REQUIRED TESTS.

B. CERTIFY THAT ULTRAVIOLET STABILITY VERIFIED BY AN INDEPENDENT LABORATORY ON THE GEOSYNTHETIC OR A GEOSYNTHETIC OF SIMILAR CONSTRUCTION AND YARN TYPE.

C. TEST STRIP:

1. LABORATORIES CANNOT EASILY TEST THE REINFORCING FILL PER TRADITIONAL METHODS FOR MAXIMUM DENSITY. CONTRACTOR SHALL WORK WITH ENGINEER AND GEOTECHNICAL TECHNICIAN TO CONSTRUCT A TEST STRIP TO DETERMINE THE TARGET MAXIMUM DRY DENSITY FOR COMPACTION TESTING.
   a. PLACE A LIFT OF FILL IN TEST STRIP AREA (MAY BE PRODUCTION AREA). TEST AREAS SHALL BE COMPACTED USING COMPACTION EQUIPMENT INTENDED TO BE USED DURING PRODUCTION.
2. PREPARE AND TEST UP TO FOUR LOCATIONS IN TEST STRIP AREA TO DETERMINE MAXIMUM DRY DENSITY USING WATER REPLACEMENT METHOD. CONTRACTOR SHALL ALSO PROVIDE CONSTRUCTION EQUIPMENT TO BE USED TO ASSIST GEOTECHNICAL TECHICIAN IN RUNNING PLATE LOAD TESTS (ASTM D 1196) AT DESIGNATED LOCATIONS IN THE TEST STRIP AREAS. THE REQUIRED ALLOWABLE BEARING CAPACITY SHALL BE A MINIMUM 3,000 PSF WITH A FACTOR OF SAFETY = 2.
3. ADDITIONALLY, IN-PLACE DENSITY SHALL BE DETERMINED USING NUCLEAR GAUGE PLACED ON BACKSCATTER SETTING IN NO LESS THAN FIVE ADDITIONAL LOCATIONS.
4. THE AVERAGE IN-PLACE DENSITY RECORED IN STEPS C.1.a.1 AND C.1.a.2 SHALL BE THE LIFT'S IN-PLACE DESITY
   b. COMPACT THE TEST STRIP AGAIN WITH 2 PASSES OF A COMPACTOR AND RETEST AS IN STEP C.1.a.
   c. RECORD THE VALUES AND REPEAT STEP b UNTIL ADDITIONAL PASSES DO NOT INCREASE THE DRY DENSITY. THE MINIMUM DRY DENSITY DETERMINED BY THE TEST STRIP SHALL BE THE TARGET DENSITY FOR COMPACTION TESTING. THE MINIMUM NUMBER OF PASSES BY COMPACTION EQUIPMENT TO MEET THIS DENSITY SHALL BE USED AS A GUIDELINE FOR SUCCESSIVE FILL PLACEMENT.

D. COMPACTIVE EFFORT OF SUCCESSIVE LIFTS SHALL, AT A MINIMUM, EQUAL THE NUMBER OF PASSES DETERMINED DURING THE TEST STRIP. ONCE INSTALLED, THE ONSITE ENGINEERING REPRESENTATIVE SHALL PERFORM A MINIMUM OF 10 IN-PLACE DENSITY TESTS (RANDOMLY LOCATED) USING A NUCLEAR GAUGE PLACED ON BACKSCATTER SETTING. THE AVERAGE OF THE 10 READINGS WILL BE IN-PLACE DENSITY OF THE COMPACTED LIFT. IF IN-PLACE DENSITY DOES NOT MEET OR EXCEED THAT ESTABLISHED DURING DEVELOPMENT OF ROLL PATTERN, ADDITIONAL COMPACTIVE EFFORT WILL BE REQUIRED. IF AFTER 4 ADDITIONAL PASSES, THE COMPACTED FILL DOES NOT MEET THE DENSITY DETERMINED IN THE TEST STRIP, THE ENGINEER SHALL BE NOTIFIED TO DETERMINE WHETHER A NEW TEST STRIP/ROLL PATTERN NEEDS TO BE PERFORMED/DEVELOPED.

1.5 QUALITY ASSURANCE

A. MANUFACTURER QUALIFICATIONS: THE GEOSYNTHETIC MANUFACTURER SHALL HAVE ONE OF THE FOLLOWING CURRENT CREDENTIALS:

1. GEOSYNTHETIC ACCREDITATION INSTITUTE (GAI) - LABORATORY ACCREDITATION PROGRAM (LAP)
2. AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION (A2LA)
3. ISO 9001 QUALITY MANAGEMENT SYSTEM

B. A GAI-LAP ACCREDITED LABORATORY SHALL PERFORM ROUTINE TESTS OF THE GEOSYNTHETIC MANUFACTURER'S PRODUCTS.

1.6 DELIVERY, STORAGE, AND HANDLING

A. GEOSYNTHETIC LABELING, SHIPMENT, AND STORAGE SHALL FOLLOW ASTM D4873. PRODUCT LABELS SHALL CLEARLY SHOW THE MANUFACTURER OR SUPPLIER NAME, STYLE NAME, AND ROLL NUMBER. GEOGRID SHALL BE MARKED WITH PRODUCT TYPE AND TENSILE STRENGTH ORIENTATION CONTINUOUSLY ALONG ENTIRE ROLL EDGE.

B. WRAP EACH GEOSYNTHETIC ROLL WITH A MATERIAL THAT WILL PROTECT THE GEOSYNTHETIC FROM DAMAGE DUE TO SHIPMENT, WATER, SUNLIGHT, AND CONTAMINANTS.

C. DURING STORAGE, ELEVATE GEOSYNTHETIC ROLLS OFF THE GROUND AND ADEQUATELY COVERED TO PROTECT THEM FROM SITE CONSTRUCTION DAMAGE, PRECIPITATION, SUNLIGHT, CHEMICALS, FLAMES, SPARKS, EXCESS TEMPERATURES, AND ANY OTHER ENVIRONMENTAL CONDITIONS THAT MAY DAMAGE THE PHYSICAL PROPERTY VALUES OF THE GEOSYNTHETIC.

PART 2 PRODUCTS

2.1 GEOSYNTHETIC MATERIAL

A. TENCATE GEOSYNTHETICS AMERICAS
365 SOUTH HOLLAND DRIVE
PENDERDRASS, GA, USA 30567
1-800-685-9990
1-706-693-2226
1-706-693-2083, FAX
WWW.MIRAFI.COM

B. MATERIALS

1. APPROVED GEOGRID IS TENCATE MIRAGRID 24XT AND MIRAGRID 10XT AS INDICATED ON THE PLANS.
2. APPROVED GEOTEXTILE FACING IS MIRAMESH.
3. MANUFACTURER SHALL LABEL APPROVED GEOGRIDS WITH PRODUCT TYPE. APPROVED GEOGRID MANUFACTURER SHALL BE TESTED BY A GAI LABORATORY AND SHALL BE MADE IN NORTH AMERICA.
4. GEOSYNTHETICS SHALL RETAIN A MINIMUM OF 70% OF THE ULTIMATE TENSILE STRENGTH PER ASTM D4595 AFTER UV EXPOSURE.

2.2 ULTRA-VIOLET LIGHT (UV) OR SUNLIGHT BARRIER

A. UV BARRIER SHALL CONSIST OF PLANTABLE FILL WITHIN THE EXPOSED PORTION OF THE WRAP FACE TO ALLOW PERMANENT VEGETATION.

B. PERMANENT VEGETATION OF THE STEEPENED SLOPE SHALL BE SET WITH APPROVED HYDROSEED MIXTURE AND METHOD.

2.3 WELDED WIRE FACING:

1. WIRE FACING UNITS SHALL BE WIRE WALL SYSTEM AS MANUFACTURED BY TENCATE, WITH ASTM A-82 WIRE. THE MESH CONFIGURATION SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS. THE MESH SHALL BE FORMED BY WELDING THE WIRES IN ACCORDANCE WITH ASTM A-185 AND BENT AS NECESSARY TO ACHIEVE THE BASKET SHAPE OF THE UNITS.
2. BRACING COMPONENTS SHALL BE 0.24 INCH DIAMETER ELECTROPLATED WIRE LOCKING TAIL STRUTS AS PER CONSTRUCITON DRAWINGS AND DETAILS.

2.4 REINFORCED FILL MATERIAL

1. ALL RETAINING WALL BACKFILL AND EMBANKMENT FILLS SHALL BE BENCHED INTO EXISTING SLOPE.

REINFORCED FILL SHALL CONSIST WELL GRADED, CLEAN, ON-SITE OR IMPORTED SOILS, FREE FROM FOREIGN DEBRIS WHICH ARE READILY COMPACTABLE, AND WHOSE STRENGTH CHARACTERISTICS AND UNIT WEIGHT SATISFY THOSE PRESENTED ON THIS DRAWING.

THE DESIGN PRESENTED ON THIS DRAWING WAS BASED ON THE FOLLOWING SOIL PARAMETERS:

FOUNDATION SOIL:	SOIL UNIT WEIGHT = 128 PCF
	SOIL FRICTION ANGLE = 28°
	SOIL COHESION = 0 PSF
RETAINED SOIL:	SOIL UNIT WEIGHT = 129 PCF
	SOIL FRICTION ANGLE = 28°
	SOIL COHESION = 0 PSF
REINFORCED BACKFILL:	SOIL UNIT WEIGHT = 120 PCF
	SOIL FRICTION ANGLE = 34°
	SOIL COHESION = 0 PSF

ALL SOIL PARAMETERS AND NET ALLOWABLE BEARING PRESSURE OF 3,000 PSF SHALL BE CONFIRMED BY THE OWNER'S GEOTECHNICAL ENGINEER PRIOR TO THE CONSTRUCTION OF THE RETAINING WALLS.

PERFORM GRADATION AND ATTERBERG LIMITS TESTING PRIOR TO CONSTRUCTION AND AT REGULAR INTERVALS DURING CONSTRUCTION PER ASTM D422 AND ASTM D4318 TO VERIFY BACKFILL TYPES MEET MINIMUM PROJECT REQUIREMENTS.

PERFORM SOIL SHEAR STRENGTH TESTS PER ASTM D3080 TO VERIFY SOIL ANGLE OF INTERNAL FRICTION (PHI ANGLE) FOR REINFORCED BACKFILL. FOR THE REINFORCED BACKFILL ZONE, THE PLASTICITY INDEX (P.I.), AS DETERMINED BY AASHTO T-90, SHALL NOT EXCEED 6 (PER REINFORCED EARTH ABBREVIATED TECHNICAL SPECIFICATIONS FOR MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALLS) WITH A GRADATION SUCH THAT 100% PASSES 4-INCH SIEVE, 75%-100% PASSES 3-INCH SIEVE, AND LESS THAN 15% PASSES #200 SIEVE.

THE OWNER OR CONTRACTOR SHALL RETAIN A GEOTECHNICAL ENGINEER TO VERIFY EXISTING SOIL CONDITIONS AND TO ENSURE THAT THE WALL IS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS. FAILURE TO PERFORM THE TESTING AND INSPECTIONS STATED HEREIN WILL RELEASE THE ENGINEER FROM THIS DESIGN. TESTING AND INSPECTION REPORTS SHALL BE PROVIDED TO THE ENGINEER. REPORTS SHOULD ADDRESS NOT ONLY TEST RESULTS BUT VERIFICATION OF MATERIAL TYPES AND CONSTRUCTION DETAILS INCLUDING GRID LENGTHS, LOCATIONS, AND INSTALLATION PROCEDURES. ANY DISCREPANCIES FROM THE CONTRACT DOCUMENTS SHOULD BE REPORTED TO THE ENGINEER.

PROVIDE WALL ENGINEER WITH MATERIAL REPORTS BEFORE CONSTRUCTION AND INSPECTION REPORTS FOR REVIEW OF DESIGN CONFORMANCE.

PART 3 EXECUTION

3.1 VERIFY

A. CHECK THAT FOUNDATION AND BEARING AREA ARE READY FOR WALL INSTALLATION (PROPERLY CLEARED AND GRUBBED, ALL STUMPS, ORGANIC MATERIAL, DEBRIS, AND DELETERIOUS MATERIAL REMOVED. REPORT UNSUITABLE CONDITIONS TO ENGINEER IN WRITING.

3.2 PREPARATION

A. EXCAVATE FOUNDATION SOIL TO THE LINE AND GRADES AS SHOWN ON THE CONSTRUCTION DRAWINGS OR AS DIRECTED BY THE ENGINEER. OVER-EXCAVATED AREAS SHALL BE FILLED WITH COMPACTED BACKFILL MATERIAL AS PER PROJECT SPECIFICATIONS OR AS DIRECTED BY THE ENGINEER. AS A MINIMUM, FOUNDATION SOIL SHALL BE PROOF ROLLED PRIOR TO BACKFILL AND GEOSYNTHETIC PLACEMENT.

3.3 INSTALLATION

A. PLACE THE WELDED WIRE FACING PANELS ALONG WALL LAYOUT LINE, AS SHOWN ON THE CONSTRUCTION DRAWINGS. ALIGN EACH BASKET WITH NO OVERLAPS UNLESS SHOWN ON PLANS. CONNECT ADJACENT BASKETS AND INSTALL WIRE STRUTS FROM HORIZONTAL LEG UP TO VERTICAL LEG. USE A RUNNING BOND PATTERN ON UPPER WIRE FACING PANEL LIFTS TO AVOID A STACKED WALL JOINT CONDITION.

B. GEOSYNTHETIC MATERIAL BREAKS DOWN WHEN EXPOSED TO UV LIGHT. LIMIT MAXIMUM EXPOSURE TO UV LIGHT TO 14 CALENDAR DAYS OR LESS.

C. PLACE THE GEOGRID AT THE PROPER ELEVATION AND ORIENTATION AS SHOWN ON THE CONSTRUCTION DRAWINGS OR AS DIRECTED BY THE ENGINEER. ENGINEER (OR ENGINEER'S REPRESENTATIVE) SHALL VERIFY AND DOCUMENT CORRECT ORIENTATION OF THE GEOSYNTHETIC. CUT THE GEOSYNTHETIC TO LENGTH AS SHOWN ON THE CONSTRUCTION DRAWINGS.

D. PLACE ONLY THE AMOUNT OF GEOGRID REQUIRED FOR IMMEDIATELY PENDING WORK TO PREVENT UNDUE DAMAGE AND UV EXPOSURE.

A. GEOGRID MAY NOT BE OVERLAPPED OR CONNECTED MECHANICALLY TO FORM SPLICES. SINGLE PANEL LENGTHS ARE REQUIRED IN THE PRIMARY STRENGTH DIRECTION (ROLL DIRECTION) PERPENDICULAR TO WALL OR SLOPE FACE. POSITION ADJACENT ROLLS ALONG ROLL EDGES, NO OVERLAPPING IS REQUIRED BETWEEN ADJACENT ROLLS UNLESS SPECIFIED BY THE ENGINEER. A MINIMUM SOIL COVER OF 3 INCHES IS REQUIRED BETWEEN GEOGRID OVERLAP LAYERS.

B. ENGINEER'S SUGGESTED INSTALLATION PROCEDURE FOR EACH LIFT OF WRAPPED RETAINING WALL.

1. AFTER PLACING AND SECURING THE FACING UNITS AND LAYING OUT THE GEOGRID, INSTALL A TEMPORARY RESERVE BETWEEN THE FACING UNIT AND THE GEOGRID TO ALLOW PLACING THE UV BARRIER. PROVIDE A MINIMUM RESERVE WIDTH OF 12 INCHES. THE UV BARRIER RESERVE MAY CONSIST OF UV BARRIER COBBLES AND BOULDERS OR REMOVABLE FORM.
2. PLACE GEOTEXTILE FILTER FABRIC PARALLEL TO THE FACING UNITS SO THAT THE HILL- SIDE EDGE IS ABOUT 4 FEET BEHIND FACING UNITS. DRAPE FILTER FABRIC OVER THE FACING UNITS AND UV BARRIER RESERVE.
3. DRAPE GEOGRID LEADING EDGE OVER THE FACING UNIT, RESERVE, AND FILTER FABRIC, EXTENDING THE GEOGRID FAR ENOUGH FOR ADEQUATE WRAP LENGTH AS SHOWN ON THE DRAWINGS. PLACE GEOGRID SMOOTHLY AND FREE OF WRINKLES AND LYING FLAT. TEMPORARILY SECURE GEOGRID IN-PLACE WITH STAPLES, PINS, SAND BAGS, OR BACKFILL.
4. PLACE AND COMPACT A LAYER OF REINFORCING FILL, SLOPE THE END OF THE FILL ADJACENT TO THE FACING UNIT AT ABOUT 1:1 TO ALLOW ROOM FOR UV BARRIER ATOP GEOGRID. UNDRAPE AND WRAP THE GEOGRID AND FILTER FABRIC OVER THE COMPACTED REINFORCING FILL AND REMOVE TEMPORARY RESERVE (IF USED).
5. PLACE THE UV BARRIER BETWEEN FACING UNITS AND FILTER FABRIC AND GEOGRID SO THAT IT COMPLETELY COVERS THE GEOGRID.
6. REPEAT FOR EACH FOLLOWING LIFT.

E. REINFORCING FILL PLACEMENT

1. PLACE REINFORCING FILL IN MAXIMUM 9 INCH COMPACTED LIFTS.
2. COMPACT EACH LIFT TO THE DENSITY AS ESTABLISHED BY THE ROLL PATTERN. COMPACT REINFORCING FILL WITHIN 3 FEET OF THE WALL FACE WITH HAND EQUIPMENT.
3. PLACE, SPREAD AND COMPACT REINFORCING FILL IN SUCH A MANNER AS TO MINIMIZE THE DEVELOPMENT OF WRINKLES IN AND/OR MOVEMENT OF THE GEOGRID.
4. PLACE REINFORCING FILL IN SUCH A MANNER AS TO MINIMIZE THE DISTURBANCE OR MISALIGNMENT OF THE WALL FACING.
5. PROVIDE A MINIMUM FILL THICKNESS OF 6 INCHES PRIOR TO THE OPERATION OF VEHICLES OVER THE GEOGRID.

H. RETAINING WALL DRAINAGE

1. INTERNAL DRAINAGE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THESE CONSTRUCTION DRAWINGS AT THE LOCATIONS AND ELEVATIONS SHOWN ON CROSS SECTIONS AND DETAILS. THE INTERNAL DRAINAGE SYSTEM IS INTENDED TO CONTROL GROUNDWATER SEEPAGE IN THE RETAINING WALL REINFORCED ZONE. THE INTERNAL DRAINAGE SYSTEM IS NOT INTENDED TO ACCOMMODATE SURFACE WATER INFILTRATION THAT OCCURS DUE TO IMPROPER CONTROL OF SURFACE WATER DURING AND AFTER CONSTRUCTION.
2. EXTERNAL DRAINAGE CONTROL MEASURES MUST BE CONSTRUCTED AND MAINTAINED DURING THE CONSTRUCTION OF THE RETAINING WALL(S). AT THE END OF EACH WORK DAY, THE RETAINING WALL CONSTRUCTOR SHALL GRADE THE SURFACE OF THE LAST LIFT OF THE REINFORCED BACKFILL SUCH THAT THE SURFACE WATER IS DIRECTED AWAY FROM THE RETAINING WALL(S).
3. THE GENERAL CONTRACTOR SHALL PROTECT THE RETAINING WALL WORK AREA FROM SURFACE WATER AT ALL TIMES BY THE USE OF BERMS, DIVERSION DITCHES, TEMPORARY DRAINS, SILT FENCING, AND ALL OTHER MEANS THAT MAY BE REQUIRED.
4. THE PONDING OF WATER ABOVE OR WITHIN TWENTY (20) FEET OF THE REINFORCED ZONE DURING OR AFTER WALL CONSTRUCTION SHALL NOT BE PERMITTED.
5. THE GROUND SURFACE ABOVE AND BELOW THE RETAINING WALL SHALL BE PROTECTED AGAINST EROSION DURING AND AFTER CONSTRUCTION BY OTHERS (SEE ALSO POST-CONSTRUCTION CARE).
6. IT IS THE RESPONSIBILITY OF THE CIVIL ENGINEER TO PROPERLY DESIGN THE SITE DRAINAGE AND GRADING TO PREVENT EROSION OF THE RETAINING WALL BACKFILL AND FOUNDATION, AND INFILTRATION INTO THE RETAINING WALL BACKFILL. THE RETAINING WALL CONTRACTOR WILL BE RESPONSIBLE FOR DAILY DRAINAGE CONTROL MEASURES WITHIN THE RETAINING WALL REINFORCED ZONE. THE GENERAL AND EARTHWORK CONTRACTORS SHALL BE RESPONSIBLE FOR SITE DRAINAGE OUTSIDE THIS AREA AND ITS EFFECTS ON THE RETAINING WALL CONSTRUCTION AND PERFORMANCE DURING AND AFTER CONSTRUCTION.

I. UTILTIES

1. ALL NEW UTILITIES LOCATED WITHIN THE RETAINING WALL REINFORCED ZONE OR LOCATED ADJACENT TO THE RETAINING WALL REINFORCED ZONE SHALL BE INSTALLED AS THE RETAINING WALL REINFORCED BACKFILL IS BEING PLACED.
2. UTILITIES TO BE INSTALLED IN THE VICINITY OF THE WALL, SUCH AS LIGHT POLES, HAND RAILS, GUARD RAILS, AND/OR DRAINAGE STRUCTURES, MUST BE DESIGNED AND CONSTRUCTED SO THAT THEY DO NOT ADD LATERAL FORCES TO THE WALL SYSTEM. ALSO, ANY EXCAVATION, SUCH AS INSTALLATION OF CONCRETE GUTTERS, SHRUB AND TREE PLANTING, ETC., CONDUCTED IN THE VICINITY OF THE WALL AFTER THE WALL HAS BEEN CONSTRUCTED MUST BE DONE WITHOUT DAMAGING THE WALL OR REINFORCEMENT MATERIALS.
3. UTILITIES THAT ARE CONSTRUCTED INSIDE THE RETAINING WALL REINFORCED ZONE SHALL BE PLACED IN STRICT ACCORDANCE WITH PROJECT SPECIFICATIONS. PROPER CARE MUST BE TAKEN TO INSURE THAT THE PIPE JOINTS ARE WATER TIGHT, AND THAT ALL PIPES ARE PLACED ON PROPERLY COMPACTED SOILS.

J. QUALITY CONTROL OF PLACED FILL SHALL CONFORM TO RSS NOTES 1.3.D

K. MINIMIZE TURNING OF TRACKED VEHICLES TO PREVENT TRACKS FROM DISPLACING THE FILL AND DAMAGING THE GEOGRID. RUBBER TIRED EQUIPMENT MAY PASS OVER THE GEOSYNTHETIC REINFORCEMENT AT LOW SPEEDS, LESS THAN 5 MPH. AVOID BRAKING AND TURNS. CONTRACTOR SHALL REPLACE ANY GEOGRID DAMAGED DURING INSTALLATION AT NO ADDITIONAL COST TO THE OWNER.

L. SLOPE SURFACE OF REINFORCING FILL TO DRAIN AWAY FROM THE WALL FACE AND TO PREVENT WATER PONDING UPON THE SURFACE OF THE REINFORCING FILL. PROVIDE DITCHES AND FLOW PATHS, AS NEEDED, TO KEEP THE SITE DRAINED. MAINTAIN THE SITE AREA TO PREVENT STORMWATER OR SURFACE WATER FLOW FROM ADJACENT AREAS FROM ENTERING THE WALL AREA.

M. POST CONTRUCTION CARE.

1. NO EXCAVATION THROUGH LAYERS OF SOIL REINFORCEMENT SHALL BE PERMITTED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE RETAINING WALL DESIGN ENGINEER OF RECORD.
2. INSTALLATION OF IRRIGATION LINES ABOVE THE REINFORCED ZONE OR WITHIN TEN (10) FEET OF THE WALL TOE IS NOT PERMITTED WITHOUT PRIOR WRITTEN APPROVAL OF THE RETAINING WALL ENGINEER OF RECORD.
3. MATERIAL STOCKPILES MUST BE KEPT A MINIMUM OF TEN (10) FEET FROM THE FRONT FACE OF THE RETAINING WALL
4. PROPER SURFACE WATER CONTROL AND DIVERSION OF WATER AWAY FROM THE RETAINING WALL MUST BE MAINTAINED AT ALL TIMES. ALL TOE AND CREST SLOPES SHALL BE VEGETATED AND PROTECTED AGAINST EROSION AS SOON AS POSSIBLE FOLLOWING CONSTRUCTION.
5. THE RETAINING WALL DESIGN ENGINEER OF RECORD SHALL BE CONTACTED TO REVIEW ANY REQUIRED POST WALL CONSTRUCTION UTILITY PLACEMENT IN THE VICINITY OF THE WALL. EXCAVATION IN AND AROUND THE WALL MAY DAMAGE THE COMPONENTS OR COMPROMISE THE INTEGRITY OF THE STRUCTURE AND MUST BE EVALUATED BY THE RETAINING WALL DESIGN ENGINEER OF RECORD
6. ANY INCIDENTS THAT MAY CAUSE DAMAGE OR COULD AFFECT THE LONG-TERM PERFORMANCE OF THE RETAINING WALL MUST BE REPORTED TO THE RETAINING WALL DESIGN ENGINEER OF RECORD IMMEDIATELY.

REVISIONS:

WSP USA ENVIRONMENT & INFRASTRUCTURE
245 N. WACO AVENUE, SUITE 110
WICHITA, KANSAS 67202
PHONE: 316-448-2711
FAX: 316-448-2711

REINFORCED SOIL SLOPE WALL DETAIL STR-001

IMHOFF CREEK BANK STABILIZATION

CITY OF NORMAN, OKLAHOMA

DESIGNED BY: ---
DRAWN BY: ACG
CHECKED BY: EJB
DATE: Mar 22, 2024

LICENSED PROFESSIONAL ENGINEER
ERIC J. BROCE
25083
3-22-24
OKLAHOMA

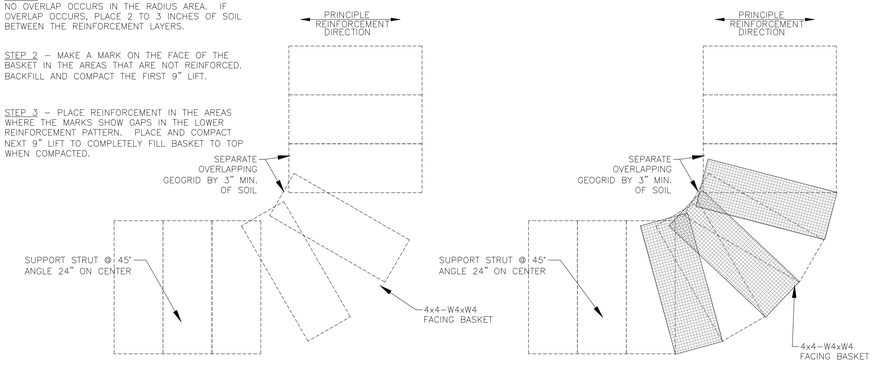
PROJECT NO.
8275000431

SHEET NO.
27 OF 30

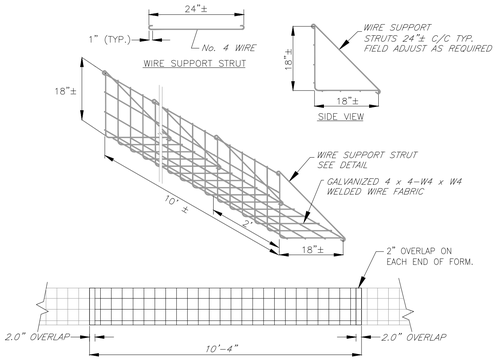
STEP 1 – PLACE REINFORCEMENT SO LITTLE OR NO OVERLAP OCCURS IN THE RADIUS AREA. IF OVERLAP OCCURS, PLACE 2 TO 3 INCHES OF SOIL BETWEEN THE REINFORCEMENT LAYERS.

STEP 2 – MAKE A MARK ON THE FACE OF THE BASKET IN THE AREAS THAT ARE NOT REINFORCED. BACKFILL AND COMPACT THE FIRST 9" LIFT.

STEP 3 – PLACE REINFORCEMENT IN THE AREAS WHERE THE MARKS SHOW GAPS IN THE LOWER REINFORCEMENT PATTERN. PLACE AND COMPACT NEXT 9" LIFT TO COMPLETELY FILL BASKET TO TOP WHEN COMPACTED.

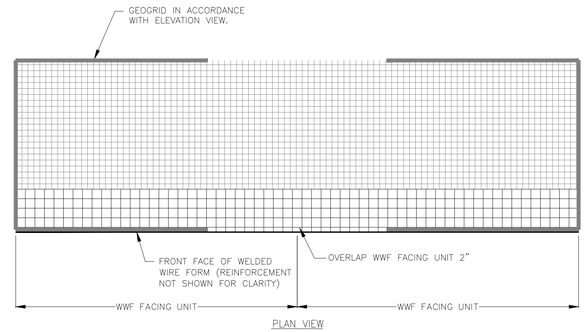


1/28 OUTSIDE CURVE DETAIL
(SCALE: N.T.S.)



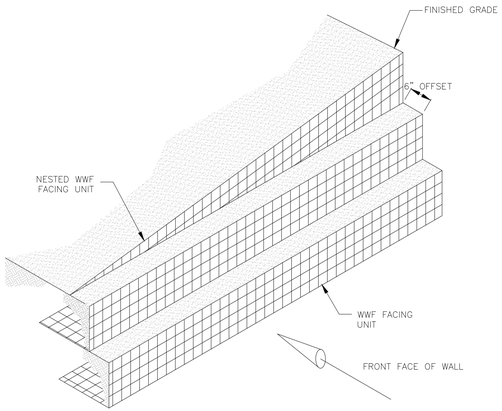
NOTES:
1. RSS FACING TO CONSIST OF PREFABRICATED GALVANIZED STEEL WELDED WIRE FABRIC, 4x4–W4xW4 FORMS.
2. OVERALL LENGTH OF WIRE FORMS IS 10'–4"±. EFFECTIVE CONSTRUCTED WIDTH IS 10 FT WITH 2" OVERLAPPING ON EACH END OF FORM.
3. FORMS AS MANUFACTURED BY DIMENSION FABRICATORS, INC. OR APPROVED EQUAL.

2/28 ELEVATION VIEW DETAIL
(SCALE: N.T.S.)

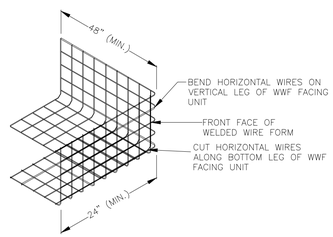


NOTES:
1. SEE WELDED WIRE FORM (WWF) FACING UNIT DETAIL FOR FACING MATERIALS AND DIMENSIONS.
2. INSTALL ADJACENT WWF FACING UNITS TO PROVIDE 2" OVERLAP OF HORIZONTAL WIRES.
3. WHEN MSE LAYOUT INCLUDES A CORNER/TURN, FULL GEOGRID COVERAGE IS REQUIRED. REFER TO ELEVATION VIEW FOR LIMITS OF FULL GEOGRID COVERAGE.

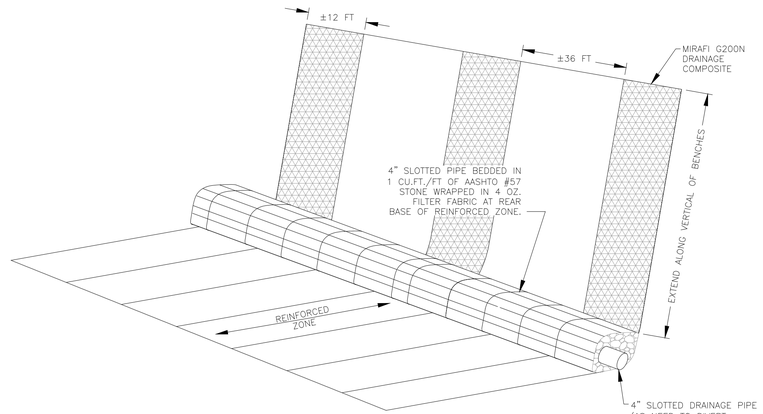
3/28 TYPICAL WWF GEOGRID COVERAGE
(NOT TO SCALE)



4/28 TOP OF WWF WALL NESTING DETAIL
(NOT TO SCALE)



5/28 WELDED WIRE FORM
OUTSIDE CORNER UNIT
(NOT TO SCALE)



6/28 REAR DRAINAGE SYSTEM
(NOT TO SCALE)

WSP USA ENVIRONMENT & INFRASTRUCTURE
245 N. WACO AVENUE, SUITE 110
WICHITA, KANSAS 67202
PHONE: 316-448-2711
FAX: 316-448-2711

REVISIONS:

REINFORCED SOIL SLOPE WALL DETAIL STR-002

IMHOFF CREEK BANK STABILIZATION

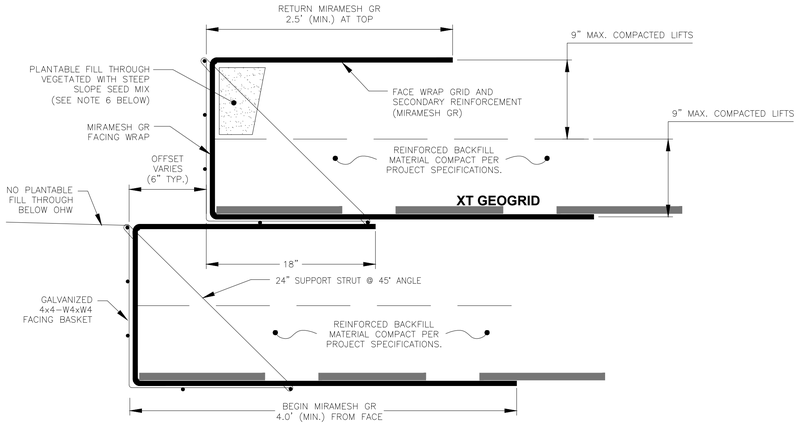
CITY OF NORMAN, OKLAHOMA

DESIGNED BY: ----
DRAWN BY: ACG
CHECKED BY: EJB
DATE: Mar 22, 2024

PROFESSIONAL ENGINEER
ERIC J. BROCE
25093
3-17-24
OKLAHOMA

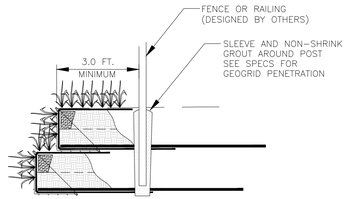
PROJECT NO.
8275000431

SHEET NO.
28 OF 30

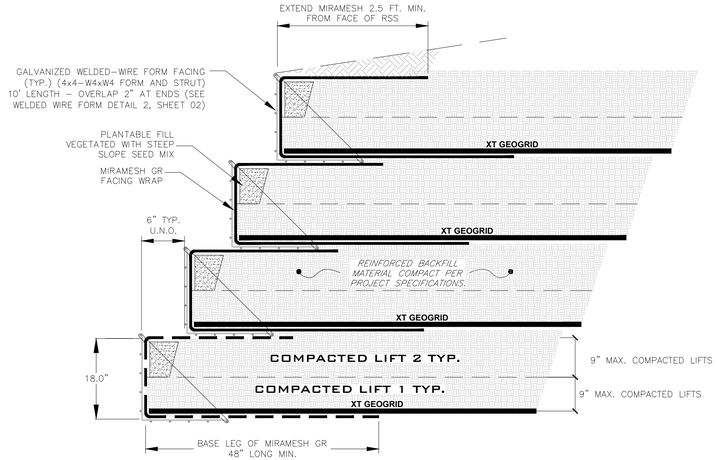


NOTE:
PLACE WELDED WIRE FORMS AS NEEDED TO CREATE THE PROPER SLOPE GEOMETRY.

1/29 PLANTABLE FACING DETAIL BLOW-UP
(SCALE: N.T.S.)



2/29 TYPICAL FENCE DETAIL
(SCALE: N.T.S.)



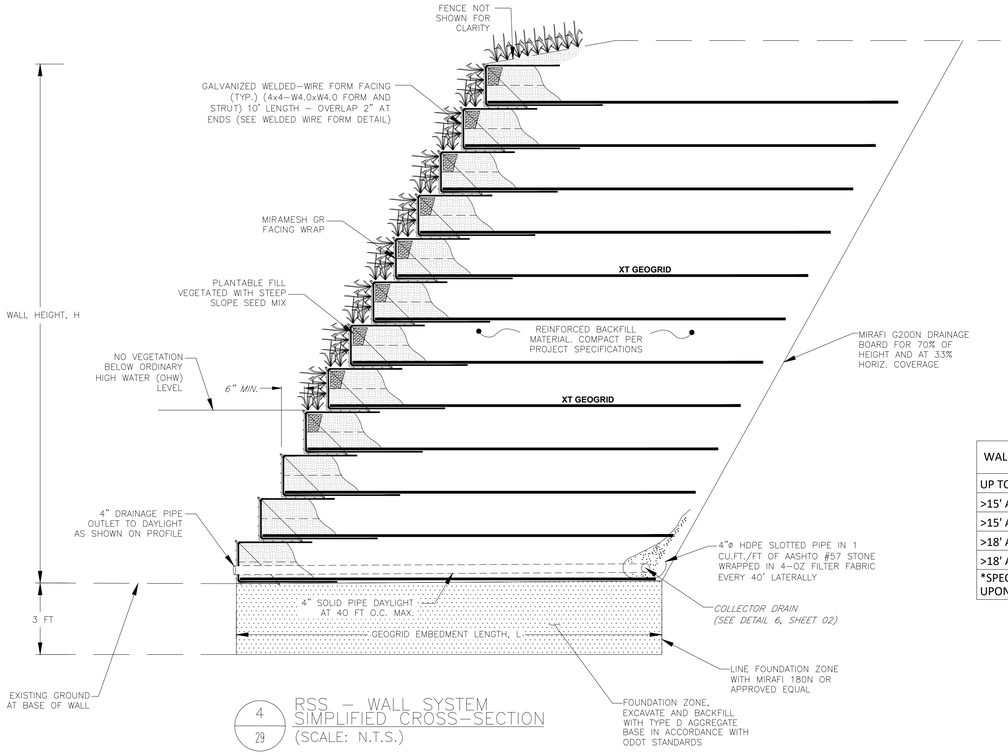
NOTES:
1. FACING TO CONSIST OF PREFABRICATED WWF, 4x4-W4xW4.
2. OVERALL LENGTH OF WIRE FORMS IS 10'-4"±.

3/29 TYPICAL DIMENSIONS AND SETBACK DETAIL
(SCALE: N.T.S.)

GENERALIZED CONSTRUCTION SEQUENCE:

1. SET WELDED WIRE FORM AT CORRECT ELEVATION AND ALIGNMENT PER PLAN GEOMETRY.
2. INSTALL WIRE STRUTS IN ACCORDANCE WITH PROJECT SPECIFICATIONS.
3. PLACE MIRAMESH GR AT FACE OF FORM TO PROVIDE A 48" HORIZONTAL BASE LENGTH, LAY MIRAMESH GR UP REAR FACE OF WELDED WIRE FORM, AND TEMPORARILY DRAPE REMAINING 30" LENGTH OF MIRAMESH GR OVER THE FRONT OF THE FORM. CUT SMALL SLOTS AS NECESSARY TO ACCOMMODATE STRUTS.
4. PLACE AND COMPACT A 9" THICK (FINAL COMPACTED LIFT THICKNESS) LAYER OF PROCESSED BACKFILL MATERIAL PER PROJECT SPECIFICATIONS. CARE SHALL BE TAKEN TO ENSURE ADEQUATE COMPACTION AT WALL FACE.
5. PLACE AND COMPACT THE FINAL LAYER OF PROCESSED BACKFILL MATERIAL FOR THIS WIRE FORM PER PROJECT SPECIFICATIONS, LEAVING A TROUGH DIRECTLY BEHIND THE WELDED WIRE FORM TO ACCOMMODATE THE GROWTH MEDIUM (PLANTABLE FILL).
6. PLACE PLANTABLE FILL AND STEEP SLOPE SEED MIX INTO TROUGH. BASE OF TROUGH SHALL BE NO LESS THAN 4" WIDE, TOP OF TROUGH SHALL BE 6" WIDE. TROUGH SHALL BE 9" HIGH SO VEGETATION OCCURS IN TOP HALF VERTICALLY AND ON THE 9" HORIZONTAL BENCH OF THE WELDED WIRE FORM. COMPACT PLANTABLE FILL IN ACCORDANCE WITH PROJECT SPECIFICATIONS.
7. FOLD BACK MIRAMESH AND PULL TAUGHTLY OVER THE TOP OF BACKFILLED WELDED WIRE FORM WITH A MINIMUM HORIZONTAL RETURN OF 30".
8. SET THE NEXT WELDED WIRE FORM PER HORIZONTAL AND VERTICAL PLAN GEOMETRY AND REPEAT STEPS 2-7 ABOVE.
9. ORDINARY HIGH WATER (OHW) LEVEL VARIES AS FOLLOWS:

STATION TO STATION	DOWNSTREAM EL.	UPSTREAM EL.
16+40 TO 17+50	1097.23	1097.69
22+00 TO 31+05	1097.77	1100.64



4/29 RSS - WALL SYSTEM
SIMPLIFIED CROSS-SECTION
(SCALE: N.T.S.)

WALL HEIGHT, H (FT)	GEOGRID EMBEDMENT LENGTH, L (FT)	GEOGRID LOCATION, MEASURED FROM BOTTOM OF WALL (FT)	GEOGRID*
UP TO 15'	9	1.5, 3, 4.5, 6, 9, 12	MIRAFI 5XT
>15' AND UP TO 18'	16	1.5, 4.5, 6	MIRAFI 20XT
>15' AND UP TO 18'	12	7.5, 10.5, 13.5, 16.5, 19.5	MIRAFI 5XT
>18' AND UP TO 22'	16	1.5, 3, 4.5, 6, 7.5	MIRAFI 20XT
>18' AND UP TO 22'	12	9, 12, 15, 18, 21	MIRAFI 7XT
*SPECIFIED GEOGRID SIZES ARE AS PRODUCED BY TENCATE. EQUIVALENT GEOGRID MAY BE SUBSTITUTED UPON APPROVAL OF THE ENGINEER.			

REVISIONS:

WSP USA ENVIRONMENT & INFRASTRUCTURE
245 N. WACO AVENUE, SUITE 110
WICHITA, KANSAS 67202
PHONE: 316-448-2711
FAX: 316-448-2711

REINFORCED SOIL SLOPE WALL DETAIL STR-003

IMHOFF CREEK BANK STABILIZATION
CITY OF NORMAN, OKLAHOMA

DESIGNED BY: ---
DRAWN BY: ACG
CHECKED BY: EJB
DATE: Mar 22, 2024

LICENSED PROFESSIONAL ENGINEER
ERIC J. BRODE
25093
3-22-24
OKLAHOMA

PROJECT NO.
8275000431

SHEET NO.
29 OF 30

GENERAL NOTES

1. NOTIFY OKLAHOMA 811 ONE-CALL. CONFIRM THE LOCATIONS OF ALL SURFACE OR SUBSURFACE FEATURES, INCLUDING UTILITIES, WHICH HAVE A BEARING UPON THE PROPOSED CONSTRUCTION PRIOR TO BEGINNING CONSTRUCTION. VERIFY THE LOCATION OF ALL EXISTING UTILITIES AND REPORT ANY DISCREPANCIES IMMEDIATELY PRIOR TO CONTINUANCE OF WORK. COORDINATE WITH LOCAL UTILITY COMPANIES PRIOR TO UTILITY DISCONNECT.
2. PERFORM ALL WORK IN ACCORDANCE WITH DRAWINGS AND ALL APPLICABLE CODES AND REGULATIONS UNLESS OTHERWISE NOTED. COMPLY WITH THE REQUIREMENTS OF THE VARIOUS FEDERAL, STATE, AND LOCAL SAFETY CODES (E.G. OSHA).
3. UNLESS NOTED OTHERWISE (UNO), EXISTING FEATURES SHALL REMAIN. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING THE INTEGRITY OF EXISTING FEATURES, INCLUDING EXISTING UTILITIES.
4. OBTAIN ALL REQUIRED PERMITS PRIOR TO EXECUTION OF THE WORK.
5. NOTIFY THE ENGINEER OF ALL ITEMS OF CONSTRUCTION REMAINING AND NOT SPECIFICALLY MENTIONED THAT INTERFERE WITH THE NEW CONSTRUCTION.
6. MAINTAIN CONDITION OF EXCAVATION SLOPE(S) AND PROVIDING SAFE WORKING CONDITIONS FOR ALL PERSONS ON THE PROJECT SITE THROUGHOUT THE CONSTRUCTION PROCESS.

SUGGESTED SEQUENCE OF CONSTRUCTION

1. LAYOUT LIMITS OF SHEET PILE BASED UPON TOTAL STREAM WIDTH.
2. DRIVE SHEET PILE TO MINIMUM TOE EMBEDMENT AS INDICATED IN THE SECTIONS. PROVIDE DRIVING LOGS TO ENGINEER WITHIN 24 HOURS OF PILE DRIVING COMPLETION. LOGS AT A MINIMUM SHALL STATE BLOWS PER FOOT, HAMMER SIZE AND ENERGY.
3. PLACE RIPRAP AS SHOWN IN THE DRAWINGS

DESIGN CRITERIA

1. SHEET PILES SIZED BASED ON SHEAR AND BENDING MOMENTS ESTIMATED USING "NAVFAC DESIGN MANUAL 7.02 FOUNDATIONS AND EARTH STRUCTURES. MAXIMUM ANTICIPATED LATERAL MOVEMENT AT TOP-OF-SHEET PILE IS 1 INCH.
2. DESIGN GROUNDWATER LEVEL IS ASSUMED AT A STATIC LEVEL EQUAL TO THE STREAM INVERT.
3. SHEET PILE DESIGNED IN ACCORDANCE WITH ALLOWABLE STRESS DESIGN (ASD) PROVISIONS OF THE "AISC STEEL CONSTRUCTION MANUAL", 14TH EDITION.

MATERIAL SPECIFICATIONS:

1. STEEL SHEET PILES SHALL BE NZ14, OR APPROVED EQUIVALENT, CONFORMING TO ASTM A572, GRADE 50.
2. SHEET PILE CORNER ANGLES: USE MANUFACTURE'S CORNER PILE ANGLE ELEMENTS TO MEET THE ANGLES CALLED FOR ON THE DETAIL.
3. RIP-RAP AROUND SHEET PILE SHALL BE D_{50} = 18" SIZE RIP RAP.

PILE WALL TOLERANCES

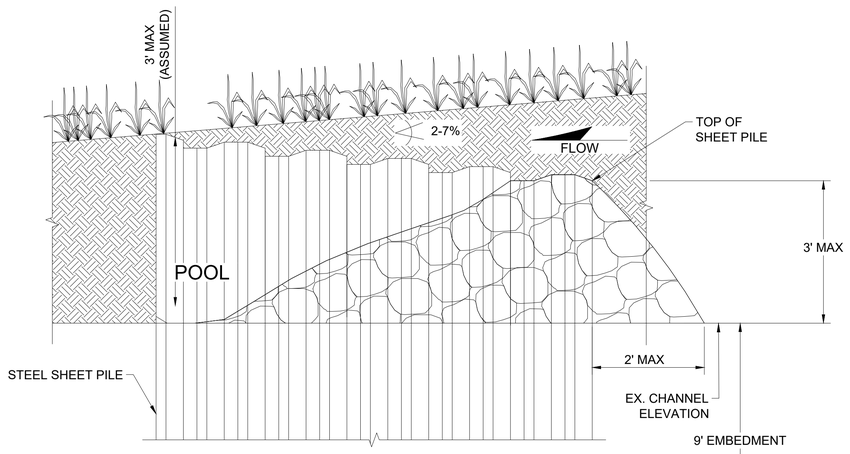
1. PLACE SHEET PILES AT THE LOCATIONS SHOWN ON THE PLAN VIEW. DO NOT DEVIATE BY MORE THAN 3 INCHES IN ANY DIRECTION FOR OF THE WALL.

FIELD TESTING INSPECTION

1. PROVIDE MINIMUM 24 HOUR NOTICE TO INSPECTION ENGINEER'S STAFF OF CONSTRUCTION ACTIVITY REQUIRING TESTS.

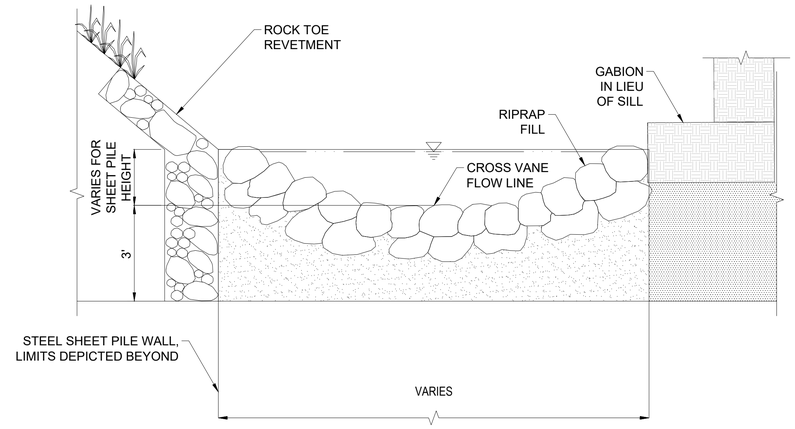
SUBMITTALS

1. PROVIDE PILE DRIVING LOGS TO ENGINEER WITHIN 24 HOURS OF PILE INSTALLATION COMPLETION.



SHEET PILE PROFILE VIEW

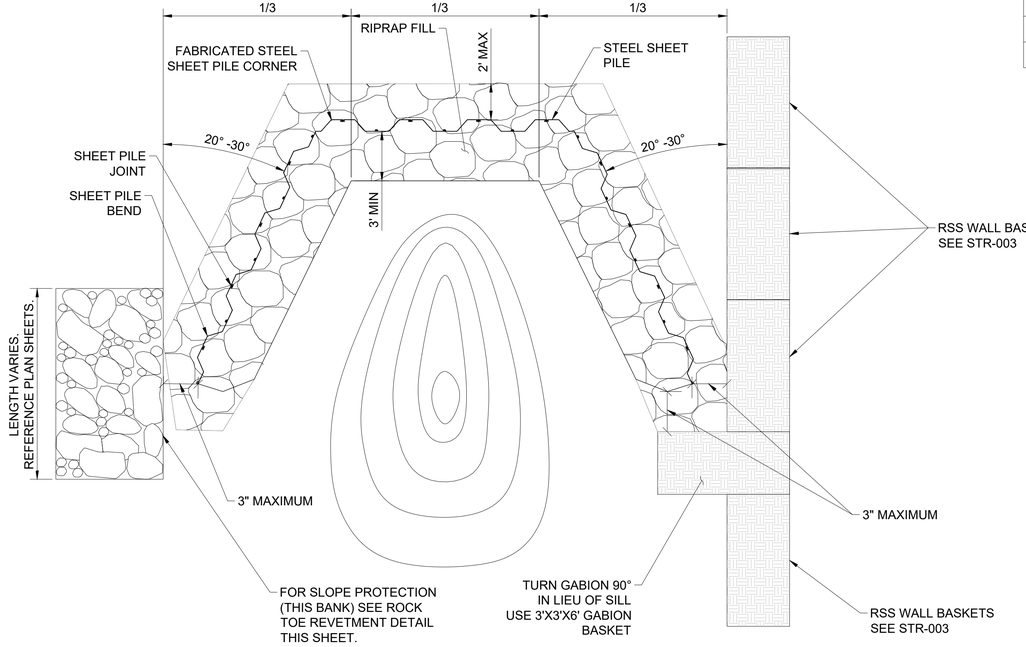
NOT TO SCALE



SHEET PILE CROSS SECTION VIEW

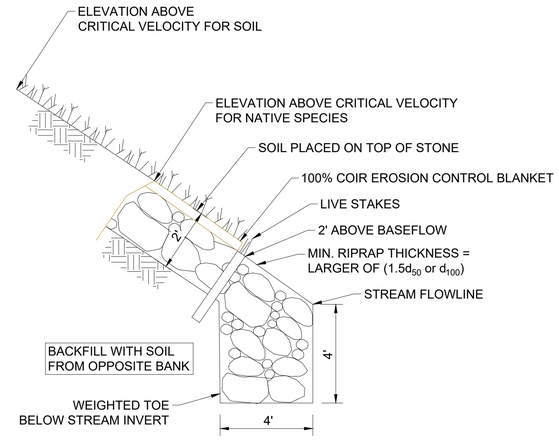
NOT TO SCALE

CROSS VANE INFORMATION				
LOCATION	CHANNEL EL.	SHEET PILE ℄ EL.	SHEET PILE EDGE EL.	100-YR CRITICAL VEL. EL.
STA 28+40	1089.33	1092.33	1093.00	1100.88
STA 24+60	1087.85	1090.85	1091.50	1098.53



SHEET PILE LAYOUT DETAIL

NOT TO SCALE



ROCK TOE REVETMENT WITH LIVE SOIL

NOT TO SCALE

WSP USA ENVIRONMENT & INFRASTRUCTURE
245 N. WACO AVENUE, SUITE 110
WICHITA, KANSAS 67202
PHONE: 316-448-2711
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REVISIONS:

SHEET PILE DETAIL STR-004

IMHOFF CREEK BANK STABILIZATION
CITY OF NORMAN, OKLAHOMA

DESIGNED BY: ---
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30 OF 30

Figure.7j.West Bank ~ 230' downstream of Imhoff Road January 28, 2025

*Figure.8j.*West Bank ~ 230’ downstream of Imhoff Road August 19, 2025

Figure.9. East bank immediately downstream of Imhoff Road

Figure.0 East bank ~110 feet downstream of Imhoff Road