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North 14th Street Corridor Improvements Project

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North 14th Street Corridor Improvements Project

An Undergraduate Honors Thesis

Submitted in Partial fulfillment of

University Honors Program Requirements

University of Nebraska-Lincoln

by

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Abstract

The following project report was a study of the North 14th Street corridor ranging from Adams Street to Virginia Street conducted by University of Nebraska-Lincoln students for a senior design capstone project. Main focuses of the project were the intersection of Adams and 14th Street and the 14th Street bridges over Cornhusker Highway and Oak Creek. Study of this area included work in transportation, traffic, structural, geotechnical, water resources, and environmental engineering. However, this report done by students should not take the place of work done by licensed professional engineers.

This project was done in collaboration with engineers for the City of Lincoln, who acted as clients looking for engineering consulting. Research was conducted to find the applicable design requirements for each of the civil engineering subdisciplines. These requirements were obtained through GIS data, maps, and certified design manuals. After obtaining the proper data and design requirements, it was concluded that the signalized intersection of Adams and 14th Street would be left alone, the bridge over Cornhusker Highway would be removed and designed as an at-grade roundabout, and the bridge over Oak Creek would be removed and completely replaced. The multi-phase project came to a total cost of about $30,759,090.

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May 6, 2022

City of Lincoln Transportation & Utilities
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To Craig Aldridge:

MAPS Engineering has completed the following engineering report for the North 14th Street Corridor Improvements Study. It is our understanding that the City of Lincoln is looking to evaluate and restructure North 14th Street from Adams to Virginia Street.

MAPS Engineering has prepared the 90% design with grading and layout for construction of a roundabout after the removal of the bridge at North 14th Street and Cornhusker Highway. We have done an environmental assessment of the project location and have determined there to be minimal hazards in the area. The 14th Street and Antelope Valley Parkway bridges over Cornhusker Highway and Oak Creek have been analyzed for removal and replacement, respectively. The total engineering and construction cost of the project is estimated to be $30,759,090.

MAPS Engineering strives to work with our clients to bring about the best results for the community. For further questions or concerns, feel free to reach out to any of our project managers listed below.

Best,

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North 14th Street Corridor Improvements Project

90% Design

MAPS Engineering

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Disclaimer

Please note that the following report was done as part of a student project for a Senior Design Capstone course at the University of Nebraska-Lincoln. The designs and information provided in this report shall not be referenced for actual construction. This report is not to be used in place of work provided by licensed professional engineers.

Project Understanding

Due to increasing traffic volumes, aging infrastructure, and safety concerns, the City of Lincoln is seeking to improve the N. 14th Street Corridor from Virginia Street to Adams Street. Figure 1 shows an image of the overall site location. A primary safety concern is the merging of vehicles from N. 14th Street to Cornhusker Highway, with the N. 14th Street bridge causing a lack of sight distance in addition to a shorter merging lane.

As a result of increasing traffic and considering the safety of the public, the Consultant, MAPS Engineering, is proposing to remove the bridge and design N. 14th and Cornhusker as an at-grade intersection by designing a roundabout. Design of sidewalk along 14th Street to continue the bicycle trail has also been done.

Complete removal and replacement of the bridge is proposed for N. 14th Street over Oak Creek based on initial conversations with the City of Lincoln. The benefits of a replacement structure include providing a design in accordance with current loading requirements, the opportunity to appropriately size the sidewalks to meet current ADA requirements, and the opportunity to upgrade the traffic rail end treatments.

Throughout the N. 14th Street corridor, repaving will be done as deemed necessary to maximize design life. A review and upgrading of storm sewers will be done as necessary throughout the area based on a runoff analysis. Since this project primarily consists of reconstruction, limited impacts to the environment or surrounding waterways are expected. MAPS Engineering has completed an environmental review to determine additional precautions must be taken during construction.

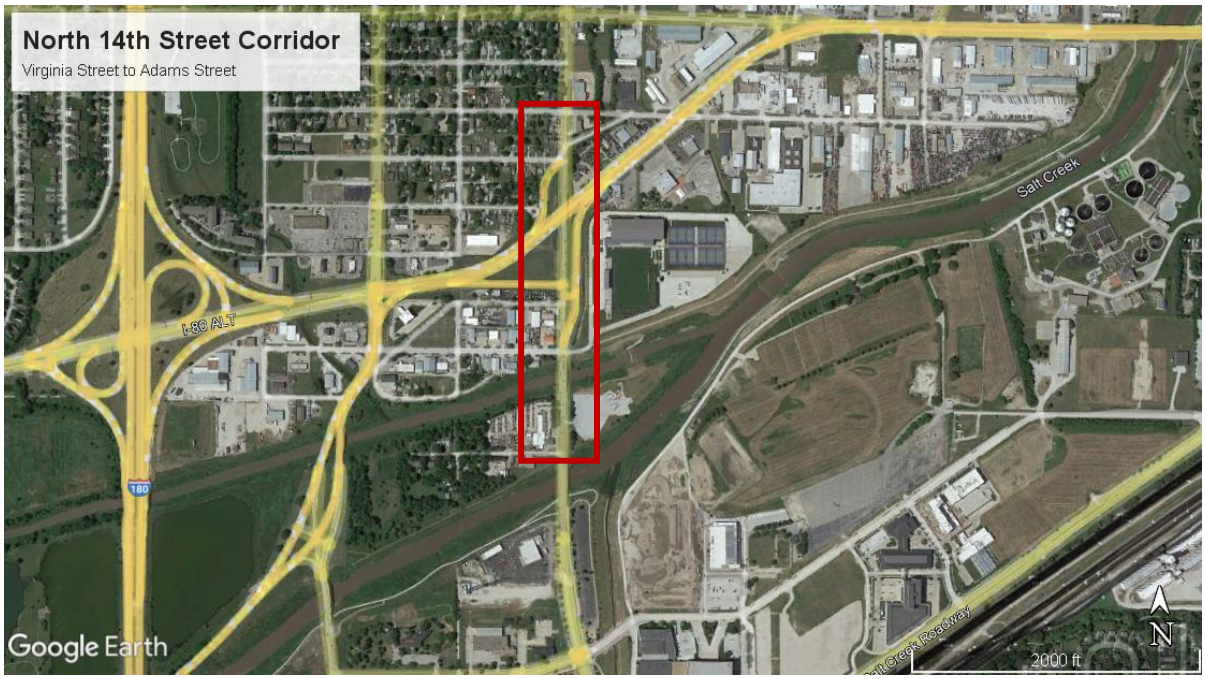

Figure 1. Project Location

Deliverables

The following sections describe preliminary design information and reference deliverables regarding the proposed design improvements to the N. 14th Street Corridor by MAPS Engineering. All deliverables are attached to this project report, including a complied set of plan sheets that were drafted in a computer-aided design program.

Existing data for traffic engineering was compiled and listed for reference during design. Traffic design standards for the City of Lincoln were also provided to ensure proper design and construction for the project. A design layout for the roundabout at N. 14th Street and Cornhusker Highway was prepared in correspondence with the design standards featured. A traffic control plan for the area was made to aid with vehicle navigation and detours during construction.

After clear inspection, the Cornhusker Highway bridge was proposed to be removed. Due to the poor condition of the Oak Creek bridge, replacing the bridge was considered the best option. The elevation view and plan view of the new bridge design is shown in this report. The new bridge would be a three-span prestressed concrete girder bridge which will have a service life of 75 years. The load combinations were also calculated for this bridge using the AASHTO specifications which are summarized in this design report. The cost estimations for both bridge replacement and bridge removal are tabulated in this report.

Using the design layout, the Consultant prepared a grading layout which was designed and evaluated to meet standards. Road profiles are provided to further display existing and proposed conditions. Assemblies are demonstrated to show the corridors used for grading and the expected design. Using the NRCS Web Soil Survey, a soil study was evaluated to determine the existing

conditions in the project area. The map and soil categories are provided in this report to ensure proper construction.

Several objectives and deliverables were prepared regarding water resources and environmental engineering. Runoff analyses were performed for both pre-construction and post-construction drainage conditions following the City of Lincoln Drainage Criteria Manual. An environmental review was performed, specifically looking into the environmental aspects necessary to apply for a Section 404 Permit. A Stormwater Pollution Prevention Plan (SWPPP) figure was created to show practices that will need to be implemented to properly manage runoff during construction to comply with an NPDES Permit. A review of other permits that would be required was also done. Additionally, a review of the existing utilities was done to create a plan of any necessary relocations or accommodations that would be required during construction. This included reviewing the existing storm sewers and inlets and bringing several to grade with the new roundabout.

Additionally, several project management estimates were prepared to support this design of the N. 14th Street corridor improvements. An engineer's opinion of cost table was prepared. This includes the estimated cost of construction as well as engineering fees. An estimated project schedule was also prepared. A meeting to present these 90% design, estimates, and plan sheets has also been scheduled to showcase these deliverables to the City of Lincoln and receive any final feedback.

Traffic Engineering

MAPS Engineering was responsible for conducting traffic research and data collection for pertinent intersections in the area. Included in this range were the intersections of North 14th Street with Adams Street, Saunders Avenue, Dawes Avenue, Cornhusker Highway, and Yolande Avenue.

Currently, Cornhusker Highway runs southwest to northeast, with the North 14th Street bridge running north to south above it. Vehicles merging from 14th Street to Cornhusker via ramp are put at higher risk due to the bridge limiting sight distance, as well as a relatively short merging lane. North of Cornhusker, Adams Street runs east to west, crossing 14th Street with a signalized intersection.

With the 14th Street bridge over Cornhusker showing signs of significant deterioration, it was decided that the bridge be removed, as further explained later in this report. The bridge will be replaced with an at-grade intersection, designed as a roundabout with specifications listed below.

Existing Traffic Data

Prior to MAPS Engineering conducting traffic research, the existing traffic data for the area was compiled. Utilizing an average daily traffic (ADT) map supplied by the City of Lincoln Transportation and Utilities (LTU), the ADT volumes for 14th Street north and south of Cornhusker Highway were found to be 19,190 and 21,750 vehicles per day, respectively. The ADT volume on Adams Street just east of 14th Street was found to be 7,640 vehicles. ADT

volumes for Cornhusker Highway were then obtained through GIS data from the Nebraska Department of Transportation. This existing traffic data is summarized in Table 1. The traffic map supplied by LTU can be found in the attached plan sheet T-001.

Table 1. Summary of Existing Traffic Data

Street	Location	Year	ADT (vehicles)
14th Street	North of Cornhusker	2018	19,190
14th Street	South of Cornhusker	2019	21,750
14th Street	North of Adams	2018	18,320
Cornhusker Highway	West of 14th	2018	27,565
Cornhusker Highway	East of 14th Street	2018	24,850
Adams Street	East of 14th Street	2018	7,640

Roadway Design Requirements

In the *Roadway Design Manual* issued by the Nebraska Department of Transportation (NDOT) in 2022, the primary guidance on Nebraska roundabout design is to be Report 672 written by the National Cooperative Highway Research Program (NCHRP) in 2010. One of the main ideas with roundabout design is that all the legs should have similar volumes of traffic. When there is an imbalance of traffic coming through each leg of the roundabout, this causes major delays all around.

The splitter island length is to have a minimum length of 50 feet on urban roadways and 200 feet on rural roads (NDOT, 2022). The lanes of the roundabout should have a width of 14 feet to 16 feet, with double-lane roundabouts having a total road width of 28 feet to 32 feet. For two-lane roundabouts, the inscribed circle is recommended to be 150 feet to 220 feet in diameter. In order to promote ideal turn speeds, it is also recommended that right-turns be at an angle near 90 degrees.

Roadway Design Layout

14th and Adams Street Intersection

Considering the traffic data and design requirements above, MAPS Engineering advises against converting the intersection of 14th Street and Adams Street into a roundabout. The disparity between the ADT volumes of the two streets makes for sub-optimal conditions for a roundabout. The surrounding area of the intersection is also occupied with various residential and commercial properties, causing difficulty in land acquisition for roundabout construction. It is therefore recommended that the intersection of 14th Street and Adams Street remains a signalized intersection.

14th Street and Cornhusker Highway Intersection

For the removal of the 14th Street bridge over Cornhusker Highway and the construction of an at grade- intersection, roundabout design has been conducted. A proposed layout for the

roundabout is located on the attached plan sheet T-002 with more design details to be described below.

The 14th Street and Cornhusker Highway roundabout has been designed with 15-feet-wide lanes, 10-feet-wide sidewalks west of the intersection, and 8-feet-wide sidewalks east of the intersection. The sidewalk width was determined based on conversation with the City of Lincoln to allow it to be connected to nearby bike trails. While Cornhusker Highway is maintained as a two-lane highway, 14th Street will also be maintained as a one-lane roadway with the addition of a right lane for entry into the roundabout. Each leg will therefore have two lanes of entry into the roundabout with turn movements being specified in Table 2 below. The entry curves and the actual roundabout have all been designed for a speed of 25 miles per hour.

The center of the roundabout will be finished with native vegetation, such as prairie grass and bushes, that will require minimal maintenance once it is rooted into the area. This will contribute to the natural aesthetics of the area and help manage stormwater runoff. The medians on the legs entering/exiting the roundabout will be finished with permeable pavers such as bricks.

The right lanes of 14th Street entering the roundabout will only be permitted to make right turns, while the left lanes will be permitted to go straight or turn left. The right and left lanes of Cornhusker Highway will both be permitted to go straight and turn right or left, respectively. In the table, NB, SB, EB, and WB indicate northbound, southbound, eastbound, and westbound respectively.

Table 2. 14th Street and Cornhusker Highway Roundabout Turn Movements

Leg	Lane	Allowed Movement
EB Cornhusker Hwy	Right	Right and Straight
EB Cornhusker Hwy	Left	Straight and Left
NB 14th St	Right	Right
NB 14th St	Left	Straight and Left
WB Cornhusker Hwy	Right	Right and Straight
WB Cornhusker Hwy	Left	Straight and Left
SB 14th St	Right	Right
SB 14th St	Left	Straight and Left

Traffic Control Plan

During construction along 14th Street for both the roundabout at Cornhusker Highway and bridge replacement above Oak Creek, vehicles will be unable to drive through the area. For this reason, a traffic control plan is necessary for proper navigation and detours through this area. A summary of detour routing can be seen in Figure 2. On 14th Street, traffic will be closed from south of Garber Avenue to north of Virginia Street as safety measures during construction. Cornhusker Highway will then be closed east of 11th Street and west of 14th Street, including the merging ramp from 14th to Cornhusker. Cornhusker Highway just southwest of Yolande Avenue will remain open until nearer to construction limits in order to maintain vehicular access

to businesses south of Yolande Avenue. Temporary signage will be placed throughout the area to guide vehicles.

14th Street Detour Route

Due to the aforementioned closures on 14th Street, pre-determined detours may aid in navigation for vehicles during construction. Vehicles driving northbound on 14th Street may turn left onto Military Road and then right onto 10th Street. From there, vehicles may turn left onto Cornhusker Highway or continue northbound to eventually continue onto 14th Street through Furnas Avenue. Vehicles wishing to head eastbound on Cornhusker Highway may continue past 14th Street on Furnas Avenue to turn onto Cornhusker Highway.

Cornhusker Highway Detour Route

With Cornhusker Highway being closed east of 11th Street, vehicles may then either turn left onto 11th Street or right onto 10th Street, depending on where they are heading. Vehicles wishing to head northbound on 14th or continue on Cornhusker will turn left at 11th Street and merge onto their desired road through Furnas Avenue. Vehicles wishing to head south on 14th would then turn right onto 10th Street, following the inverse of the detour route for 14th Street.

Figure 2. Detour Routing During Construction

Existing Bridge Conditions

North 14th Street Bridge over Cornhusker Highway

The North 14th Street bridge over Cornhusker Highway was built in 1961, and sections of the steel girders and concrete deck were repaired in 1976 due to impact damage. Other areas of the

steel girders have been repaired numerous times from impact damage from oversized trucks. From the most recent bridge inspection, a new load rating is potentially needed due to the poor condition of the bridge superstructure. Table 3 shows the existing conditions of the bridge. The main concern was finding a broken bottom nut at the south pin and hanger in Girder 5 (East) and finding further deterioration at all the abutment bearings. At the two Girder 5 pin and hangers, there are several areas of complete section loss (holes) through the girder web. The existing bridge plan is shown in plan sheet S-001.

Most of the complete section loss is located adjacent to the hanger plates in low-stress areas. However, this section loss extends past the hanger plate areas and is reducing the girder capacity. The broken pin at the south pin and hanger is currently tight in place. The other pin and hanger assemblies in the bridge appear to be in fair condition.

With the additional evaluation, inspection, testing, and repairs completed, the bridge does not currently need to be load posted. The bridge is currently safe for legal loads; no permit loading should be allowed. The pin and hangers will also have to be watched to monitor deterioration rates and check that there is no movement or broken pins/nuts. If the bridge continues to deteriorate, additional temporary repairs, shoring, and/or load posting may be required.

Table 3. Existing Structure Information - U142512347

Facility Carried	Feature Intersected	Deck Rating	Super-structure Rating	Sub-structure Rating	Length (ft)	Cross Section	Structure ID	Year built
N 14th St.	Cornhusker Hwy	4	3	5	213	2 lane ND	U142512347	1961

North 14th Street / North Antelope Valley over Oak Creek

The existing structure is a 217’-0” three-span welded plate steel girder bridge crossing Oak Creek constructed in 1968. The superstructure consists of six steel girders with a web depth of 42” and a 7½” thick concrete deck. The existing condition of the bridge is shown in Table 4. There are sidewalks on both sides of the bridge that are cantilevered off the exterior girders. The abutments consist of concrete caps with backwalls and flared wings found on HP10x42 steel bearing piles. The piers are wall-type found on HP10x42 steel bearing piles.

The bridge supports various conduits as well as a 12” diameter water main. There are two functional deficiencies noted at the existing bridge: the guardrail and the sidewalk. The northwest guardrail does not meet current standards for length of need and geometry. Additionally, neither of the guardrail to traffic rail connections meet current standards.

The existing sidewalk has a clear width of approximately 3’-9”, which does not comply with the US Access Board Guidelines for Pedestrian Facilities in the Public Right-of-Way minimum width of 5’-0”. From visual inspection of the deck, a 1”-2” deep spall/pothole on the northbound lane about 30 feet from Abutment No. 2 was found. There is minor cracking throughout the deck with a more-prominent crack forming near the southwest corner of the bridge. Abutment caps,

backwalls and bearings were also visually inspected. Bearings at both abutments are in poor condition with heavy pack rust making them non-functional. The backwalls are cracked and spalling with exposed rebar in some areas. The abutment caps also have cracking and spalling throughout.

The expansion joints at both bridge ends are in very poor condition. The joints have failed in areas allowing water to penetrate to the abutments. The joint at Abutment No. 1 is opened to about 4" and the joint at Abutment No. 2 is covered by an asphalt overlay. The girders were visually inspected. Girder 6 has major corrosion along the bottom flange with one area of 100% section loss and a hole through the web, just above the bottom flange, approximately 12 feet north of Abutment No. 1. Webs beyond the bearing stiffeners at Abutment No. 1 are corroded to the point of section loss. The approach slabs are settling and cracking. Bridge and approach rails are spalling and cracking throughout. A majority of the curb is severely spalled with exposed rebar.

Table 4. Existing Structure Information - U142512345

Facility Carried	Feature Intersected	Deck Rating	Super-structure Rating	Sub-structure Rating	Length	Cross Section	Structure ID	Drawing #	Year built
N Ant Valley Pkwy	Oak Creek	4	4	5	217	4 lane ND	U142512345	COL deck rehab: 117-d-28 (2007)	1968

Structure Alternative Analysis

As a result of increasing traffic and considering the safety of the public, the North 14th Street Bridge over Cornhusker Highway (Structure #U142512347) will be removed. After further evaluation, we plan to completely remove and replace the bridge for the North Antelope Valley bridge over Oak Creek (Structure #U142512345). The benefits of a replacement structure include providing a design in accordance with current loading requirements, the opportunity to appropriately size the sidewalks to meet current ADA requirements and the opportunity to upgrade the traffic rail end treatments.

The new structure is a bridge length of 230'-0" from the centerline of the abutment to the centerline of the abutment. This bridge is designed to have two lanes on each side with a total of 4 lanes for the bridge. A configuration of 60' – 110' – 60' is utilized for the three-span structure with prestressed concrete girder (NU 1350) superstructure. The bridge is supported by abutments at both ends and two large piers with 6 piles each between the spans. A conceptual bridge geometry and bridge layout is shown in Figure 3 and Figure 4.

The bridge will support a conduit to hold the 12" diameter water main and insulation, as shown in the attached plan sheet S-003. The elevation view and plan view of the bridge are shown in Figures 5 and 6. A dead load of 150 psf and a live load of 46 psf was found to be acting on the bridge. The dead load was calculated using concrete, which is the material used in the structure.

Live loads due to vehicular traffic on highway bridges are specified by the American Association of State Highway and Transportation Officials (AASHTO).

Since the heaviest loading on highway bridges is usually caused by trucks, the AASHTO Specification defines two systems of standard loads, Highway Semi-trailer (HS-20) trucks and lane loading, to represent the vehicular loads for design purposes as shown in the following S-002. The HS-20 truck carries 20-ton weight of the tractor (first two axles). Each axle will carry the loads as follows, the first axle carries 8000 lbs, the second axle 14 feet away carries 32,000 lbs and a single-axle semi-trailer 14-30 ft away from the second axle carries 32,000 lbs. A concentrated load of 18 kips acts on the lane road for shear and a concentrated load of 26 kips acts on the lane road for moment as shown in Figure 4.

The longer center span is used to avoid conflict between the piles at the existing and proposed interior supports. Assuming the hydraulic performance of the new structure is equal to or better than existing, the new structure is constructed with a small grade raise of approximately 10". New bridges are currently being designed assuming a service life of 75 years. Maintaining the deck and joints on a bridge is a key to extending its life. If these items are adequately maintained, the service life for a replacement bridge should exceed the expected length of 75 years. Additionally, the proposed concrete girders typically require less maintenance than steel girders.

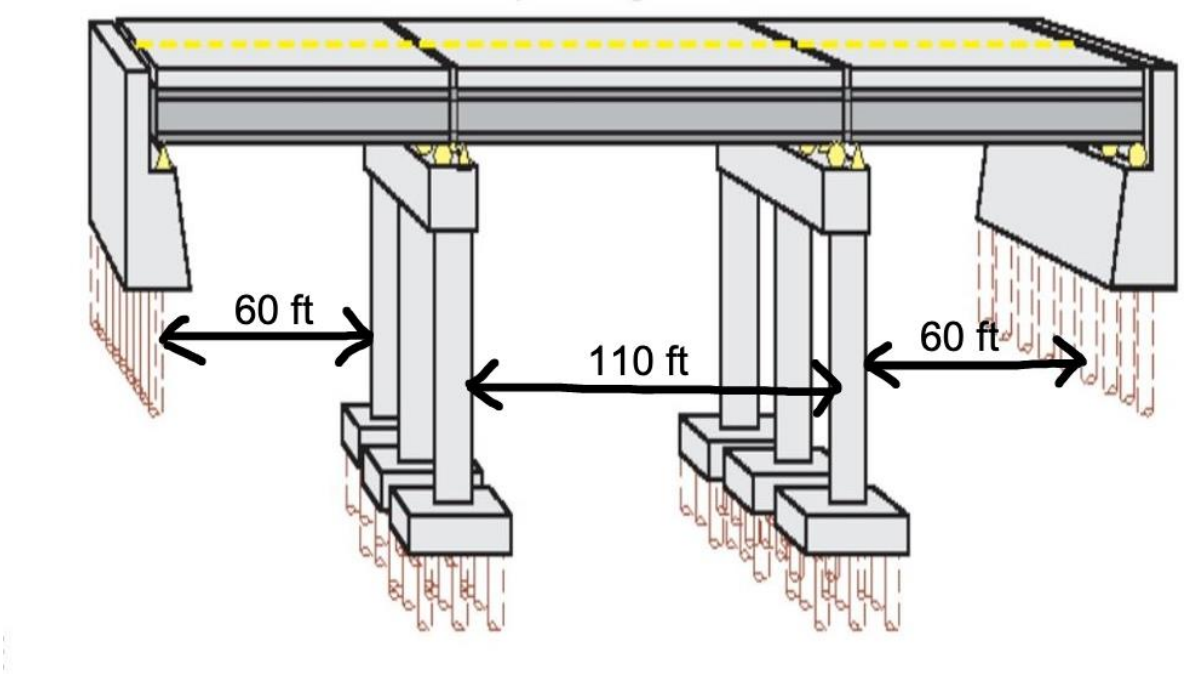

Figure 3. Conceptual Bridge Geometry

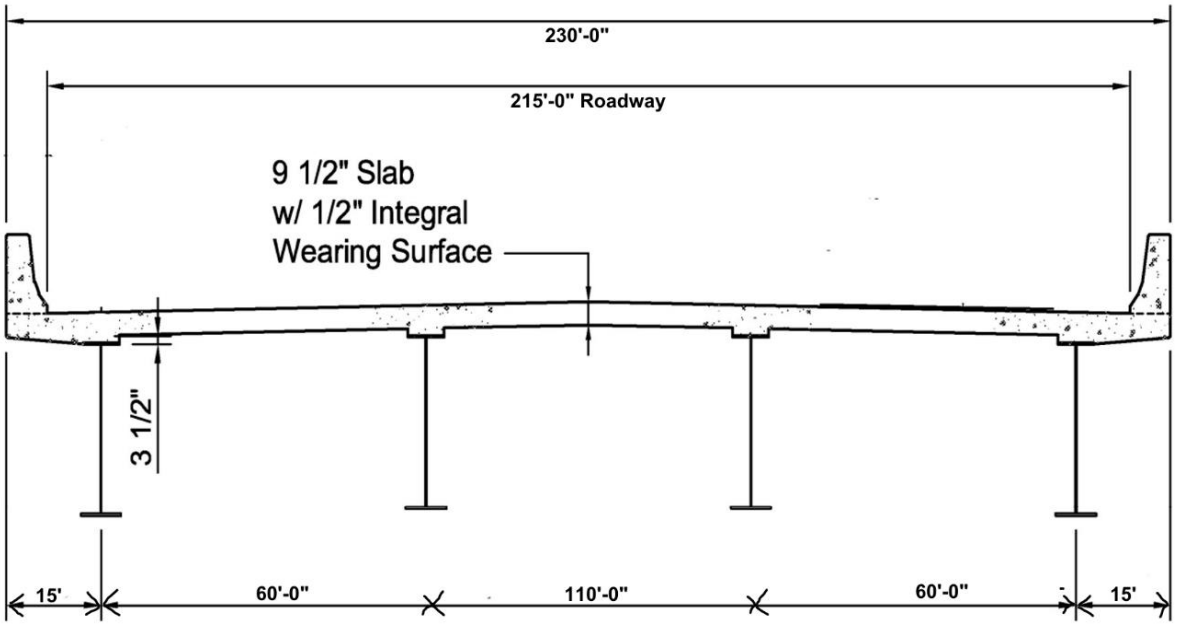

Figure 4. Bridge Layout Cross Section

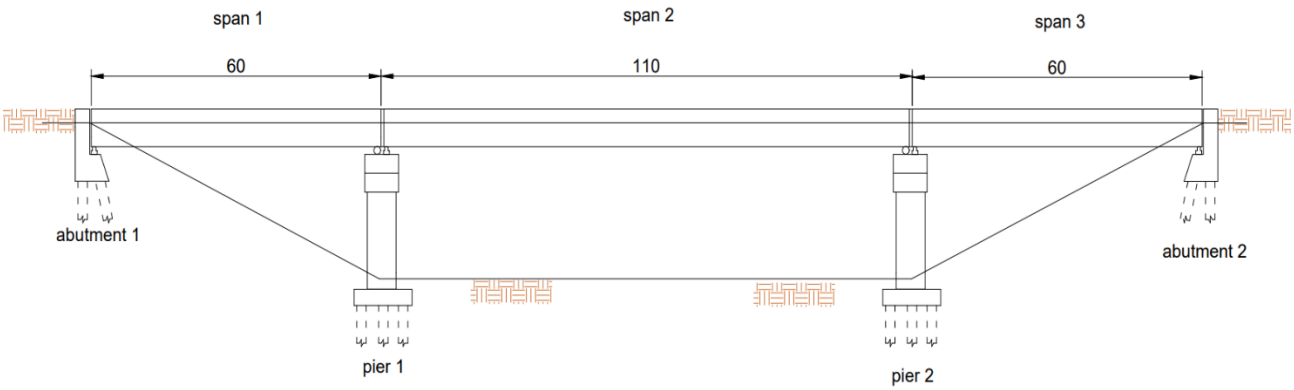

Figure 5. Elevation View of Oak Creek Bridge

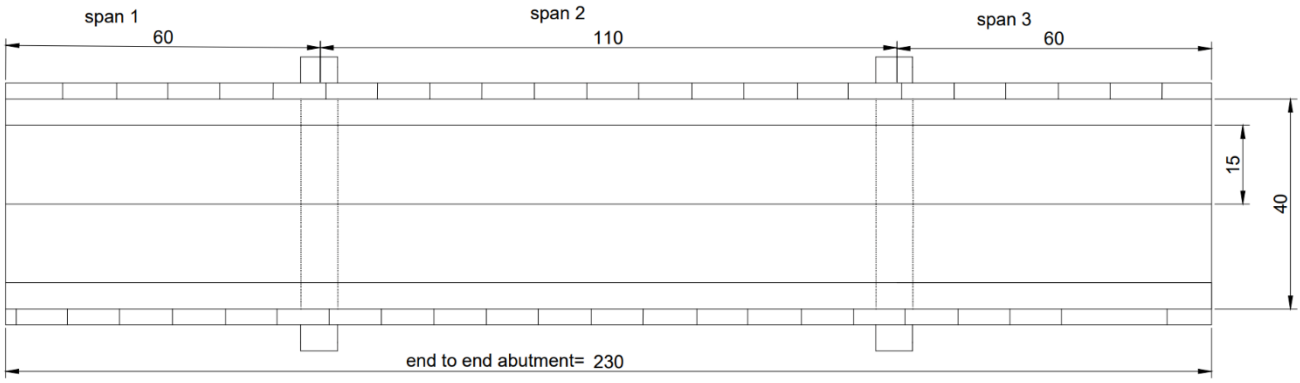

Figure 6. Plan View of Oak Creek Bridge

Bridge Cost Summary

Costs were developed for the replacement of the Oak Creek bridge and removal of Cornhusker Highway bridge by MAPS Engineering. Detailed opinions of those probable construction costs for this option can be found below in Table 5. The detailed breakdown of cost estimate for the Oak Creek bridge replacement is shown in Table 6. Note that the costs used in this analysis do not include engineering and administration costs. Additionally, there are utilities present on this bridge that will need to be relocated or temporarily supported during construction of the replacement structure. However, utility costs have not been accounted for in the opinion of probable construction cost. Square foot bridge and approach slab replacement costs are based on data currently used by NDOT for concept-level planning.

Table 5. Cost Estimate for Bridge Replacement and Removal

Option	Cost (2018 dollars)
Replacement (Oak Creek)	$2,066,220
Removal (Cornhusker Hwy)	$50,000

Table 6. Bridge Replacement Cost Estimate

Opinion of Probable Construction Costs Oak Creek Bridge Replacement Option				
Item	Estimated Quantity	Unit	Unit Cost	Amount
Bridge	14,567	SF	$110	$1,602,333
Approach Slabs	6,333	SF	$35.00	$221,667
Remove Existing Bridge	12,208	SF	$15.00	$183,120
Roadway/Sidewalk Pavement	735	SY	$60.00	$44,100
Earthwork/Seeding	1	LS	$10,000	$10,000
Roadway Removals	1	LS	$5,000	$5,000
Subtotal				$2,066,220

Grading Plan

The attached plan sheet G-001 shows grading to the existing ground surface of the proposed roundabout at North 14th Street and Cornhusker Highway. A surface was created from existing ground to gather current elevations. Using existing topography from a survey and the proposed roundabout layout, the centerline was established as alignments. From those alignments, road profiles were created on the existing ground surface.

Assemblies were created for the roundabout using a 78 foot-radius median, with a 1' curb and two 15' lanes. The Cornhusker East assembly consists of 8' sidewalk, 1' curb, 12' lane, 12' lane, median, 12' lane, 1' curb, 8' sidewalk. On the west side the same components are present but with 10' sidewalks. N. 14th Street's corridors are made up of 10' sidewalks, 1' curb, three 12' lanes tying into existing lanes, 1' curb, and 8' sidewalk.

Corridors of those roads were created; corridor surfaces were used to create grading lines to tie into the existing ground. A tin grid volume surface was established for each corridor as the base surface and the comparing surface as the existing ground.

Fill and cut factors used for this project are 1.0 and 1.35. When excavating, the cut factor adjusts the excavated soil to consider material swelling. The fill factor is the additional volume needed after compacting the soil. Cut factors are usually on a 1:1 basis so that the contractors can easily see how much soil to remove. For this grading plan, the fill factor was set at 1.35. 35% extra volume is a conservative value in accounting for loss in transport, wind, and erosion as well as compaction and settlement. The soil in this area is also prone to water runoff, so it is more cost effective to account for extra fill than to later to have to transport more.

Table 7 below and the attached plan sheet G-002 show specific total cut and fill volumes for each section. , the net material change is a cut quantity of 22.86 cubic yards. Due to excavation stripping, a topsoil of 4 to 6 inches will be used.

Table 7. Cut and Fill Volume Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
N. 14th Street South	1.000	1.350	30625.00 Sq. Ft.	499.63 Cu. Yd.	380.07 Cu. Yd.	119.56 Cu. Yd.<Cut>
East Cornhusker Highway	1.000	1.350	9375.00 Sq. Ft.	75.26 Cu. Yd.	3.98 Cu. Yd.	71.28 Cu. Yd.<Cut>
West Cornhusker Highway	1.000	1.350	21875.00 Sq. Ft.	208.08 Cu. Yd.	92.43 Cu. Yd.	115.65 Cu. Yd.<Cut>
N. 14th Street North	1.000	1.350	16875.00 Sq. Ft.	591.41 Cu. Yd.	104.10 Cu. Yd.	487.31 Cu. Yd.<Cut>
Roundbabout	1.000	1.350	26875.00 Sq. Ft.	659.62 Cu. Yd.	1430.56 Cu. Yd.	770.94 Cu. Yd.<Fill>
Totals			105625.00 Sq. Ft.	2034.00 Cu. Yd.	2011.14 Cu. Yd.	22.86 Cu. Yd.<Cut>

Soil Review

Using NRCS Web Soil Survey, soil data was obtained along North 14th Street from Adams to Virginia Street, as shown in Figure 7. Overall, much of the land in the project area is classified as urban. A majority of the soil in this area is classified as Hydrologic Soil Group C with the rest being Hydrologic Soil Group B (NRCS, 2022). When exposed to water, Group C soils have low infiltration rates and therefore lack water transmission. Group B soils have moderate infiltration rate when wet. Table 7 shows a detailed overview of findings from Figure 7 regarding Hydrologic Soil Groups. Overall, the project corridor is composed of silty loam and silty clay loam. Silty loam soils contain medium sized particle soils that are easily compacted but will

flush away with rain. Silty clay loam soils are very coarse but support plant growth. Boring logs have not been provided at this time, so all soil analysis is based on the NRCS Web Soil Survey.

Figure 7. Soil Map (NRCS, 2022)

Table 8. Hydrologic Soil Group Breakdown in Project Area

Hydrologic Soil Group and Surface Runoff–Lancaster County, Nebraska			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
9708—Urban land-Judson complex, 1 to 3 percent slopes			
Urban land	65	High	—
Judson	35	Low	C
9709—Urban land-Kennebec complex, 0 to 2 percent slopes			
Urban land	55	High	—
Kennebec, occasionally flooded	45	Negligible	B
9710—Urban land-Pawnee-Mayberry complex, 2 to 6 percent slopes			
Urban land	65	Very high	—
9999—Water			
Water	100	—	—

Watershed Delineation

The northern part of the North 14th Street Project Corridor falls within the North Salt Creek Watershed in Lincoln. The area of the corridor crossing Oak Creek is within the Oak Creek Watershed. Figure 8 shows a map of how the sub-watersheds are delineated within Lincoln, including the North Salt Creek and Oak Creek watersheds including this project area. Both sub-watersheds are under management of the Lower Platte South Natural Resources Department (NRD).

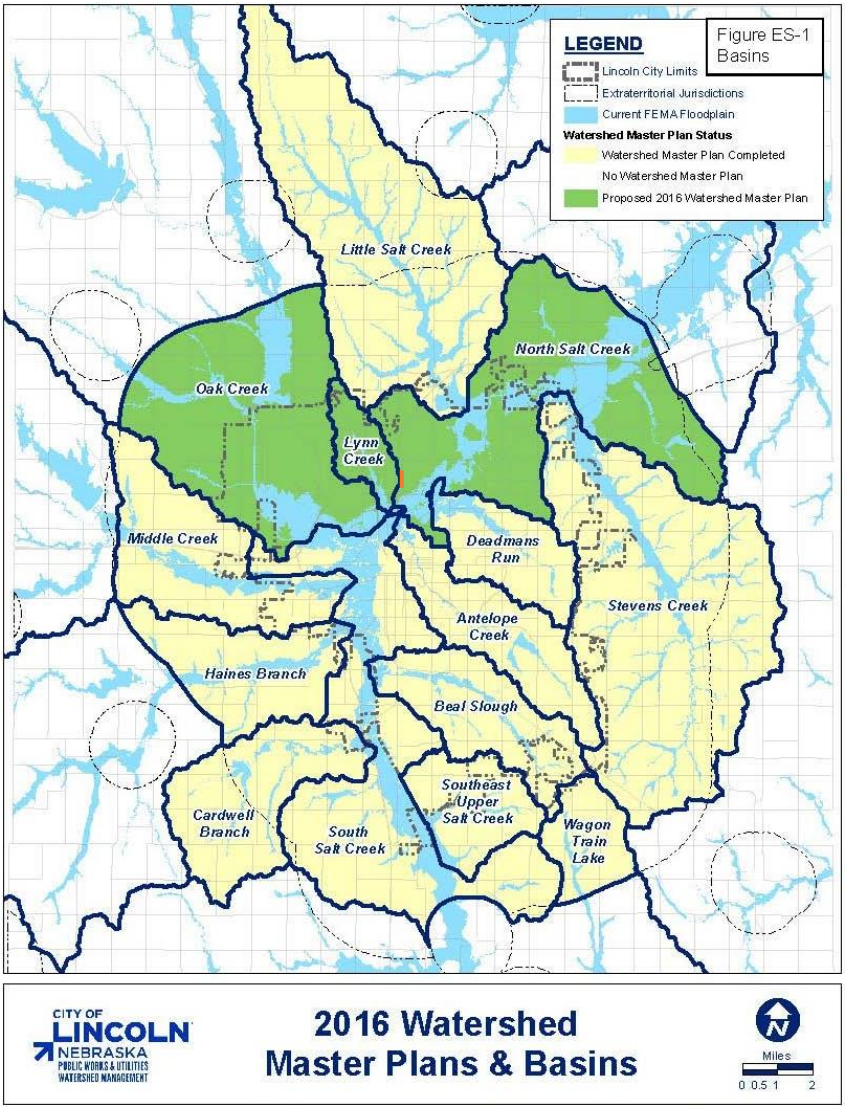

Figure 8. Lincoln Watersheds

Pre-Construction Runoff Analysis

For design, the Consultant plans to use the rational method to find flow. Given that Q is flow, C is the runoff coefficient, I is the rainfall intensity, and A is area of the drainage basin, the formula for flow is:

$$Q = CIA$$

The area was outlined to be the project limit of construction area, which covers 7.5 acres, in order to consistent for the pre-construction and post-construction runoff analysis.

A composite runoff coefficient for the area can be found by measuring the present areas that are covered by different surfaces such as impermeable pavement or grassy land. These areas were measured based on the existing survey and are outlined in Table 9. The runoff coefficient of 0.80

for the pavement was based on typical ranges for pavement. The runoff coefficient for the grassy surfaces was found in a table in Chapter 2 of the City of Lincoln Drainage Criteria Manual based on the predominance of Hydrologic Soil Groups B and C and average slopes (City of Lincoln, 2014). Thus, based on values outlined in the area, a composite runoff coefficient of 0.56 was chosen for the pre-construction runoff coefficient.

Table 9. Pre-Construction Runoff Coefficient Breakdown

Description	Coefficient	Area (ac)	Percent of Total
Pavement	0.80	4.7	63
Grass	0.17	2.8	37
Pre-construction composite coefficient:			**0.56**

Per Chapter 3 of the City of Lincoln Drainage Criteria Manual, storm sewers on commercial, industrial, and arterial roads such as N. 14th Street should be designed for a return period of 10 years (City of Lincoln, 2014). The rainfall duration for this design storm should be equal to the time of concentration, or the time it takes from rainfall to travel from the most remote point in the watershed to the inlet and through the storm sewer to the outfall. A chart was provided in the Drainage Criteria Manual to find the time of concentration based on the distance covered by the most remote path, the slope of the area, and the runoff coefficient. The path found to be the most remote was over a distance of 200 feet and had a slope of about 1.5 percent. Based on these values and the runoff coefficient of 0.56, a time of concentration of approximately 20 minutes was found. Thus, the design storm will have a duration of 20 minutes. The intensity-duration frequency (IDF) curve provided in the City of Lincoln Drainage Criteria Manual and shown in Figure 9 was used to find the rainfall intensity (City of Lincoln, 2014). Based on the criteria of a 10-year return period and 20-minute duration, the rainfall intensity is 4.1 inches per hour.

Based on these numbers, the expected flow in the project area pre-construction is expected to be 17.22 cubic feet per second. It is assumed that the storm sewers in the area are already designed to handle this flow and meet City standards for drainage and flooding. Based on the Drainage Criteria Manual, this means that the existing storm sewer is able to handle a 50-year storm without water overtopping the curb. The City standards also state that a 100-year storm will not cause flooding that will damage the roadway or adjacent properties. The existing storm sewer was designed to accommodate runoff from a 10-year storm since this is classified as a commercial/industrial area. This means that stormwater will not encroach on the street to cause any safety hazard to vehicles or pedestrians for a 10-year storm (City of Lincoln, 2014).

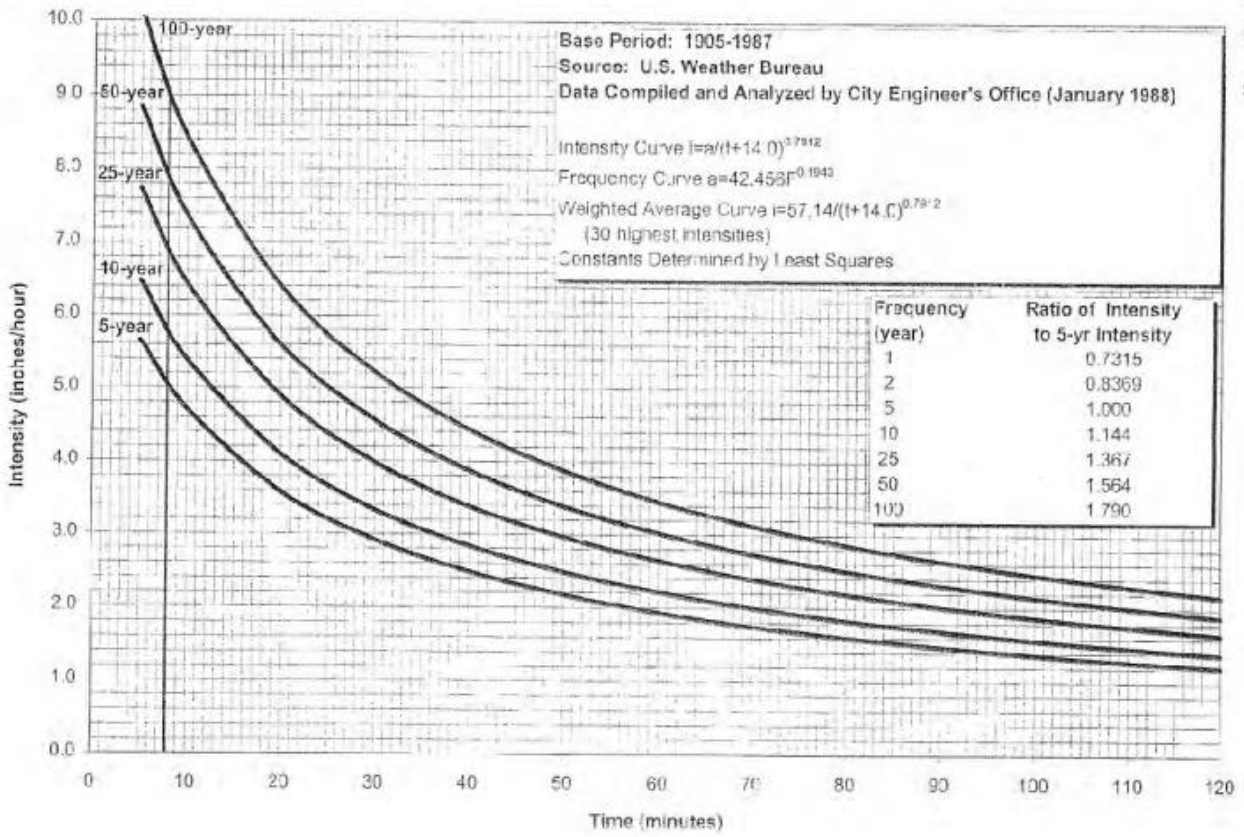

Figure 9. IDF Curve from City of Lincoln Drainage Manual

Post-Construction Runoff Analysis

The rational method, as described in the previous section, was also used to perform a post-runoff construction analysis using area, runoff coefficient, and rainfall intensity. The area of the post-construction area is the same as in the pre-construction runoff. This is the area within the limits of construction: 7.5 acres.

Table 10 outlines the breakdown of areas and corresponding runoff coefficients for the surface types after construction of the roundabout. The center and medians of the roundabout are planned to be surfaced with bricks or permeable pavers, and thus have a lower runoff coefficient of 0.70. Based on these values, the post-construction runoff coefficient is expected to be 0.52. Comparing this to the pre-construction runoff coefficient of 0.56, it can be seen that this construction of the roundabout will not create any additional impervious surfaces that would create additional runoff. Thus, no adverse impacts should be expected with the storm sewer system.

Table 10. Post-Construction Runoff Coefficient Breakdown

Description	Coefficient	Area (ac)	Percent of Total
Pavement	0.80	3.7	49
Grass	0.17	3.2	43
Permeable Pavers	0.70	0.6	8
Post-construction composite coefficient:			**0.52**

To find the rainfall intensity, first the time of concentration must be found. The parameters are approximately the same for post-construction due to the inlets being around the same locations. Thus, the time of concentration and equivalent storm duration was set to 20 minutes. This yields the same rainfall intensity of 4.1 inches per hour.

Utilizing the rational method to combine the area of 7.5 acres, runoff coefficient of 0.52, and rainfall intensity of 4.1 inches per hour yields a flow of 16.0 cubic feet per second. Due to the lessening of permeable surfaces, it is logical that there would be less runoff post-construction. This means that the existing storm sewers should have sufficient capacity to handle runoff in the project area and meet City of Lincoln drainage standards.

Utility Review

Three plan sheets have been prepared showing the existing utilities in the area and describing precautions and phasing during construction. These plan sheets are attached, numbered sheets W-001 through W-003.

Sheet W-001 shows the utilities around the intersection of N. 14th Street and Cornhusker Highway. As the sheet describes, all water lines, sanitary sewers, and storm sewers are assumed to be at grade with Cornhusker Highway with the necessary depth of cover unless otherwise specified. The contractor shall not disturb any of these existing utilities. There is one utility line that is assumed to be going across the N. 14th Street bridge that the Consultant is proposing to remove. However, that 8-inch VCP sewer line runs in parallel with another 8-inch VCP sewer line that is at grade with Cornhusker Highway. Both of these lines converge at sanitary manholes and continue as 8-inch lines either way. Thus, it is assumed that one of the lines is redundant. Due to this, the sewer line running across the bridge should not need to be reconstructed with this project. Prior to removal of the bridge and this redundant line, the contractor shall test that the western line is operational. Then, a cap and plug shall be installed to close off the portion of line that is being removed along the bridge. Plan sheet W-001 also calls out the existing storm sewer inlets and existing manholes that will need to be relocated or brought to grade. Plan sheet W-003 provides more detail regarding the relocation of storm sewer inlets. The contractor shall bring 3 specified manholes to grade with the proposed pavement during construction.

Plan sheet W-002 shows the utility plan in the area of the bridge over Oak Creek. There is presently a 12-inch water main running across the bridge in a conduit. Prior to bridge removal, the water main shall be turned off using the valves on either side of the bridge. The existing line

shall then be cut and temporarily capped. After bridge construction, the new 12-inch pipe shall be threaded through the conduit built into the new bridge. This will be surrounded by 3.5 inches of insulation to prevent the pipe from freezing. The water main and insulation will be threaded through a conduit that is installed on the bridge per sheet S-003. After this installation, the new water line will be connected to the existing portion. Prior to turning the water back on and completing construction, the new water line will need to be pressure tested. Additionally, the line will be chlorinated to ensure disinfection and then tested for bacteria. These tests must be sufficient before reopening the water main for service.

If it is not possible to shut down the water line crossing the bridge during construction, an alternate option may be needed. Modeling to determine whether or not the other existing water lines in the area have the capacity to provide water in the area is outside the scope of this project, and so the option of constructing the new bridge with a conduit pipe carrier is assumed to be sufficient for the basis of this design. However, in the case that the City of Lincoln would prefer not to shut off the water line during bridge construction, an alternate bid option can be prepared. This alternate option would be to directionally drill the water main under Oak Creek within a casing. This would minimize and almost eliminate the shutdown time, although it would be more costly.

Plan sheet W-003 shows the locations of the proposed storm sewer inlets that are being relocated to match the new roundabout alignment and elevation. Removal of these 12 inlets shall include plugging the existing opening in storm sewer pipe that the water drained into. The new inlets shall all be 72-inch curb-opening inlets constructed per City of Lincoln standard details. All inlets are being constructed directly above the existing storm sewer lines, such that a new tap into the line will need to be constructed, but the pipelines will not need to be relocated. Based on the pre- and post-construction runoff analyses, it is shown that no additional modification or expansion is necessary for the storm sewers in the area.

Groundwater Wells

There are three groundwater wells within the project area, as shown in Figure 10. Information about these wells is listed in Table 11. Since these nearby wells just have the purpose of monitoring groundwater and are not a water supply, it is assumed that no wellhead protection program requirements will apply to the project area. The two wells north of Cornhusker Highway are currently active to monitor groundwater quality. Since they are near the proposed roundabout and interfere with the proposed sidewalk at Cornhusker and North 14th Street, they will need to be decommissioned and relocated.

The contractor will need to contact the owner, Whitehead Oil Company, and coordinate decommissioning and replacement of these two wells by an approved well contractor in Nebraska. It is likely that Whitehead Oil Company installed these wells to monitor an oil or gas spill in the area to ensure it was not contaminating the groundwater supply. These monitoring wells shall be decommissioned per Nebraska Title 178 which specifies water well standards (NDHHS, 2014). This will include adding disinfectant to the well and then filling the hole with an approved fill material such as grout. The upper 3 feet of the casing shall be cut and removed

then filled with a grout seal and topped with native soil. A notice of decommissioning will then need to be sent to the Director of the Department of Natural Resources. More specific details for decommissioning and fill materials are outlined in Section 12-012 of Title 178 (NDHHS, 2014).

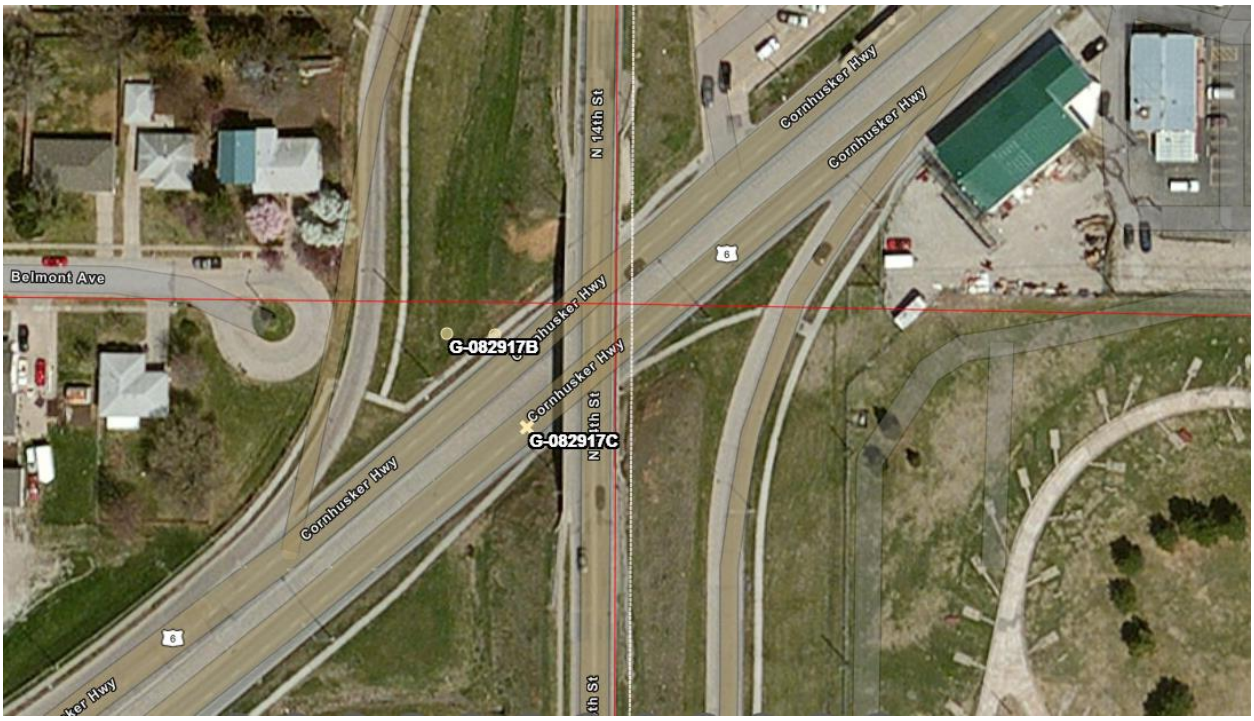

Figure 10. Wells in Project Area (NDNR, 2022)

Table 11. Information about Wells in Project Area (NDNR, 2022)

Name	Well ID	Purpose	Status	Owner
G-082917B	92658	Monitoring (Ground Water Quality)	Active	Whitehead Oil Company
G-082917A	92657	Monitoring (Ground Water Quality)	Active	Whitehead Oil Company
G-082917C	92659	Monitoring (Ground Water Quality)	Decommissioned	Whitehead Oil Company

Environmental Review

Overall, there does not seem to be many environmental issues that would constrain the project corridor, much of which will be expanded upon in the 404 Permit Section. Minimal new permanent impact is expected on the stream channel for Oak Creek due to the fact that the bridge is being removed and reconstructed with the same pier size. There are no wetlands in the project area. The endangered Salt Creek Tiger Beetle lives in the area around Salt Creek, but this project is not expected to impact the creek or discharge any runoff into it, so that should not be an issue.

One impact to keep in mind with regard to social and environmental justice is the impact to low income and minority populations in the project area. The residential area south of Atlas Avenue

and northeast of 14th and Cornhusker has been identified as low to moderate income. However, since the modifications are primarily just to the intersection of N 14th Street and Cornhusker Highway, this is not expected to impact any residential streets in the area. No historic or archaeological structures have been identified in the project area except for a few homes in the area. The Consultant plans to minimize impact to homes in the area already, so the project should not affect any historic structures. Since care will be taken not to disturb any existing building structures in the area and avoid impact to residents and businesses in the area, there is no plan to look into building zoning ordinances with regard to this project. Due to the project area not disturbing or acquiring any public park or recreation areas, historic sites, or wildlife areas, Section 4(f) or Section 6(f) permits are not anticipated.

Figure 11 shows the location of USACE levees near the project area, which are located along Salt Creek. Due to this proximity to the levee and floodway, the Consultant will need to prepare an Emergency Action Plan for the contractor to follow in case of a dangerous rise in water levels during construction.

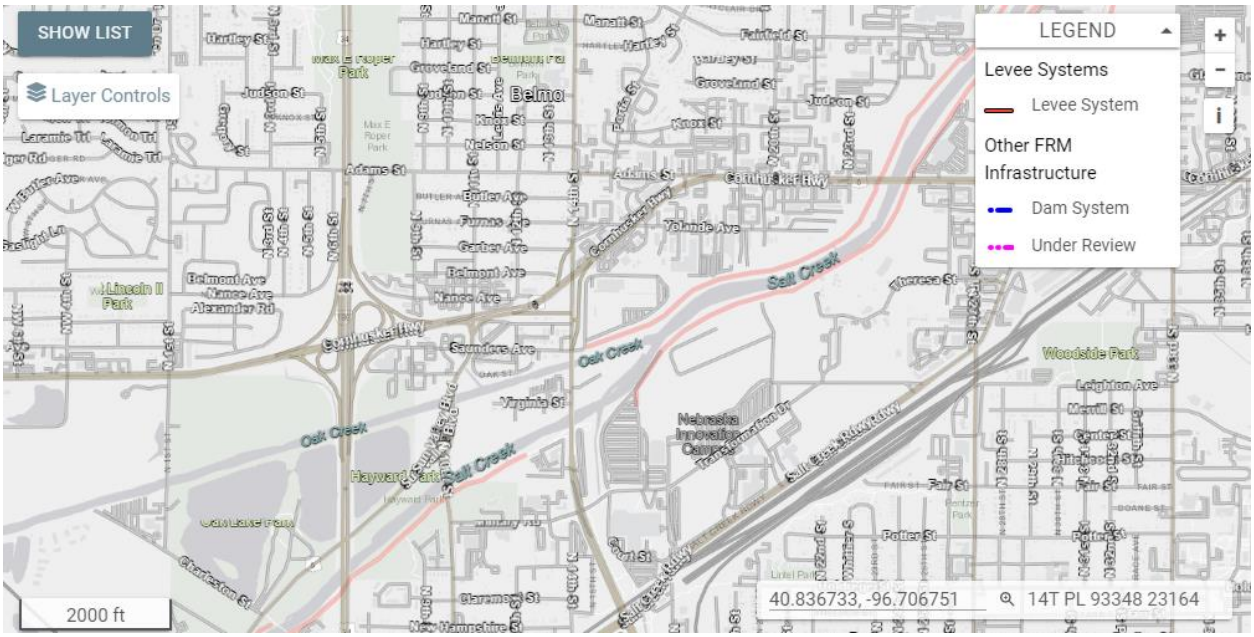

Figure 11. Map of USACE Levees

Section 404 Permit Review

A Section 404 Permit will need to be obtained from the US Army Corps of Engineers (USACE) due to work within Waters of the US where the N. 14th Street corridor crosses Oak Creek. This permit will require review and delineation by the Consultant of many different environmental aspects of the project as outlined in the following sections. This includes preliminary information and maps that will assist in applying for the Section 404 Permit.

Purpose and Need

Due to increasing traffic volumes, aging infrastructure, and safety concerns, the City of Lincoln is seeking to improve the North 14th Street Corridor from Virginia Street to Adams Street. A primary safety concern is the merging of vehicles from N. 14th Street to Cornhusker Highway due to the N. 14th Street bridge causing a lack of sight distance and only a short distance to merge. Due to this, the Consultant is proposing to remove the bridge and design 14th and Cornhusker as an at-grade signalized intersection. The N. 14th Street bridge crossing Oak Creek is in disrepair and needs to be repaired or replaced. The Consultant plans to remove and replace this bridge. Throughout the N. 14th Street corridor, repaving will be done to maximize design life. A review and upgrading of storm sewers and utilities will be done as necessary throughout the area. Since this project primarily consists of reconstruction, limited impacts to the environment or surrounding waterways are expected.

Wetlands and Waters of the U.S.

Figure 12 shows the wetlands and surface waters near the project area. There are no wetlands within the 14th Street corridor. The only surface waters, or Waters of the U.S., is where the 14th Street bridge crosses Oak Creek. Since the bridge is simply being removed and reconstruction, no new permanent impacts are expected to the stream channel. Approximately 0.50 acres of temporary impact are expected in the stream channel due to construction activities.

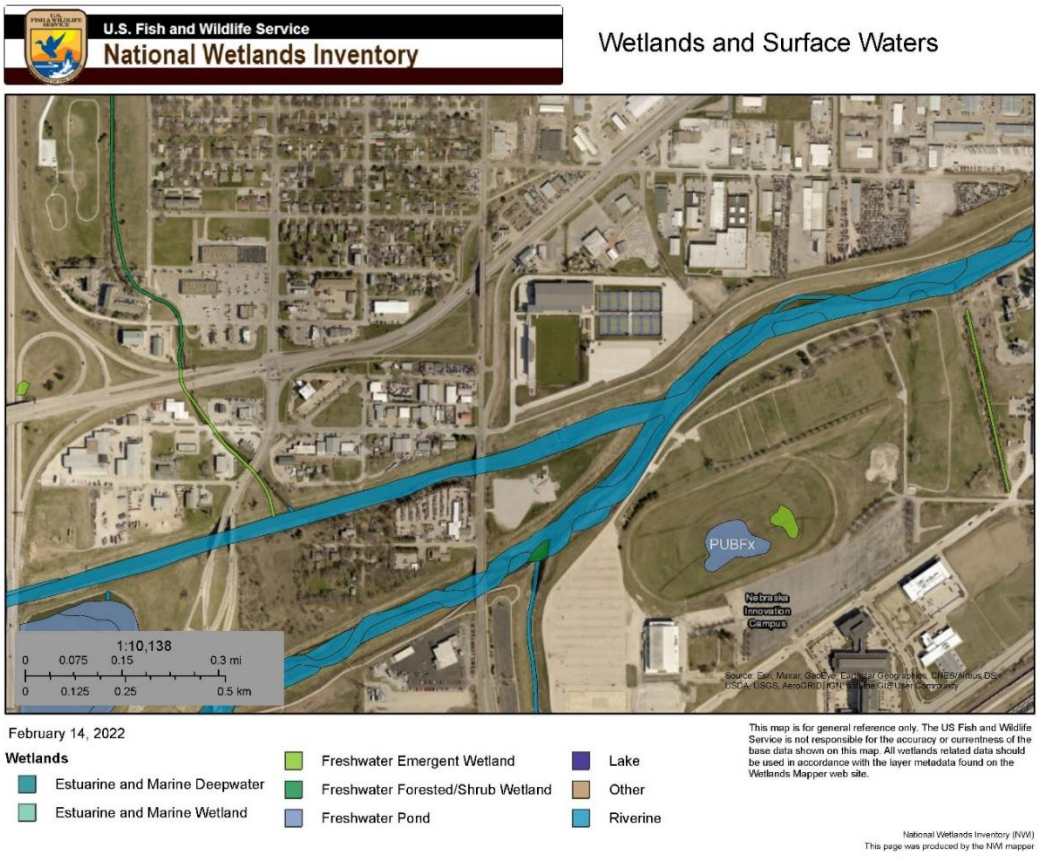

Figure 12. Wetlands and Surface Waters Map (USFWS, 2021)

Floodplain and Floodway

The majority of 14th Street along the project corridor is not within the floodplain, although some areas directly adjacent are in the floodplain, as shown in light blue in Figure 13. Oak Creek and Salt Creek flow under 14th Street. Due to this, the bridge that will be reconstructed over Oak Creek is in the floodway, and precautions will need to be taken accordingly. Since it is an existing bridge being replaced, no changes are expected to the stream channel cross-sectional area to cause a rise in water level.

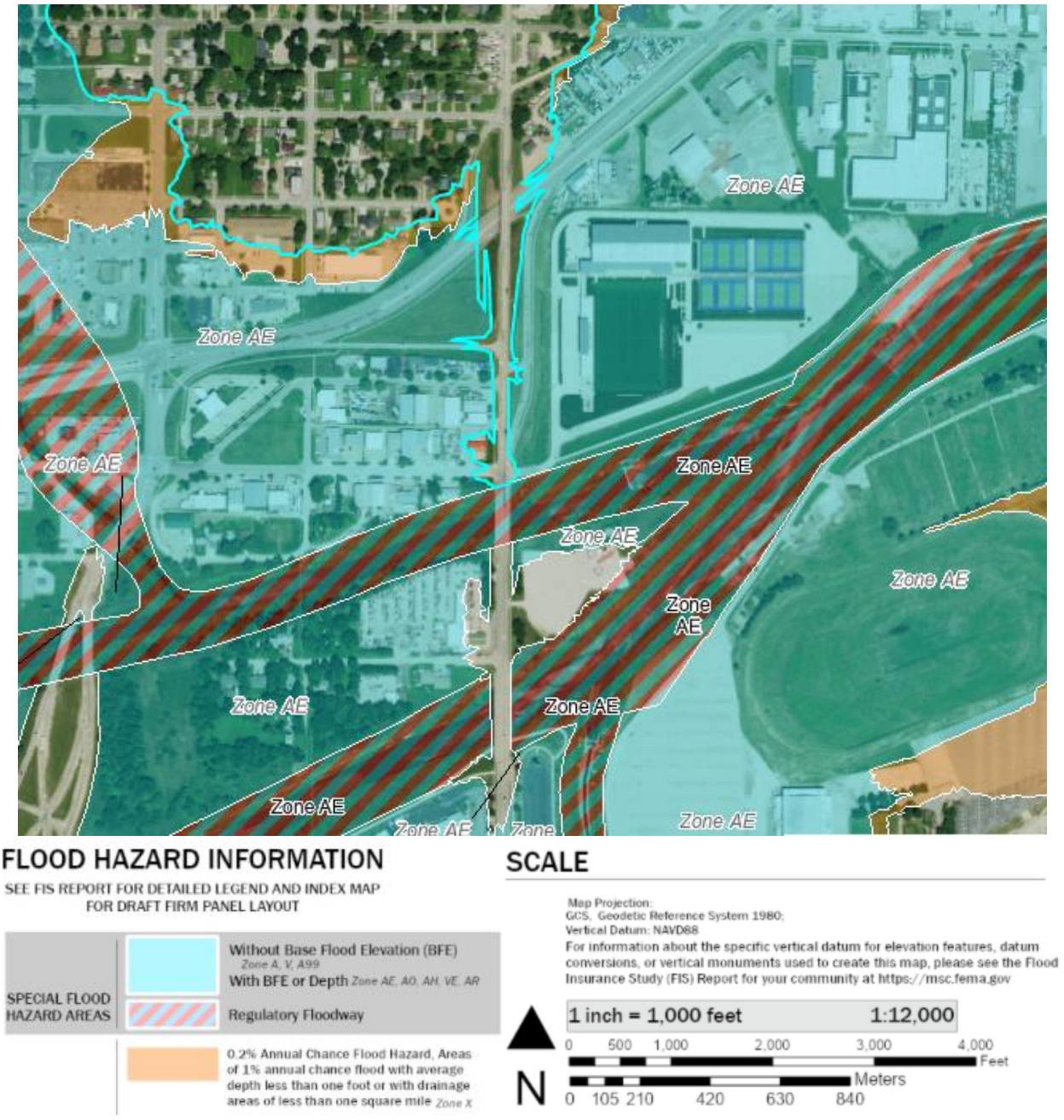

Figure 13. Floodway and Floodplain Map (NDNR, 2022)

Endangered Species Review

The only endangered species identified within the potential project area is the Salt Creek Tiger Beetle. According to the Nebraska Natural Heritage Program, it categorized as Endangered both by state and federally (NGP, 2022). Figure 14 shows a map of the closest critical habitat for the Salt Creek Tiger Beetle and the rating of surrounding areas for how crucial the habitat is there. As can be seen in the figure, the N. 14th Street Corridor, marked in green, is about two miles away from the crucial habitat. The project area is ranked 3 with the Crucial Habitat Assessment Tool, where 1 is the most crucial. Thus, the project is not expected to critically endanger the species. However, one precaution that must be taken during construction is to ensure that the habitat is not disturbed by not discharging stormwater to Salt Creek.

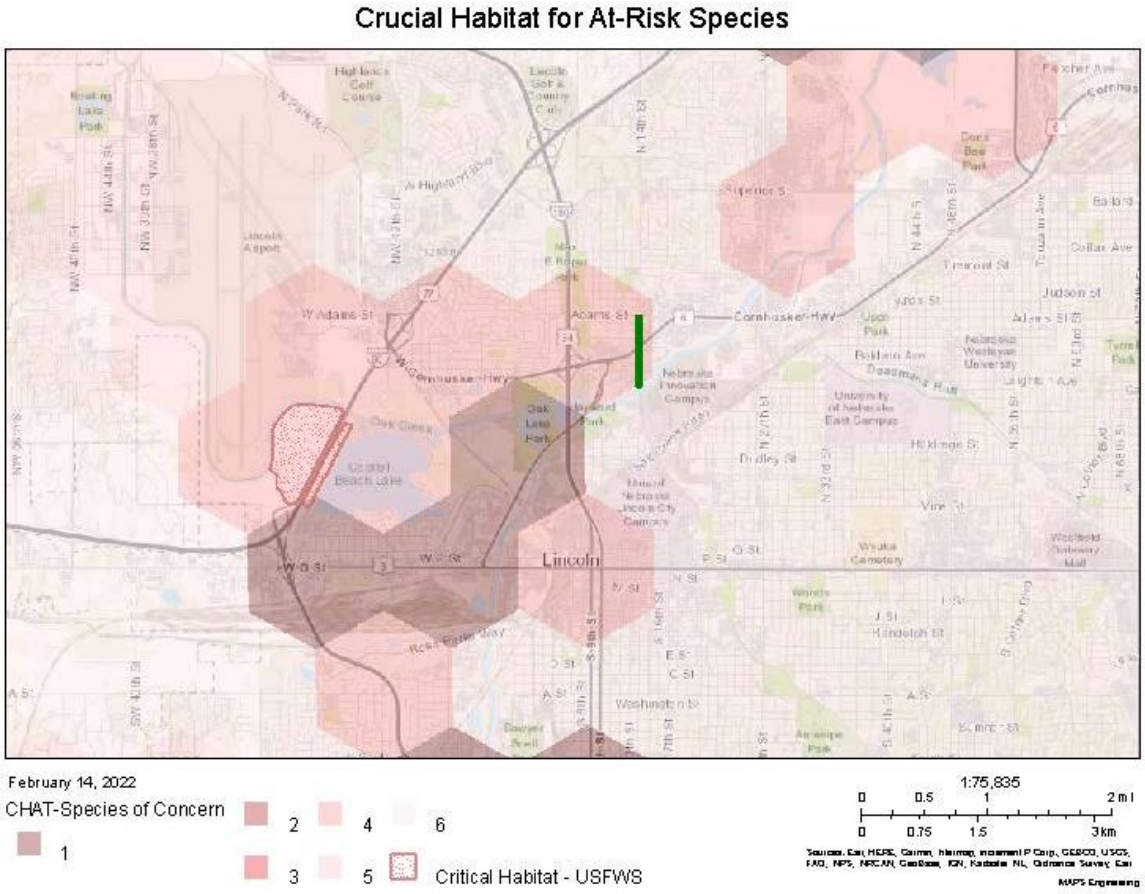

Figure 14. Crucial Habitat for At-Risk Species (Nebraska Game and Parks, 2022)

Additionally, any trees that are removed may not be removed between June 1st to July 31st due to the northern long-eared bat roosting season.

Impaired Waters

According to the US Environmental Protection Agency (EPA), Oak Creek is not categorized as an impaired water. However, Salt Creek, which is just outside the project limits, is impaired, as

shown in Figure 15. The EPA categorized Salt Creek to be impaired for recreational use for E. coli (EPA, 2020).

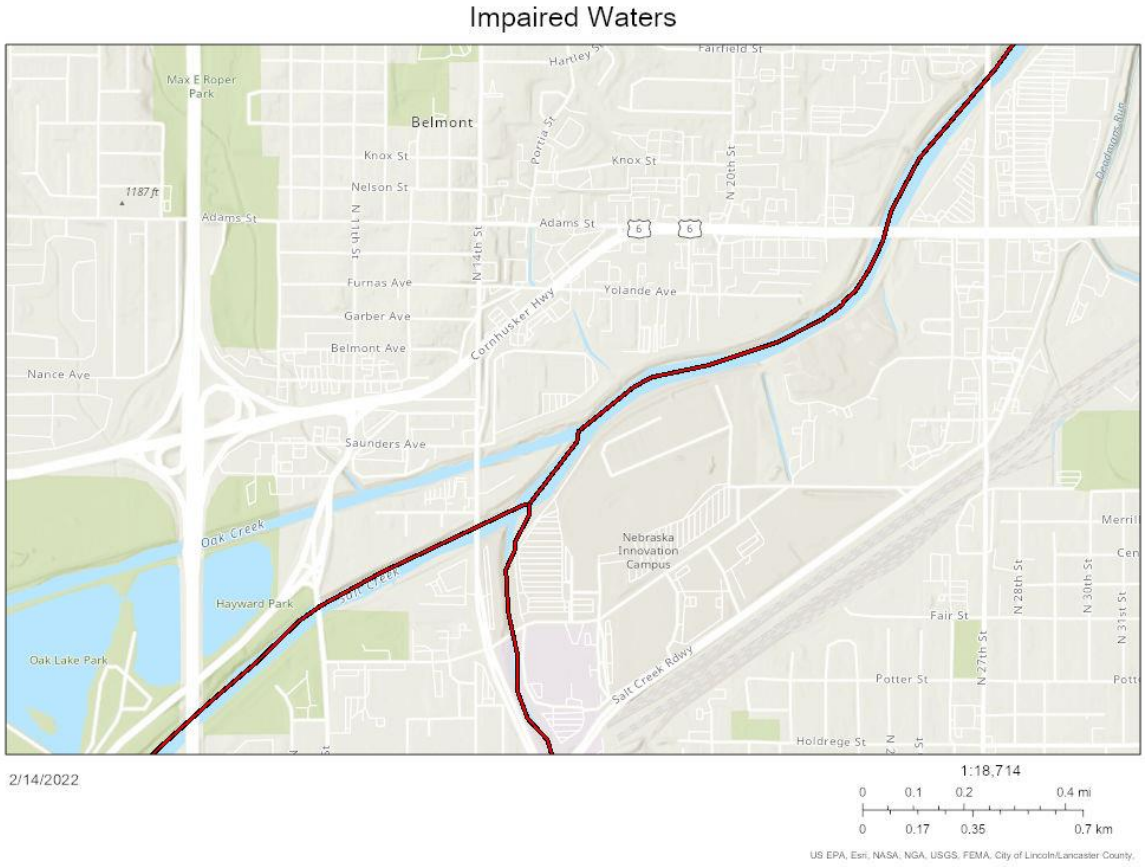

Figure 15. Impaired Waters Map (EPA, 2020)

Soil Map

A soil map of the project area from the NRCS Web Soil Survey is shown in the previous section in Figure 7. It was found that most of the project area belongs to Hydrologic Soil Group B, having a moderate infiltration rate when wet (NRCS, 2022). Most of the land is classified as Urban.

NPDES Permitting Review

A National Pollutant Discharge Elimination System (NPDES) permit will be required along with the preparation of a Stormwater Pollution Prevention Plan (SWPPP) to manage construction stormwater. This will account for ensuring any runoff from the project does not adversely affect the surrounding environment or streams. This permit application along with supporting maps and drawings will need to be approved by the Nebraska Department of Energy and Environment and the City of Lincoln.

The SWPPP figures are attached as sheets W-004 and W-005. Measures include a silt fence around the entire project area to limit construction runoff and sediment from getting outside the

project area, which would lead to erosion. Another SWPPP measure shown is to install an erosion control blanket on all slopes that are being graded and on areas that pavement is being removed. This will prevent soil from being exposed and eroding or creating sediment that would erode other surfaces. A final sediment and erosion control measure is straw wattles along the bank by the bridge removal and reconstruction over Oak Creek. These will prevent excess sediment from getting into the creek due to construction activities. All management practices shall be installed by contractor according to the City of Lincoln standard details and specifications. Estimated costs of these items are outlined in the attached cost estimate.

Other Permitting Requirements

In addition to the Section 404 and NPDES Permits, several other permits are anticipated for construction. A Right-of-Way Permit will be required prior to construction on the roadway and in the adjacent right-of-way areas. Due to the demolition of the bridge over Cornhusker Highway and any excavation that may be needed, a Construction & Demolition Waste Landfill Permit may be required to plan how the waste will be disposed of. Depending on the machinery and equipment used by the Contractor, an Air Construction Permit may be required to regulate air quality near the project site. Due to the water and sewer lines along the bridges that the project is disturbing, permits regarding Public Water Supply and Domestic Wastewater are also anticipated.

Project Impacts

With such a large-scale project, it is important to discuss potential effects the project will have on the local community. MAPS Engineering has identified some, not all, of the significant environmental, social, and economic impacts of this project below.

Environmental Impact

As discussed in the previous Environmental Assessment sections, there is not expected to be any lasting environmental impacts due to this project. Precautions will be taken during construction to ensure there are no adverse impacts to the surrounding waterways, plants, and animals. The SWPPP figure will help to prevent erosion and sedimentation. Overall, this project will result in an increase of permeable vegetated areas, which will help to manage stormwater and create a more natural aesthetic in the area and benefit the environment.

Additionally, adding an option for individuals to walk or bike in this area can encourage individuals who live in the area to access this area by foot instead of by a vehicle, decreasing vehicular emissions and the pollution created by them.

Social Impact

The completion of this project will bring about an overall increase in safety when navigating through this area. Removal of the bridge over Cornhusker Highway and the connecting merging ramp eliminates the hazards associated with turning onto Cornhusker Highway from North 14th Street with limited sight distance. Both the Cornhusker bridge and the bridge over Oak Creek pose safety concerns themselves, as they are both heavily deteriorated. The Oak Creek bridge

replacement will be better adapted to carry the increasing traffic volumes of the area in comparison to the existing bridge which was constructed in 1965.

This project will also promote healthy living habits and increase walkability in this area, promoting bicycle and foot traffic as an alternative to car travel. Communities with walkable environments are less likely to have adverse health effects and are more likely to have better mental and physical health.

The roundabout design at 14th and Cornhusker includes sidewalk connecting on all sides of the road, allowing for the continuation of the bike trail that was once cut off by the Cornhusker bridge. With crosswalks to be added on the roundabout, it will be much safer for pedestrians to navigate this area than previously. As this project primarily concerns arterial roads, no impact is expected on the residential streets, so no adverse social impact is expected to the residents in the area.

Economic Impact

The North 14th Street Corridor Improvement project will also have positive economic impacts. Bridges are much more costly to maintain than at-grade intersections, and so the removal of the Cornhusker Bridge will prevent the City of Lincoln from having to continuously maintain another bridge. Additionally, the new bridge over Oak Creek will be in excellent condition and not need significant maintenance for a while.

The development of the Cornhusker and North 14th Street roundabout and adjacent sidewalk will bring more foot and bike traffic to the area, which could benefit the surrounding businesses. The at-grade roundabout will provide more visibility and ease of access to cars driving in the area who want to visit specific businesses. Additionally, the roundabout will lead to more open land in the area due to removing the space-consuming merging lanes. This land could be used for future development to further activity in the area.

Project Cost Estimate

MAPS Engineering has prepared a preliminary cost estimate based on the 90% design plans and project scope. The itemized opinion of cost for construction will be attached and submitted to the client along with this project proposal report. The engineer's 90% total construction cost estimate was calculated to be $26,559,090. A summary of quantities accounted for in this cost estimate can be found in the appendix.

MAPS Engineering has also prepared an engineering fee estimate and found a project total of $4,200,000. It includes tasks such as project management, technical research, data collection, drafting and design, stakeholder coordination, meetings, preparing report, and record drawings. Additional engineering fees have been prepared for services such as project administration and marketing, geotechnical testing, surveying, and permitting fees. A breakdown of all the costs contributing to the total engineering fee can be found in Table 12 and the appendix.

Accounting for the opinion of construction cost and engineering fee, the improvements to the North 14th Street Corridor is expected to cost a total of $30,759,090.

Table 12. Project Engineering Fees

Task	Geotechnical Engineer	Transportation Engineer	Water and Environmental Engineer	Structural Engineer
	Maricela Paramo	***Ashley Nguyen***	***Samantha Corey***	***Pooja Rajeev***
Project Management	80	80	80	80
Technical Research	200	250	250	230
Data Collection	180	70	120	160
Drafting and Design	360	360	320	240
Opinion of Cost	100	150	90	110
Specifications	150	180	120	280
Permitting Tasks	60	50	120	50
Stakeholder Coordination	50	100	90	60
Meetings	120	50	60	60
Preparing Report	250	260	300	260
QA/QC	50	50	50	50
Record Drawings	50	50	50	70
Total Hours	1650	1650	1650	1650
Hourly Billing Rate	$ 250.00	$ 250.00	$ 250.00	$ 250.00
Hourly Cost Subtotal	$ 412,500.00	$ 412,500.00	$ 412,500.00	$ 412,500.00
				Additional Engineering Services
			Project Administration and Marketing	$150,000
			Geotechnical Testing Services	$600,000
			Surveying Fees	$900,000
			Permitting Fees	$100,000
			Construction Observation	$800,000
		Total Engineering Fees		**$ 4,200,000.00**

Project Schedule

A project schedule of task completion is shown in Table 13 below. This schedule is based on a best estimate from MAPS Engineering and is subject to change. Prior to the final design submittal, the Consultant plans to present the design at a city council or town hall meeting to

allow for additional stakeholder feedback and public involvement. Construction must be completed no later than August 31, 2023 to accommodate for Husker football game day traffic.

Table 13. Schedule of Task Completion

Task	Completion Date
Proposal and 30% Design	March 2022
90% Design Review Meeting	May 2022
Final Design	June 2022
Open for Bid and Choose Contractor	September 2022
Begin Construction	January 2022
Complete Construction-Phase 1	August 31, 2023

Conclusion

As a reminder, this report was written by students as part of a Senior Design Capstone course project. The designs and information provided here should not be used for construction, nor should it be used in place of work done by licensed professional engineers.

This report presented the 90% technical design for the North 14th Street Corridor Improvements by MAPS Engineering for the City of Lincoln. In addition to this report, attached is a complete plan set as well as construction and engineering cost estimates. We ask that you please review this design report and the attached documents and return any comments to MAPS Engineering for final design.

References

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NORTH 14TH STREET CORRIDOR IMPROVEMENTS

INDEX

N

N.T.S.

MAPS ENGINEERING

90% PROGRESS PLANS – NOT FOR CONSTRUCTION

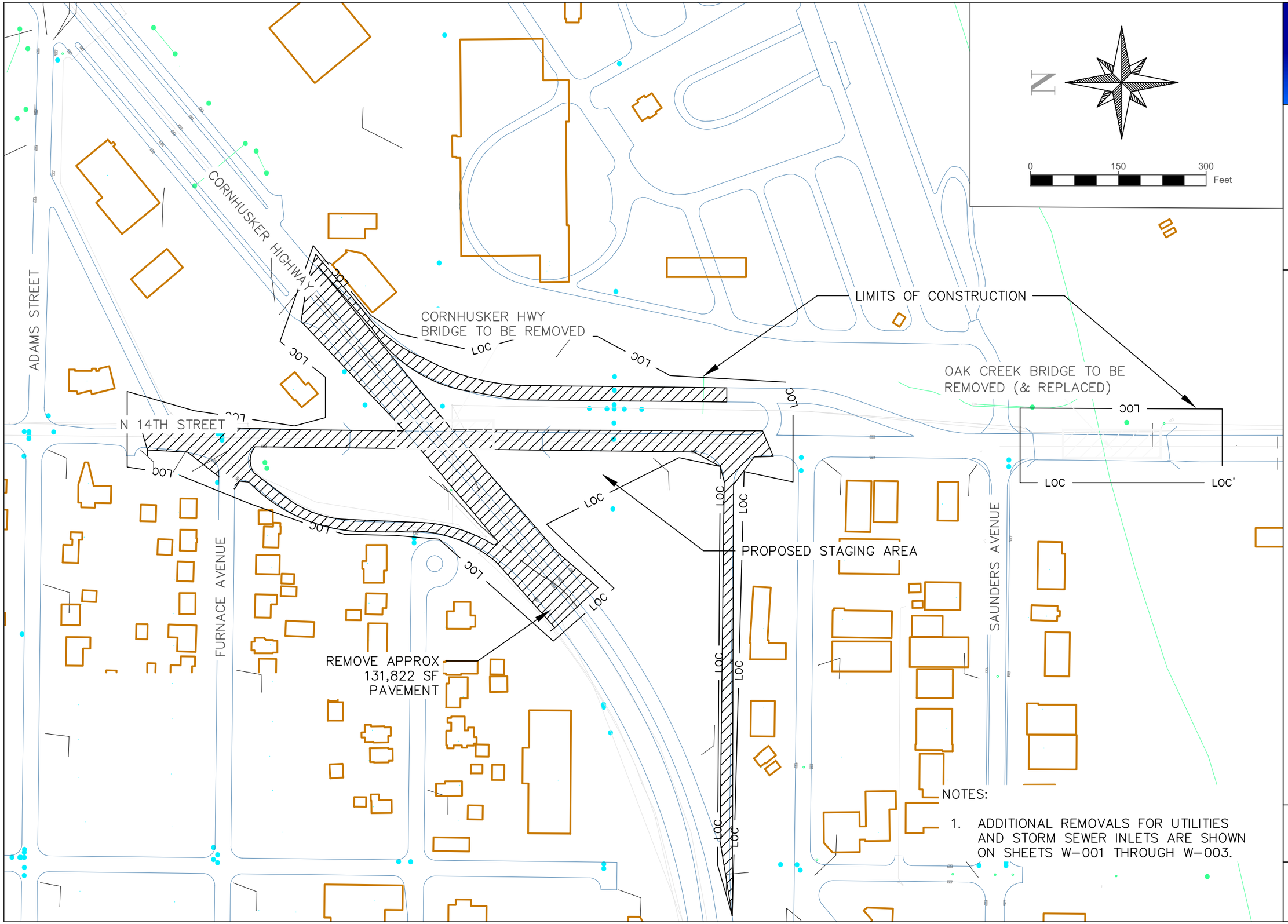
COVER SHEET

N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

DRAWN BY: ALN
CHECKED BY: SJC
DATE: 05/06/2022

SHEET
C–001



MAPS ENGINEERING

90% PROGRESS PLANS – NOT FOR CONSTRUCTION

EXISTING SITE DEMOLITION PLAN

N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

NOTES:

1. ADDITIONAL REMOVALS FOR UTILITIES AND STORM SEWER INLETS ARE SHOWN ON SHEETS W–001 THROUGH W–003.

DRAWN BY: ALN
CHECKED BY: SJC
DATE: 05/06/2022

SHEET
C–002

CORNHUSKER HIGHWAY

ADAMS STREET

N 14TH STREET

FURNAS AVENUE

SAUNDERS AVENUE

VIRGINIA STREET

LIMITS OF CONSTRUCTION

LOC

PROPOSED CONSTRUCTION STAGING AREA

PROPOSED AT-GRADE ROUNDABOUT

RECONSTRUCT BRIDGE OVER OAK CREEK

N

0 250 500 Feet

MAPS ENGINEERING

90% PROGRESS PLANS – NOT FOR CONSTRUCTION

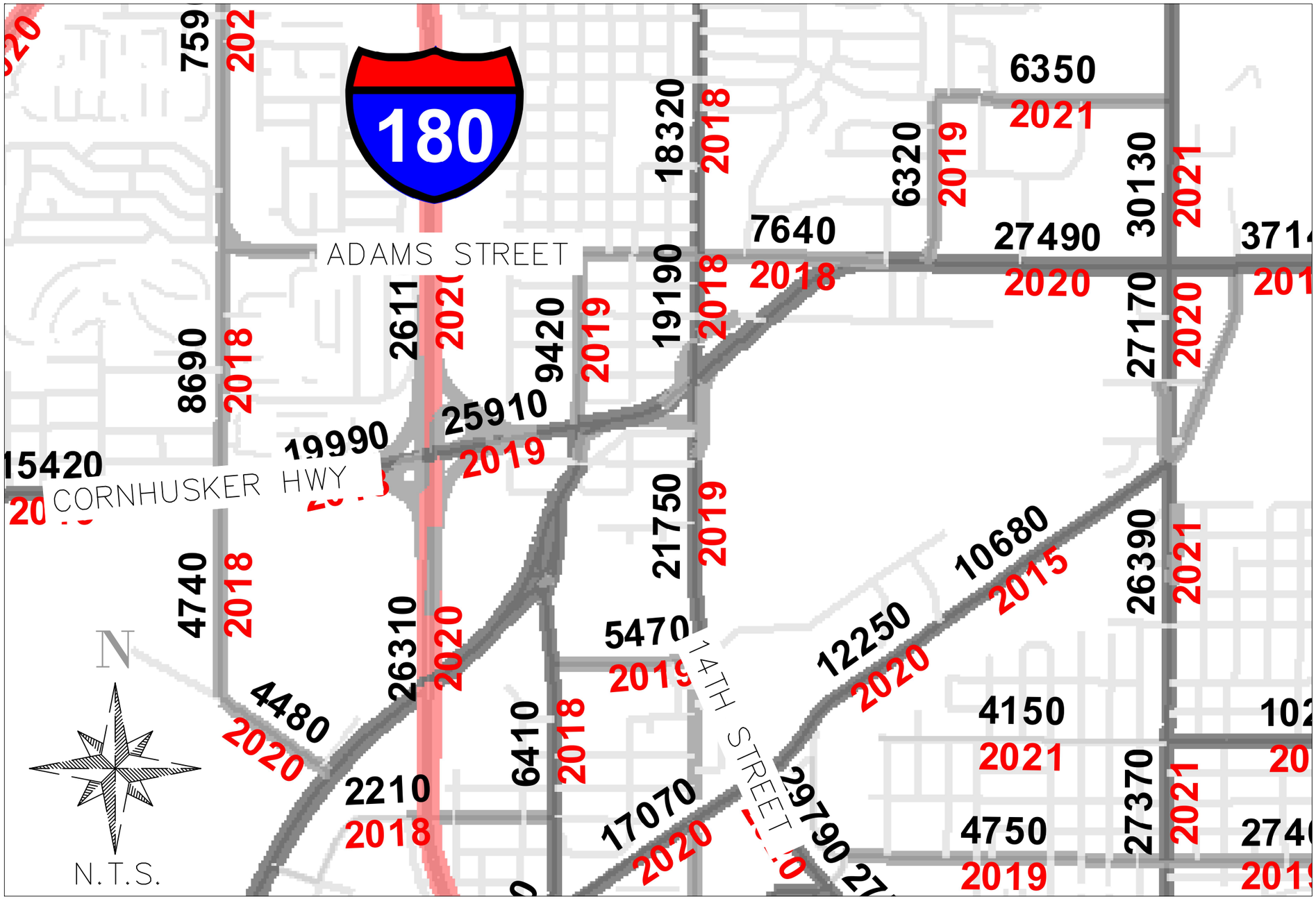
OVERALL SITE PLAN

N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

DRAWN BY: ALN
CHECKED BY: SJC
DATE: 05/06/2022

SHEET
C-003



MAPS ENGINEERING

90% PROGRESS PLANS – NOT FOR CONSTRUCTION

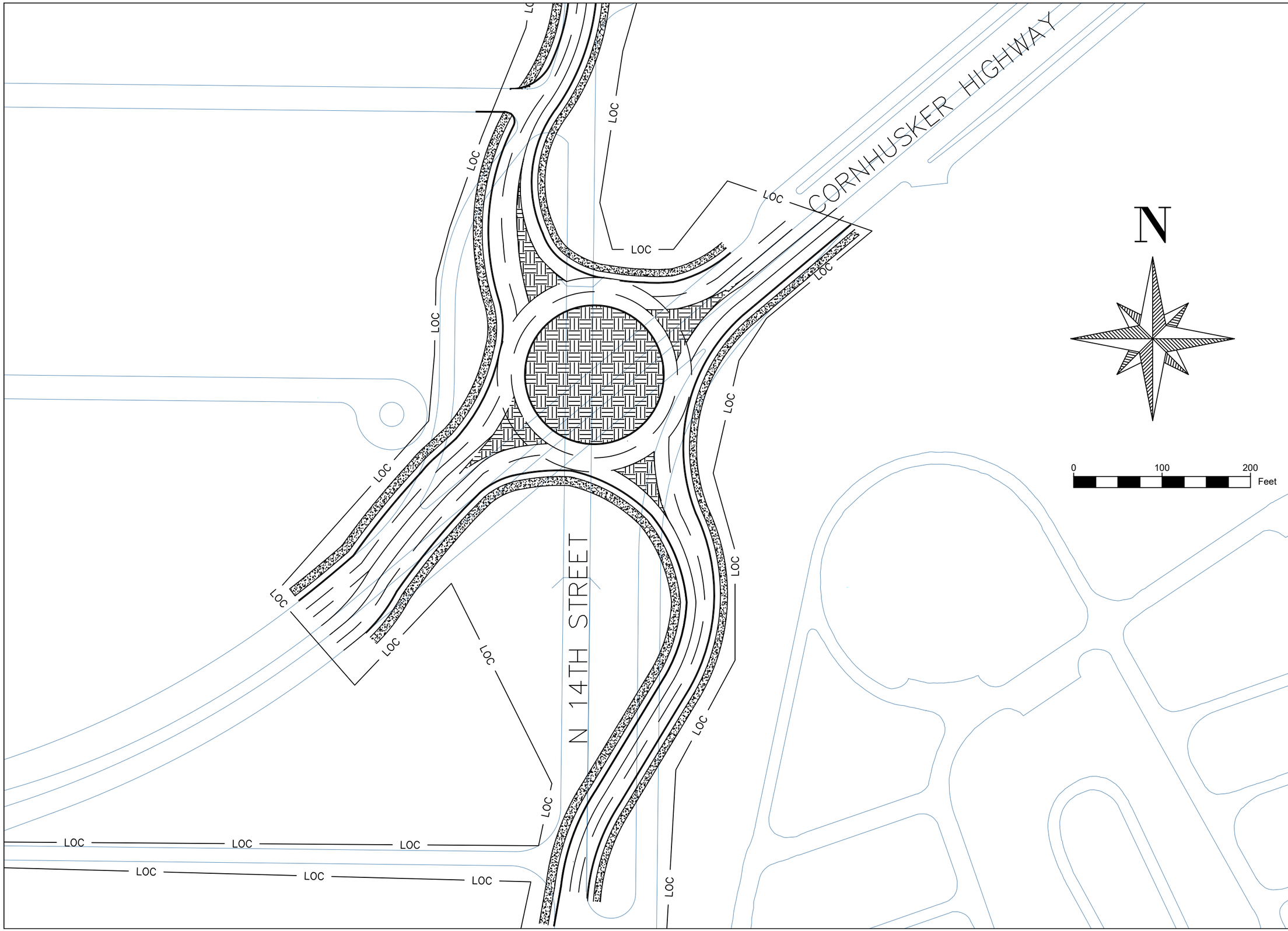
LTU AVERAGE DAILY TRAFFIC MAP

N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

DRAWN BY: ALN
CHECKED BY: ALN
DATE: 05/06/2022

SHEET
T–001



MAPS ENGINEERING

90% PROGRESS PLANS – NOT FOR CONSTRUCTION

CORNHUSKER HWY ROUNDABOUT

N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

DRAWN BY: ALN
CHECKED BY: SJC
DATE: 05/06/2022

SHEET
T–002

REVISIONS		
NO.	DESCRIPTION	BY	DATE
	Pile Layout	ALN	1-22-63

℄ Abut. No.1 Sta. 22+44.95 Gr. Elev. 1169.33

℄ Pier No.1 Sta. 23+13.45 Gr. Elev. 1170.33

℄ Pier No.2 Sta. 24+23.95 Gr. Elev. 1170.97

℄ Abut No.2 Sta. 24+76.45 Gr. Elev. 1155.41

℄ Bridge Sta. 23+48.95

3" Ornamental Handrail Expansion Device (at Roadway Expansion Device)

Ornamental Handrail

1"Cl.

Grade

Prestressed Concrete Piling

Low Steel Elev. 1165.16

Profile of Natural Ground

Elev. 1152.62

Elev. 1162.33

Prestressed Concrete Piling

Class B, Type "B" Embankment to be constructed by the Grading Contractor before the Abutment work begins.

Prestressed Concrete Piling

Class B, Type "B" Embankment to be constructed by the Grading Contractor before the Abut. work begins.

℄ Right Roadway

℄ Left Roadway

Prestressed Concrete Piling

* Dimensions normal to ℄ Piers

DESIGN PILE BEARING

Abutments 36 T/Piles

Piers 35 T/Piles

This structure is located between Sec. 18 T10N - R6E & Sec. 13 T10N - R6E.

SECTIONAL ELEVATION

Scale: 1" = 20'-0"

End to End of Floor = 213'-0½"

℄ to ℄ Abutment = 211'-6"

Span No.1 = 49'-0"

Span No.2 = 110'-0"

Span No.3 = 52'-6"

5 Spa. @ 9'-6" = 47'-6"

23 Spa. @ 7'-6" = 172'-6"

7 Spa. @ 15'-0" = 105'-0"

179'-3"

Ornamental Handrail

Post Spacing

{Preformed Expansion Joint in Curb (Sponge Rubber Type)

End of Buttress

℄ Wing

℄ Roadway

Roadway Expansion Devices

Capacity Plate

Y = 32.7"

Y = 9.8"

End of Floor Sta. 24+77.22

End of Floor Sta. 22+66.18

℄ Light Standard Bases

℄ Right Roadway

℄ Left Roadway

{Preformed Exp. Joint in Curb (Sponge Rubber Type)

Ornamental Handrail Post Spacing

End of Buttress

GENERAL PLAN

Scale: 1" = 20'-0"

PILE DATA

Location	Pile No.	Pile C.O. Elevation	Min. Penet. below C.O.	Order Length
Abut. No.1	1	1161.83	51	55
	**2	1161.81	51	55
	**5	1159.12	51	55
	9	1158.12	51	55
Abut. No.2	1	1163.10	51	55
	**2	1163.10	51	55
	**8	1161.49	51	55
	9	1160.49	51	55
Pier No.1	All Piles	1143.62	31	35
Pier No.2	All Piles	1144.82	36	40

** Pile cut-off Elevations shall vary uniformly between these Elevations.

ROCKER & ROLLER DATA

Pier No.1	1687-B, Type I Rocker A = 11-0"
Pier No.2	1687-B, Type I Rocker B = 8'-6"

P = Positive Moment Section

N = Negative Moment Section

℄ Wing

℄ Roadway

Alternate Pouring Sequence

℄ Abut No.1

℄ Pier No.1

℄ Pier No.2

℄ Abut No.2

POURING DIAGRAM

Not to scale

Original Pouring Sequence

Section "B" shall be poured after Sections "A" have been poured. Sections "C" shall be poured after Section "B". Section "C" may be poured continuous with Section "B".

Alternate Pouring Sequence

Pour slab in 1, 2, or 3 pours as shown. Use retarders in all sections. Retarders shall be in accordance with the Special Provisions.

PILE LAYOUT

Not to scale.

Span No.1 = 49'-0"

Span No.2 = 110'-0"

Span No.3 = 52'-6"

Water level taken immediately

Water level after 6 hrs.

HOLE NO. 1

13' Rt. Sta. 22+71

Elev. 1148.8 Roadway fill, yellow-tan.

Elev. 1145.8 Clay, black, silty, gray below 4½'

Elev. 1130.8 Silt, dark gray, slightly clayey, slightly calcareous, sandy below 28'

Elev. 1116.3 Sand, medium clean.

Elev. 1111.8

Sandstone, orange-brown, 6" of ironstone @ 48½'.

Elev. 1073.8

HOLE NO. 2

13' Rt. Sta. 23+23

Elev. 1149.0 Roadway fill

Elev. 1145.0 Clay, black, silty.

Elev. 1131.0 Silt, dark gray, clayey, sandy below 28'

Elev. 1115.5 Sand, medium, clean contains gravel grains

Elev. 1111.0

Sandstone, orange-brown, contains traces of ironstone @ 55½'.

Elev. 1074.0

HOLE NO. 3

13' Rt. Sta. 24+38

Water level taken immediately

Elev. 1148.9 Asphalt & pavement.

Elev. 1143.4 Roadway fill.

Elev. 1141.9 Clay, black, slightly silty.

Elev. 1136.9 Clay, tan, silty, dark gray below 22'

Elev. 1117.4 Sand, medium- coarse to coarse, slightly silty and clayey.

Elev. 1111.9

Clay, gray, slightly silty with small layers of sand.

Elev. 1104.4 Sandstone, soft, orange-brown.

Elev. 1036.9

HOLE NO. 4

6' Lt. Sta. 24+5

Water level taken immediately

Elev. 1150.0 Asphalt.

Elev. 1149.5 Clay, brown slightly silty, (Roadway fill)

Elev. 1147.0 Clay, black slightly silty.

Elev. 1141.0 Clay, beige-tan, silty

Elev. 1131.0 Clay, dark gray, black below 25', soft, gray and silty below 29'.

Elev. 1117.0 Sand, fine to medium-coarse, clean with a 2-foot layer of brown-orange clay at 31'-39'.

Elev. 1098.0 Sandstone, fine, brown-orange, layer of ironstone @ 6-, saline.

Elev. 1085.0

HOLE NO. 5

9' Rt. Sta. 25+02

Water level taken immediately

Elev. 1150.6 Asphalt and pavement.

Elev. 1150.1 Roadway fill.

Elev. 1145.6 Clay, black, slightly silty.

Elev. 1141.6 Clay, tan silty.

Elev. 1125.6 Clay, dark gray slightly silty, very slightly calcareous.

Elev. 1115.6 Sand, clean, fine.

Elev. 1109.1 Sandstone, orange-brown ironstone layer @ 48½'.

Elev. 1095.6

HOLE NO. 6

7' Lt. Sta. 25+16

Water level taken immediately

Elev. 1150.6 Asphalt and concrete.

Elev. 1150.3 Roadway fill: tan clay

Elev. 1147.6 Clay, black, silty mottled gray and tan below 8', tan below 11', sandy below 15'.

Elev. 1127.6 Clay, dark gray silty.

Elev. 1117.3 Sand fine, clean.

Elev. 1113.8 Sandstone, fine-grained, orange-brown, small ironstone layers @ 41' and 58', saline.

Elev. 1075.8

LOG OF BORINGS

March, 1961

Note: Figures in right hand column indicate number of blows required to drive sampling pipe one foot, using 140 lbs weight falling 30 inches.

NOTES

All concrete for Prestressed Concrete Piling shall be Class "47B-P" or "47B-PHE."

All other concrete shall be Class "47A-S," "47B" or "47C-S."

All exposed edges of concrete shall be chamfered.

The working stress for concrete Class "47A-S," "47B" or "47C-S" is 1200 psi.

All reinforcing steel shall be deformed bars and that used for bent bars shall satisfy the bend test requirements for Structural Grade Steel in accordance with the Specifications.

The working stress for reinforcing steel shall be 20,000 psi for straight bars and 18,000 psi for bent bars. The working stress for structural steel is 18,000 p.s.i.

All steel in the flanges and web of the Welded Plate Girder, and Alternate Design Rockers and Rollers shall conform to the requirements of A.S.T.M. Designation A-373.

All other structural steel shall conform to the requirements of A.S.T.M. Designation A-7.

The borings as logged on these plans represent the character of the subsoil at the locations indicated. No guarantee is made that the subsoil conditions vary uniformly between or outside the given locations.

Concrete shims shall be varied to compensate for vertical curve and dead load deflection.

The unit price bid for Class "47A-S," "47B" or "47C-S" concrete for slab shall include the furnishing and placing of lightweight concrete filler blocks, 1" aluminum conduit and the ½ inch preformed expansion joints in curbs.

Concrete floor slab shall be poured in accordance with the pouring diagram.

Ornamental Handrail shall be set to transit line and grade. Posts shall be set normal to top of the curb.

All lightweight concrete filler blocks shall conform to the strength requirements of grade "A" blocks as specified in A.S.T.M. "Hollow Load Bearing Concrete Masonry Units," Designation C90, and shall have a minimum face shell thickness of ¾ inch.

The contractor may substitute any one of the alternate designs for the original design. Quantities are based on original designs. No deductions or additions will be allowed for the use of alternate design.

Capacity Plates shall be aluminum alloy conforming to the requirements of A.S.T.M. B26 Alloy SG 70A. Connections and bolts shall be aluminum. Anchor Bolts shall be galv. steel.

The item "Concrete Slope Protection" shall be in accordance with Special Provisions.

All welding shall be done by the "Arc Process" in accordance with the "Standard Specifications for Welded Highway and Railway Bridges" of the American Welding Society.

This structure is designed in accordance with the 7th edition of the "A.A.S.H.O. Standard Specifications for Highway Bridges."

For details, except as shown, see Standard Plan No. 1650 B.
For details of Capacity Plate, except as shown, see Standard Plan No. 1741.
For details of Ornamental Handrail, except as shown, see Standard Plan No. 1753 C.
For details of Prestressed Concrete Piling, Type B, see Standard Plan No. 1720 - C-R1
For details of Piers, except as shown, see Standard Plan No. 1657
For details of Rockers and Rollers except as shown see Standard Plan No. 1687-B

QUANTITIES

Excavation for Bridges	270 Cu.Yds.
Abutments	120 Cu.Yds.
Piers	150 Cu.Yds.
Class "47A-S," "47B" or "47C-S" Concrete	3010 Cu.Yds.
Slab Curbs, Sidewalk and Buttresses	2187 Cu.Yds.
Abutments	438 Cu.Yds.
Piers	775 Cu.Yds.
Reinforcing Steel	651101 Lbs.
Slab, Curbs, Sidewalk and Buttresses	418254 Lbs.
Abutments	53251 Lbs.
Piers	180201 Lbs.
Steel Superstructure	1 Each.
Girders, Stiffener Plates, etc.	199825 Lbs.
Separators, Cross Frames & Cantilever Arm Bracing	15490 Lbs.
Rockers, Rollers & Bearing Plates	8340 Lbs.
Roadway Expansion Devices	9820 Lbs.
Total:	232,973 Lbs.
Prestressed Concrete Piling, Type B	2190 Lin. Ft.
Ornamental Handrail, Type A	448.33 Lin. Ft.
Concrete Slope Protection	549 Sq. Yds.

STATE OF NEBRASKA
DEPARTMENT OF ROADS

1-49'-0" 1-110'-0" 1-52'-6" SPANS DECK STEEL GIRDER BRIDGE - CANTILEVER TYPE - COMPOSITE

STATE ROAD LINCOLN-WAHOO 40°43'29.69" **SKEW**
PROJ. F 312 (11) 28FT RDWY (1-4'-0" SIDEWALK **ROADWAY**
COUNTY LANCASTER CONCRETE **FLOOR**
LOCATION BETWEEN SEC. 14 T10N-R6E & SEC. 13 T10N-R6E
DESIGN CLASS H20-S16-44 **STA.** 23+68.95

BRIDGE DESIGN SECTION, LINCOLN, NEBR. JULY, 1961

DESIGNED BY P.M.K.		PLAN NUMBER	
DETAILED BY E.V.K.		F-312(11)	
TRACED BY		SHEET NO.	TOTAL SHEETS
CHECKED BY M.E.N.	STATE ENGINEER	9	

MAPS ENGINEERING

90% PROGRESS PLANS – NOT FOR CONSTRUCTION

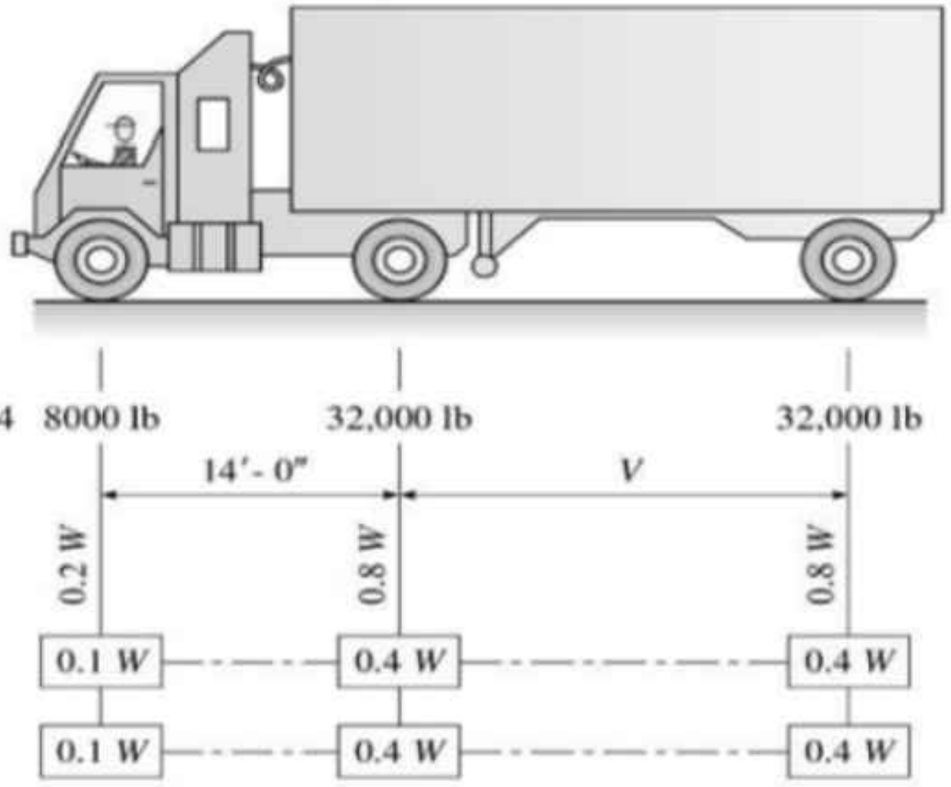
EXISTING PLAN FOR NORTH 14TH STREET

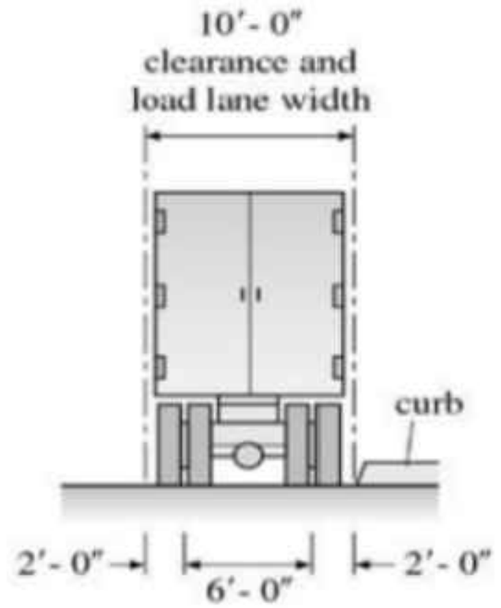
N. 14TH STREET CORRIDOR IMPROVEMENTS

DRAWN BY: ALN
CHECKED BY: SJC
DATE: 05/06/2022

SHEET
S-001

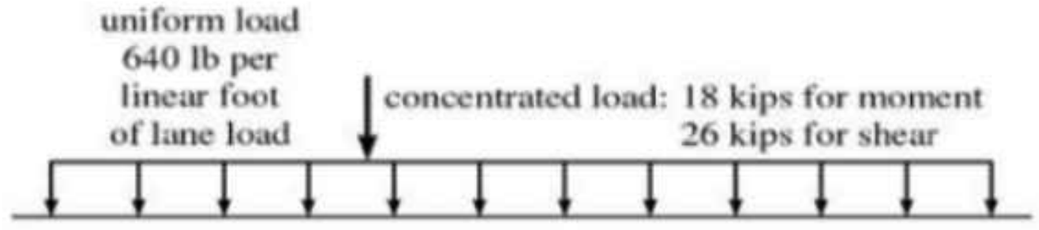
Bridge Loading: (a) HS 20 – 44 Truck; (b) Lane Loads





W = Combined weight on the first two axles, which is the same as for the corresponding H truck
V = Variable spacing – 14 ft to 30 ft inclusive. Spacing to be used is that which produces maximum stresses.

(*a*)



(*b*)

MAPS ENGINEERING

90% PROGRESS PLANS – NOT FOR CONSTRUCTION

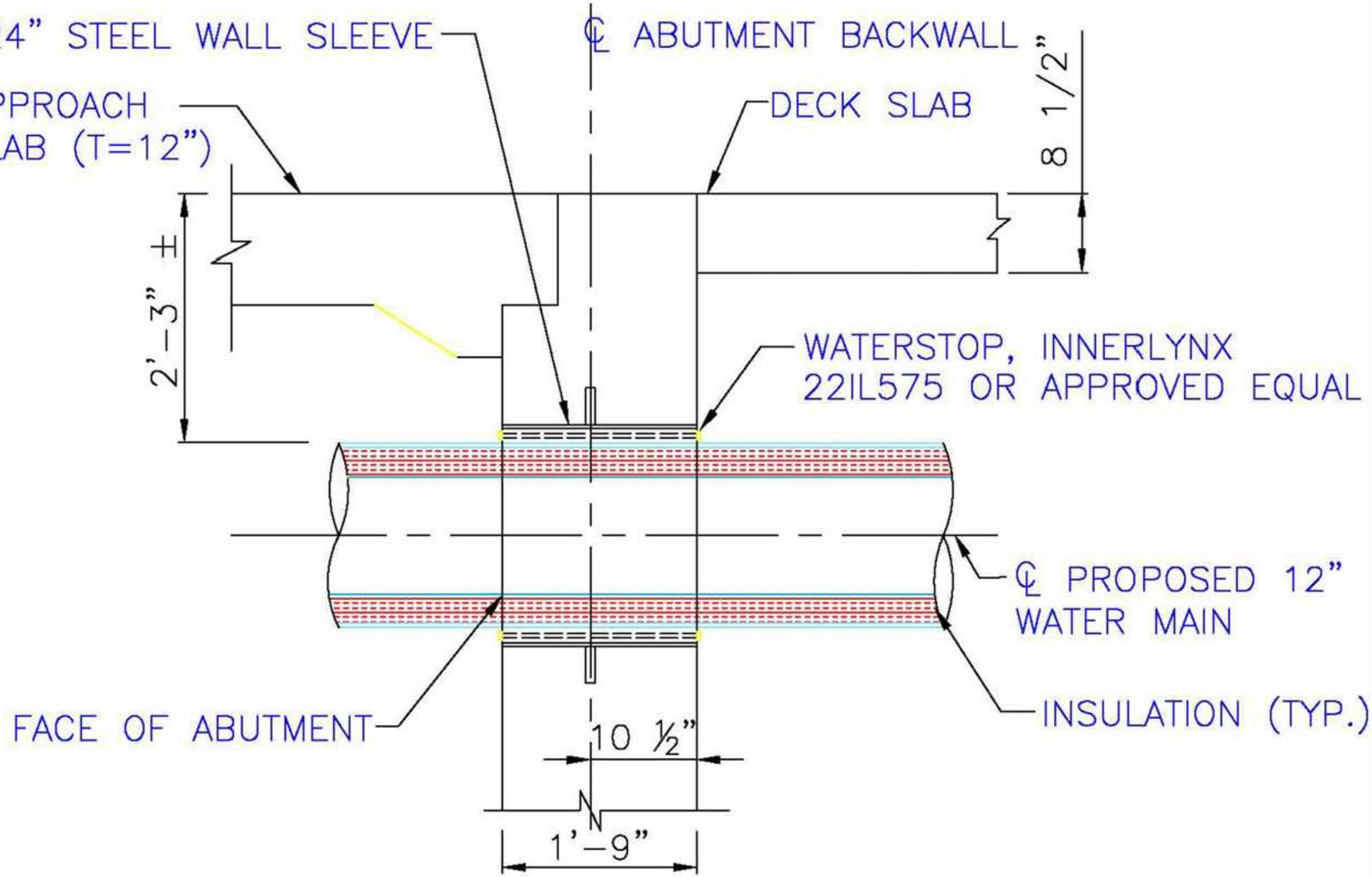
DEAD AND LIVE BRIDGE LOADING

N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

DRAWN BY: ALN
CHECKED BY: SJC
DATE: 05/06/2022

SHEET
S–002



SLEEVE FOR WATER MAIN AT ABUTMENTS DETAIL

(REAR ABUTMENT SHOWN, FORWARD ABUTMENT SIMILAR)

SCALE: NONE

STD-BR02

DATE: 6-22-2009 | BY: DCR

MAPS ENGINEERING

90% PROGRESS PLANS – NOT FOR CONSTRUCTION

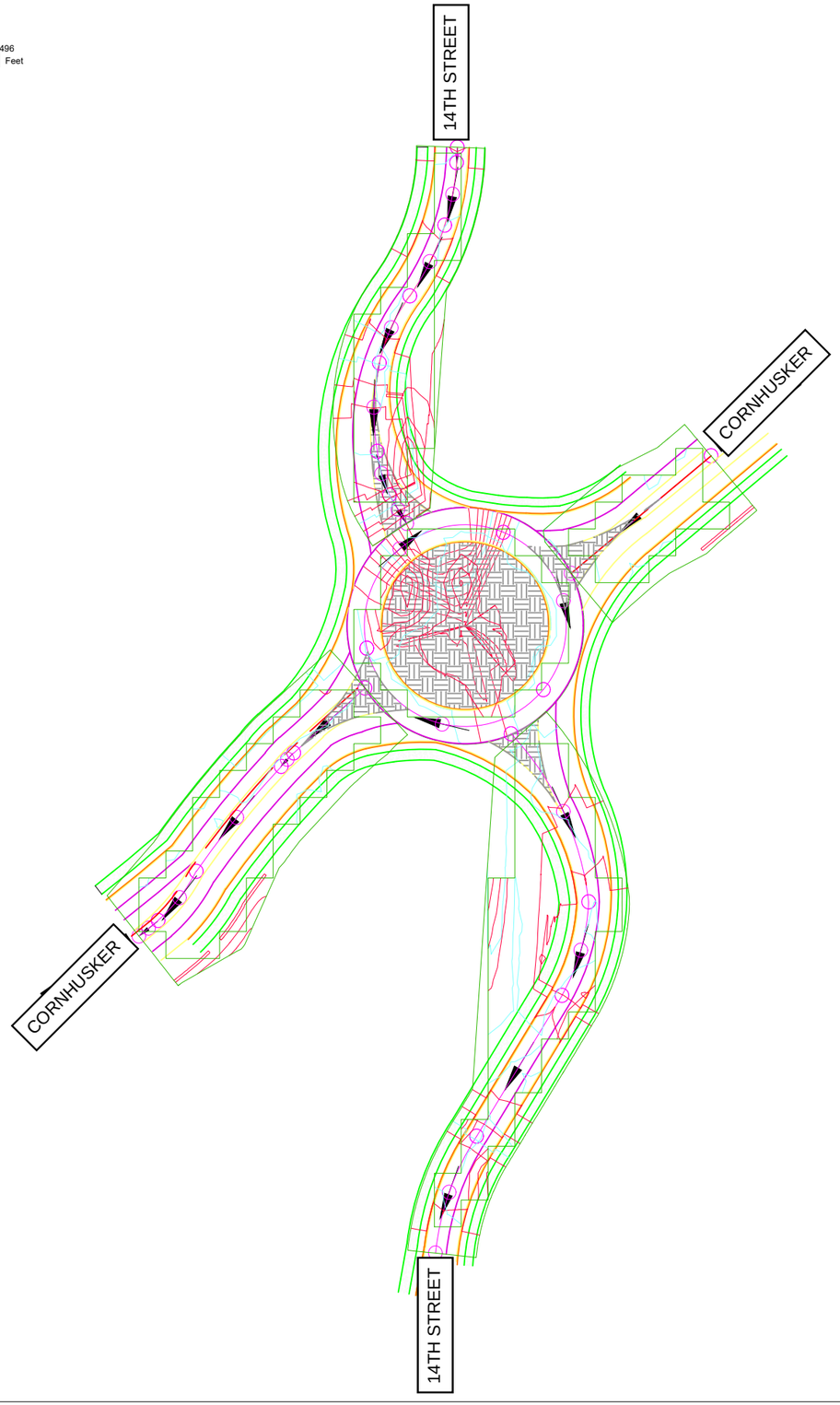
BRIDGE CONDUIT FOR WATER MAIN
N. 14TH STREET CORRIDOR IMPROVEMENTS
MAPS ENGINEERING

DRAWN BY: ALN
CHECKED BY: SJC
DATE: 05/06/2022

SHEET
S-003

N

0 79.248 158.496 Feet



MAPS ENGINEERING

90% PROGRESS PLANS - NOT FOR CONSTRUCTION

GRADING PLAN

N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

DRAWN BY: MPR
CHECKED BY: MAPS
DATE: 05/6/2022

SHEET
G-001

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
N. 14th Street South	**1.000**	1.350	30625.00 Sq. Ft.	499.63 Cu. Yd.	380.07 Cu. Yd.	119.56 Cu. Yd.<Cut>
East Cornhusker Highway	**1.000**	1.350	9375.00 Sq. Ft.	75.26 Cu. Yd.	3.98 Cu. Yd.	71.28 Cu. Yd.<Cut>
West Cornhusker Highway	**1.000**	1.350	21875.00 Sq. Ft.	208.08 Cu. Yd.	92.43 Cu. Yd.	115.65 Cu. Yd.<Cut>
N. 14th Street North	**1.000**	1.350	16875.00 Sq. Ft.	591.41 Cu. Yd.	104.10 Cu. Yd.	487.31 Cu. Yd.<Cut>
Roundbabout	**1.000**	1.350	26875.00 Sq. Ft.	659.62 Cu. Yd.	1430.56 Cu. Yd.	770.94 Cu. Yd.<Fill>
Totals			105625.00 Sq. Ft.	2034.00 Cu. Yd.	2011.14 Cu. Yd.	22.86 Cu. Yd.<Cut>

MAPS ENGINEERING

90% PROGRESS PLANS - NOT FOR CONSTRUCTION

CUT & FILL

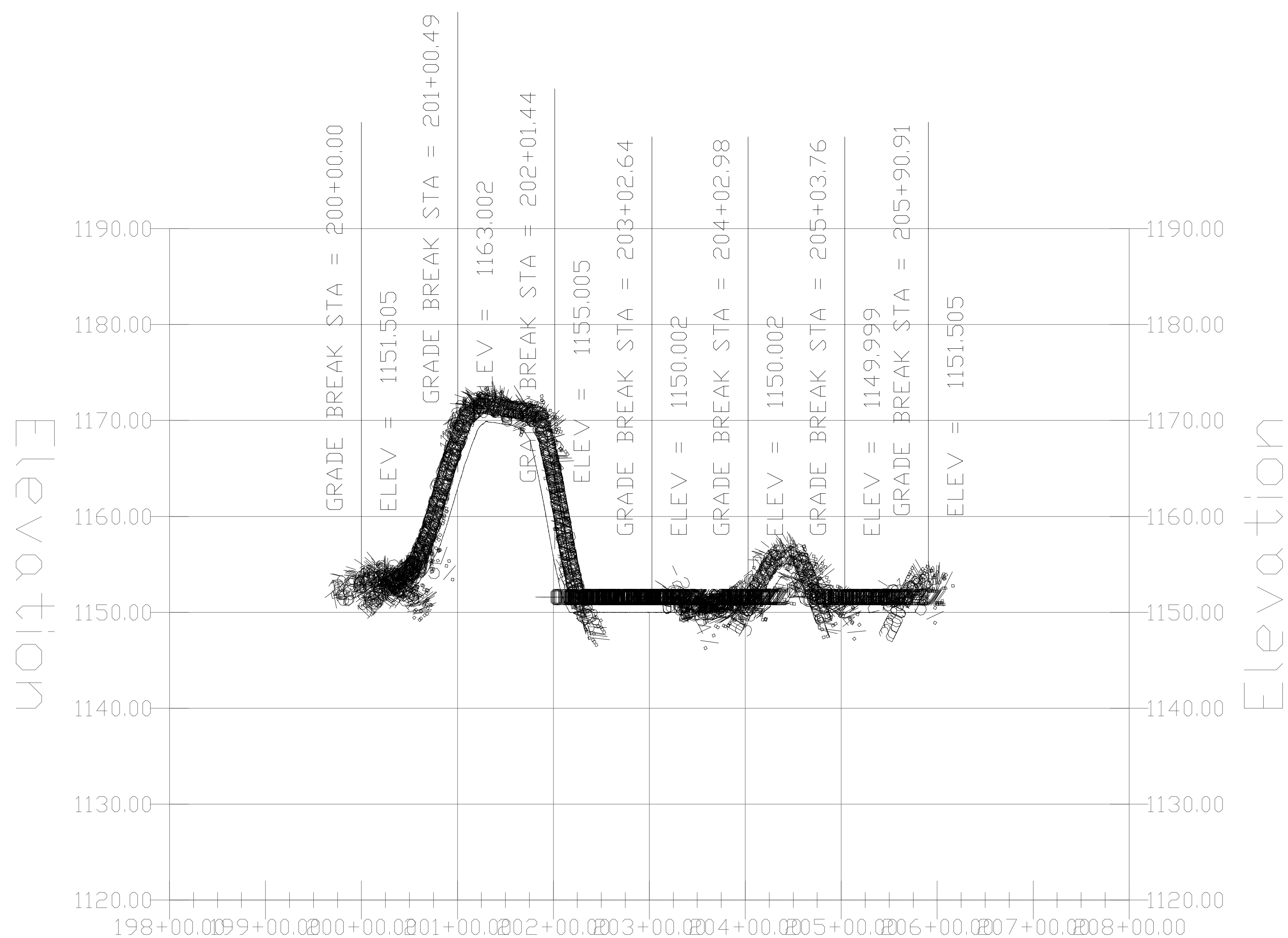
N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

DRAWN BY: MPR
CHECKED BY: MAPS
DATE: 05/06/2022

SHEET
G-002

Roundabout



MAPS ENGINEERING

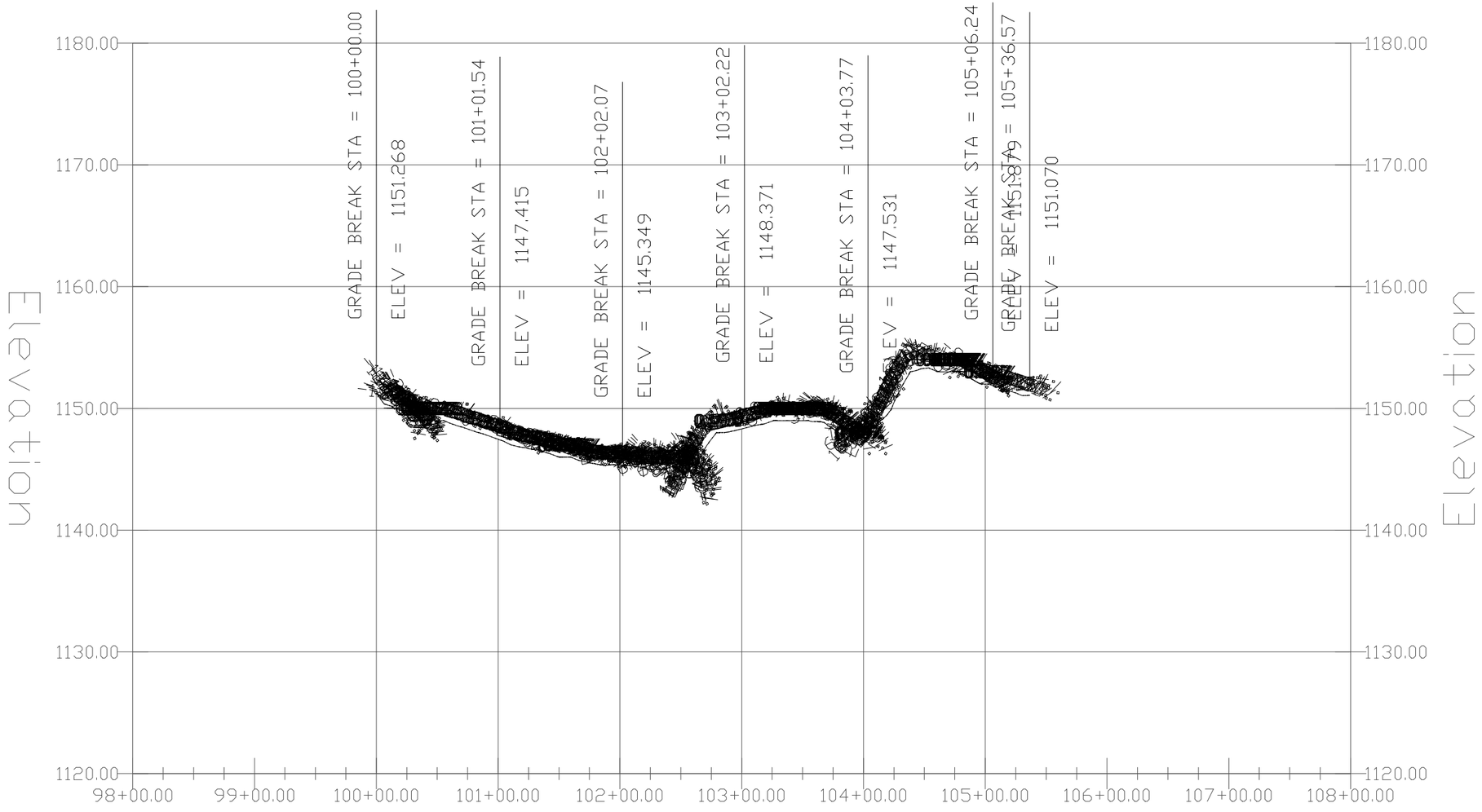
90% PROGRESS PLANS - NOT FOR CONSTRUCTION

PROFILES
N. 14TH STREET CORRIDOR IMPROVEMENTS
MAPS ENGINEERING

DRAWN BY: MPR
CHECKED BY: MAPS
DATE: 05/06/2022

SHEET
G-003

N. 14th South



MAPS ENGINEERING

90% PROGRESS PLANS - NOT FOR CONSTRUCTION

PROFILES

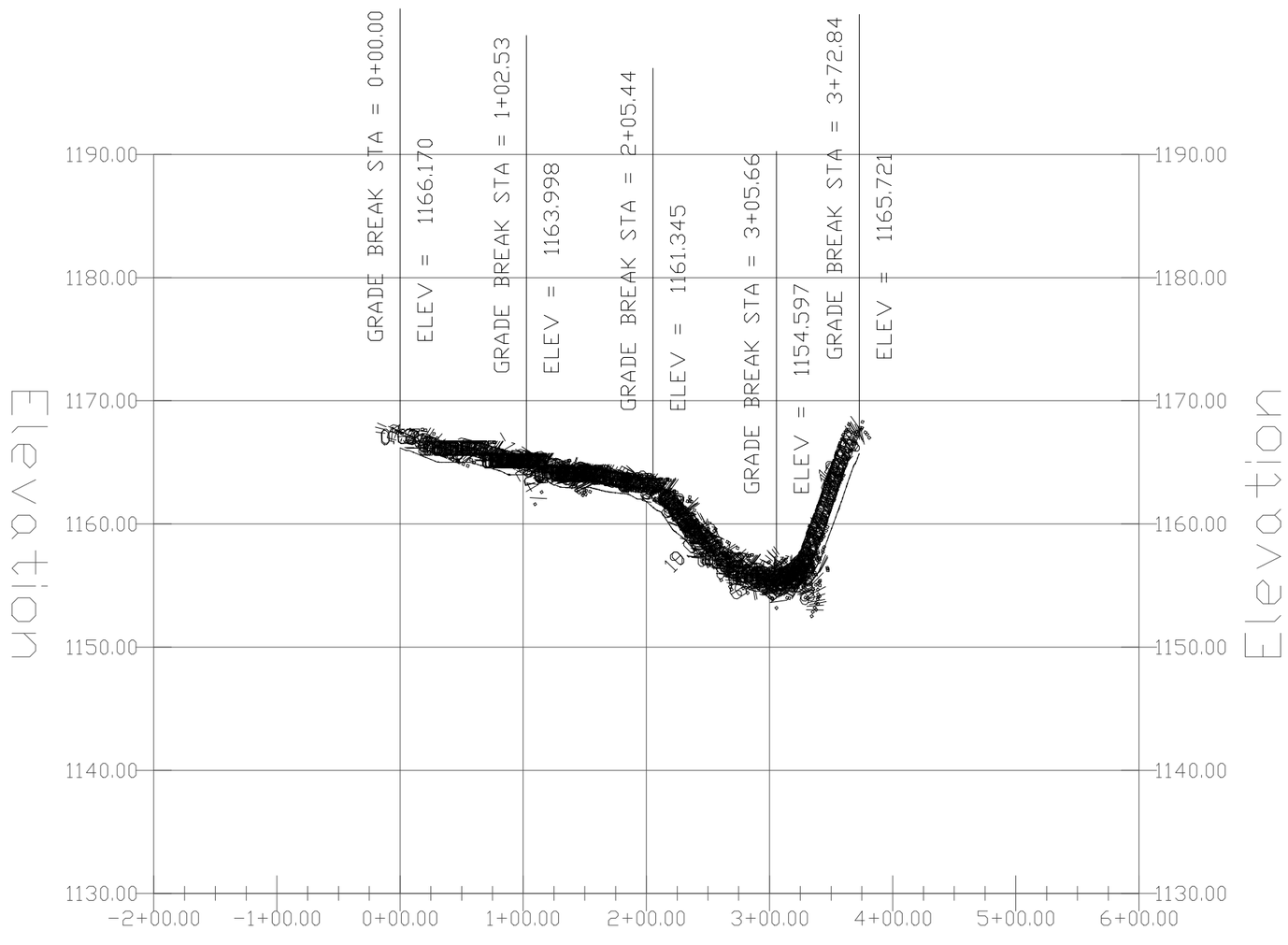
N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

DRAWN BY: MPR
CHECKED BY: MAPS
DATE: 05/06/2022

SHEET
G-004

N. 14th Street North



MAPS ENGINEERING

90% PROGRESS PLANS - NOT FOR CONSTRUCTION

PROFILES

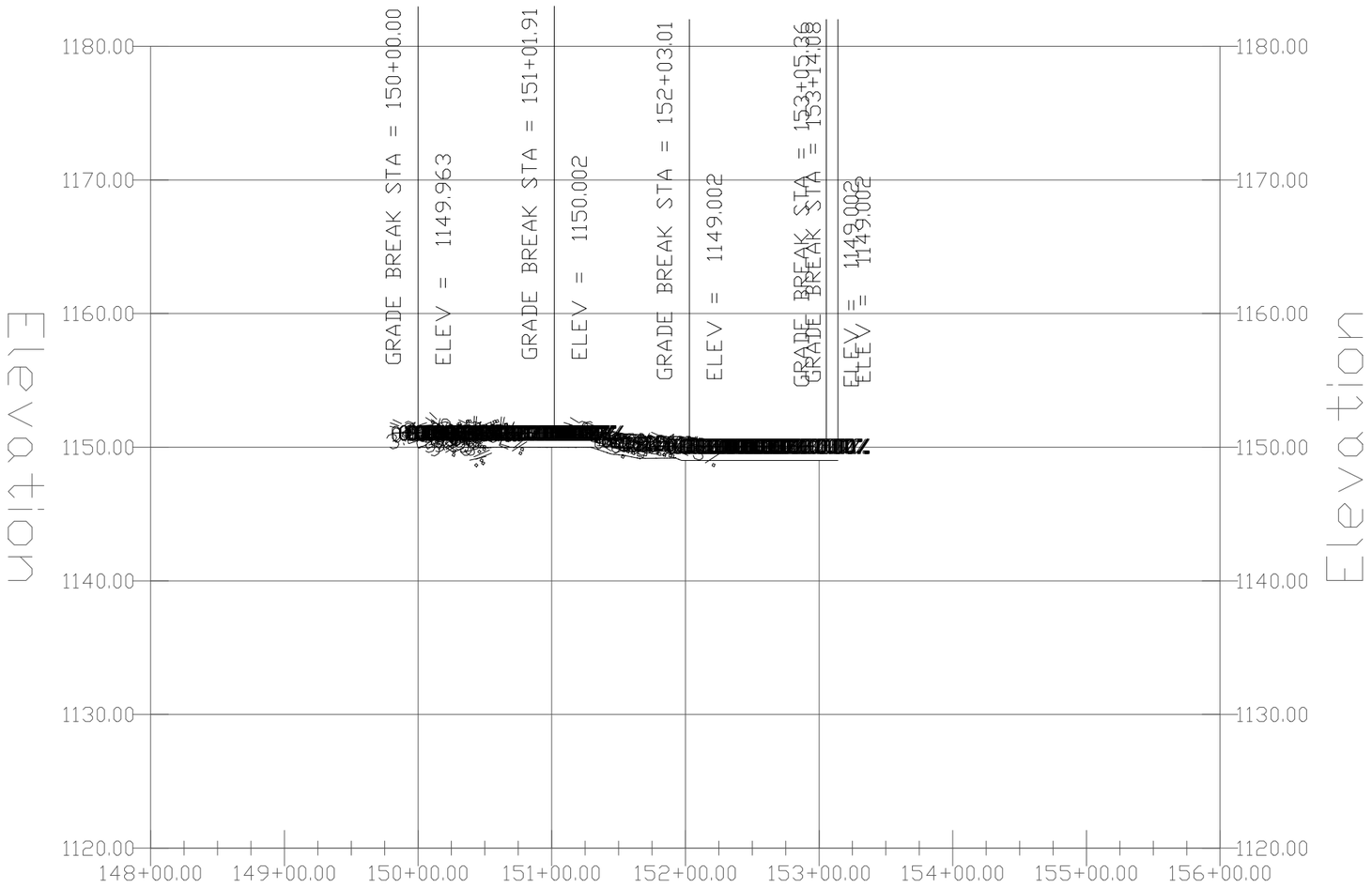
N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

DRAWN BY: MPR
CHECKED BY: MAPS
DATE: 05/06/2022

SHEET
G-005

Cornhusker West



MAPS ENGINEERING

90% PROGRESS PLANS - NOT FOR CONSTRUCTION

PROFILES

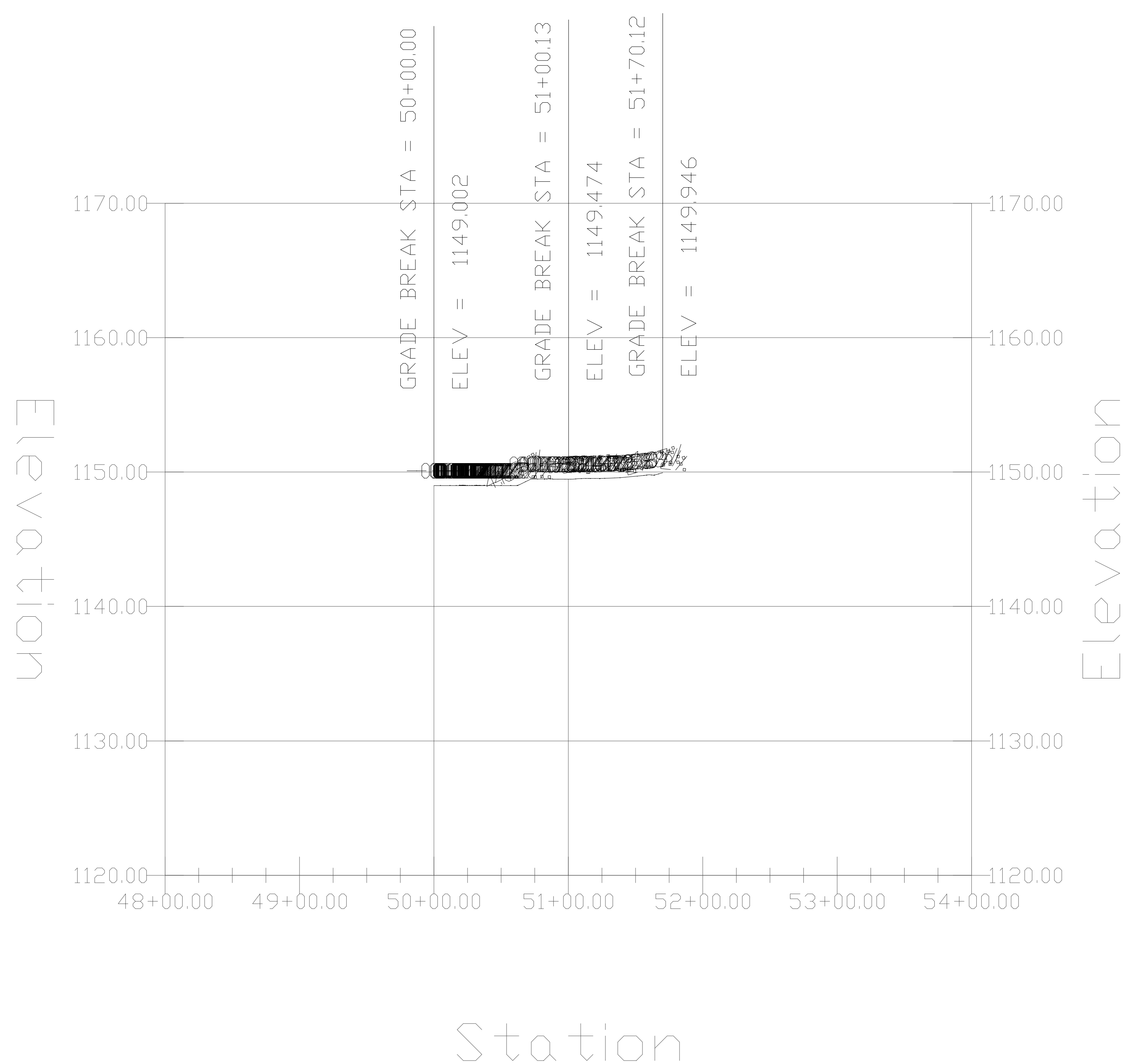
N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

DRAWN BY: MPR
CHECKED BY: MAPS
DATE: 05/06/2022

SHEET
G-006

Cornhusker East



MAPS ENGINEERING

90% PROGRESS PLANS - NOT FOR CONSTRUCTION

PROFILES
N. 14TH STREET CORRIDOR IMPROVEMENTS
MAPS ENGINEERING

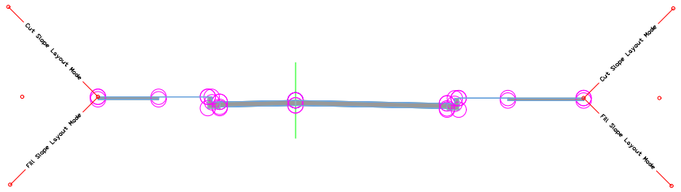
DRAWN BY: MPR
CHECKED BY: MAPS
DATE: 05/06/2022

SHEET
G-007

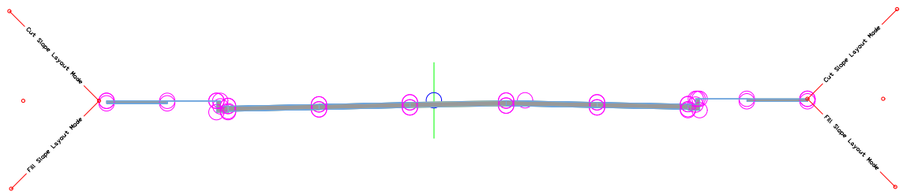
0 12.192 24.384 Feet

N

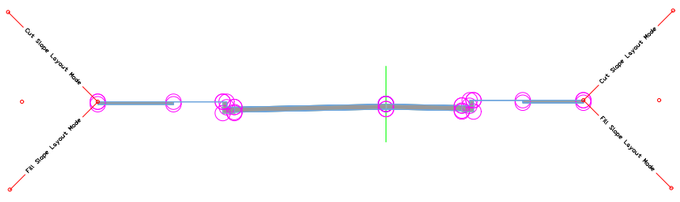
#1 Roundabout
SCALE: 1:20



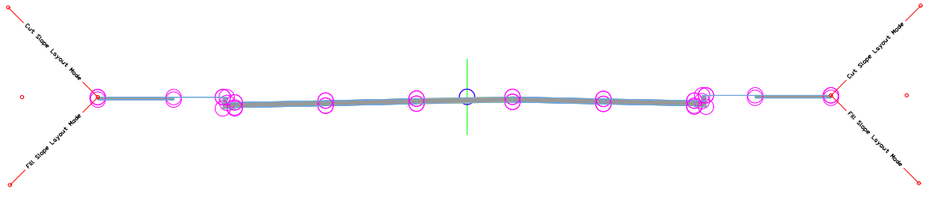
#2 N. 14th Street North
SCALE: 1:20



#3 Cornhusker East
SCALE: 1:20



#5 N. 14th Street South
SCALE: 1:20



#6 Cornhusker West
SCALE: 1:20

MAPS ENGINEERING

90% PROGRESS PLANS - NOT FOR CONSTRUCTION

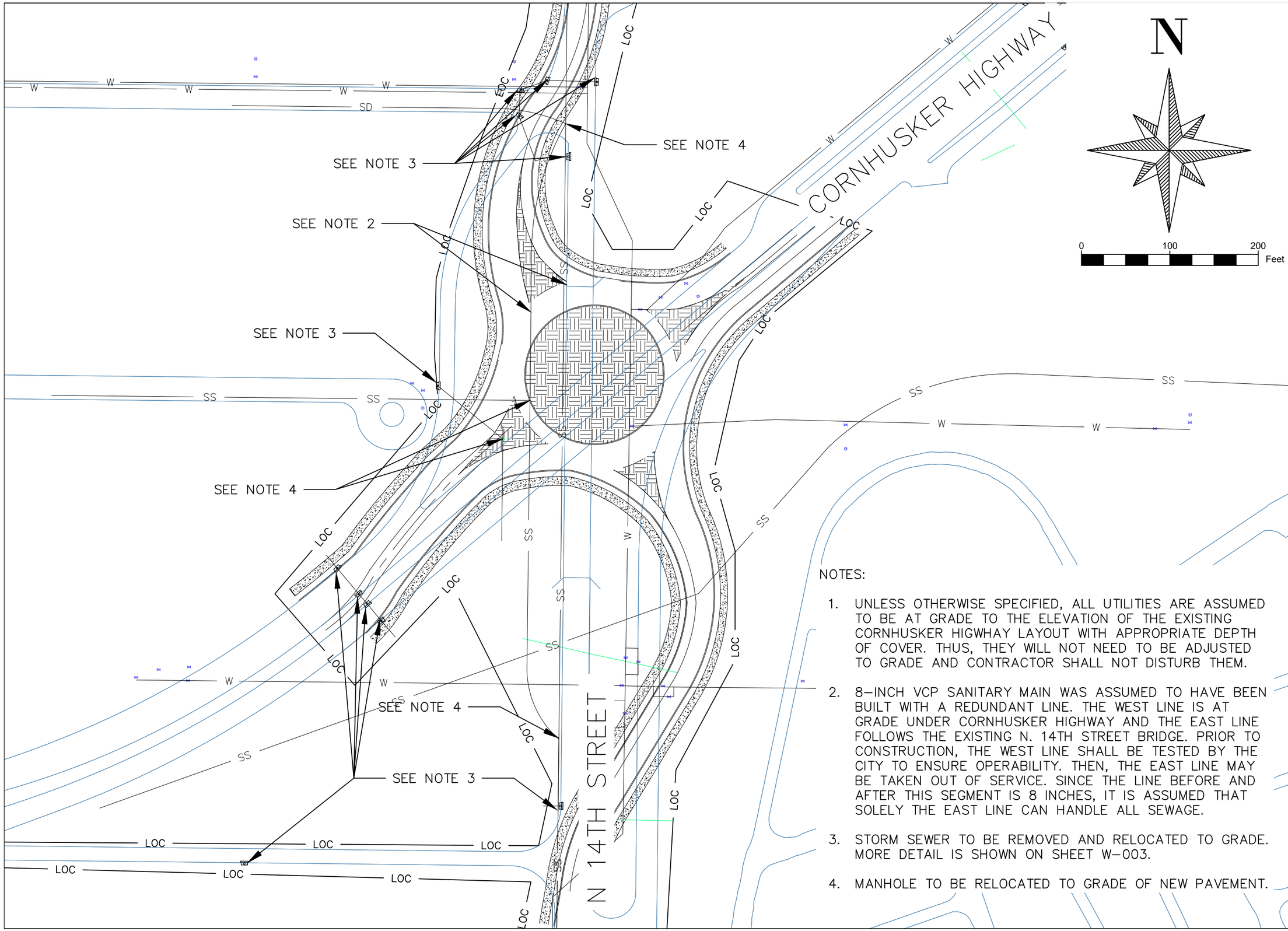
PROFILES

N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

DRAWN BY: MPR
CHECKED BY: MAPS
DATE: 05/06/2022

SHEET
G-007



NOTES:

1. UNLESS OTHERWISE SPECIFIED, ALL UTILITIES ARE ASSUMED TO BE AT GRADE TO THE ELEVATION OF THE EXISTING CORNHUSKER HIGWHAY LAYOUT WITH APPROPRIATE DEPTH OF COVER. THUS, THEY WILL NOT NEED TO BE ADJUSTED TO GRADE AND CONTRACTOR SHALL NOT DISTURB THEM.
2. 8–INCH VCP SANITARY MAIN WAS ASSUMED TO HAVE BEEN BUILT WITH A REDUNDANT LINE. THE WEST LINE IS AT GRADE UNDER CORNHUSKER HIGHWAY AND THE EAST LINE FOLLOWS THE EXISTING N. 14TH STREET BRIDGE. PRIOR TO CONSTRUCTION, THE WEST LINE SHALL BE TESTED BY THE CITY TO ENSURE OPERABILITY. THEN, THE EAST LINE MAY BE TAKEN OUT OF SERVICE. SINCE THE LINE BEFORE AND AFTER THIS SEGMENT IS 8 INCHES, IT IS ASSUMED THAT SOLELY THE EAST LINE CAN HANDLE ALL SEWAGE.
3. STORM SEWER TO BE REMOVED AND RELOCATED TO GRADE. MORE DETAIL IS SHOWN ON SHEET W–003.
4. MANHOLE TO BE RELOCATED TO GRADE OF NEW PAVEMENT.

MAPS ENGINEERING

90% PROGRESS PLANS – NOT FOR CONSTRUCTION

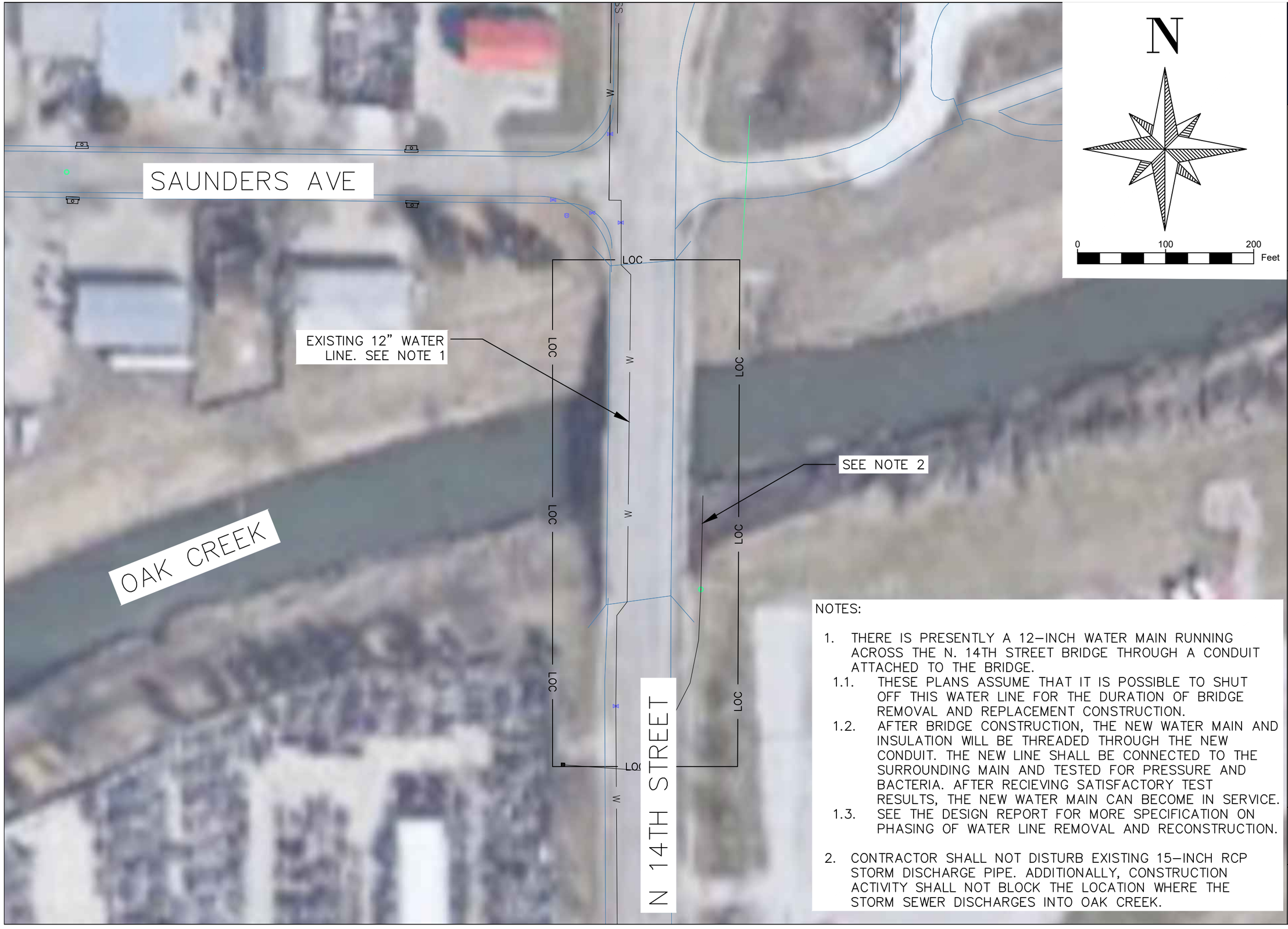
UTILITY PLAN – CORNHUSKER

N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

DRAWN BY: SJC
CHECKED BY: ALN
DATE: 05/06/2022

SHEET
W–001



NOTES:

1. THERE IS PRESENTLY A 12–INCH WATER MAIN RUNNING ACROSS THE N. 14TH STREET BRIDGE THROUGH A CONDUIT ATTACHED TO THE BRIDGE.
   - 1.1. THESE PLANS ASSUME THAT IT IS POSSIBLE TO SHUT OFF THIS WATER LINE FOR THE DURATION OF BRIDGE REMOVAL AND REPLACEMENT CONSTRUCTION.
   - 1.2. AFTER BRIDGE CONSTRUCTION, THE NEW WATER MAIN AND INSULATION WILL BE THREADED THROUGH THE NEW CONDUIT. THE NEW LINE SHALL BE CONNECTED TO THE SURROUNDING MAIN AND TESTED FOR PRESSURE AND BACTERIA. AFTER RECIEVING SATISFACTORY TEST RESULTS, THE NEW WATER MAIN CAN BECOME IN SERVICE.
   - 1.3. SEE THE DESIGN REPORT FOR MORE SPECIFICATION ON PHASING OF WATER LINE REMOVAL AND RECONSTRUCTION.
2. CONTRACTOR SHALL NOT DISTURB EXISTING 15–INCH RCP STORM DISCHARGE PIPE. ADDITIONALLY, CONSTRUCTION ACTIVITY SHALL NOT BLOCK THE LOCATION WHERE THE STORM SEWER DISCHARGES INTO OAK CREEK.

MAPS ENGINEERING

90% PROGRESS PLANS – NOT FOR CONSTRUCTION

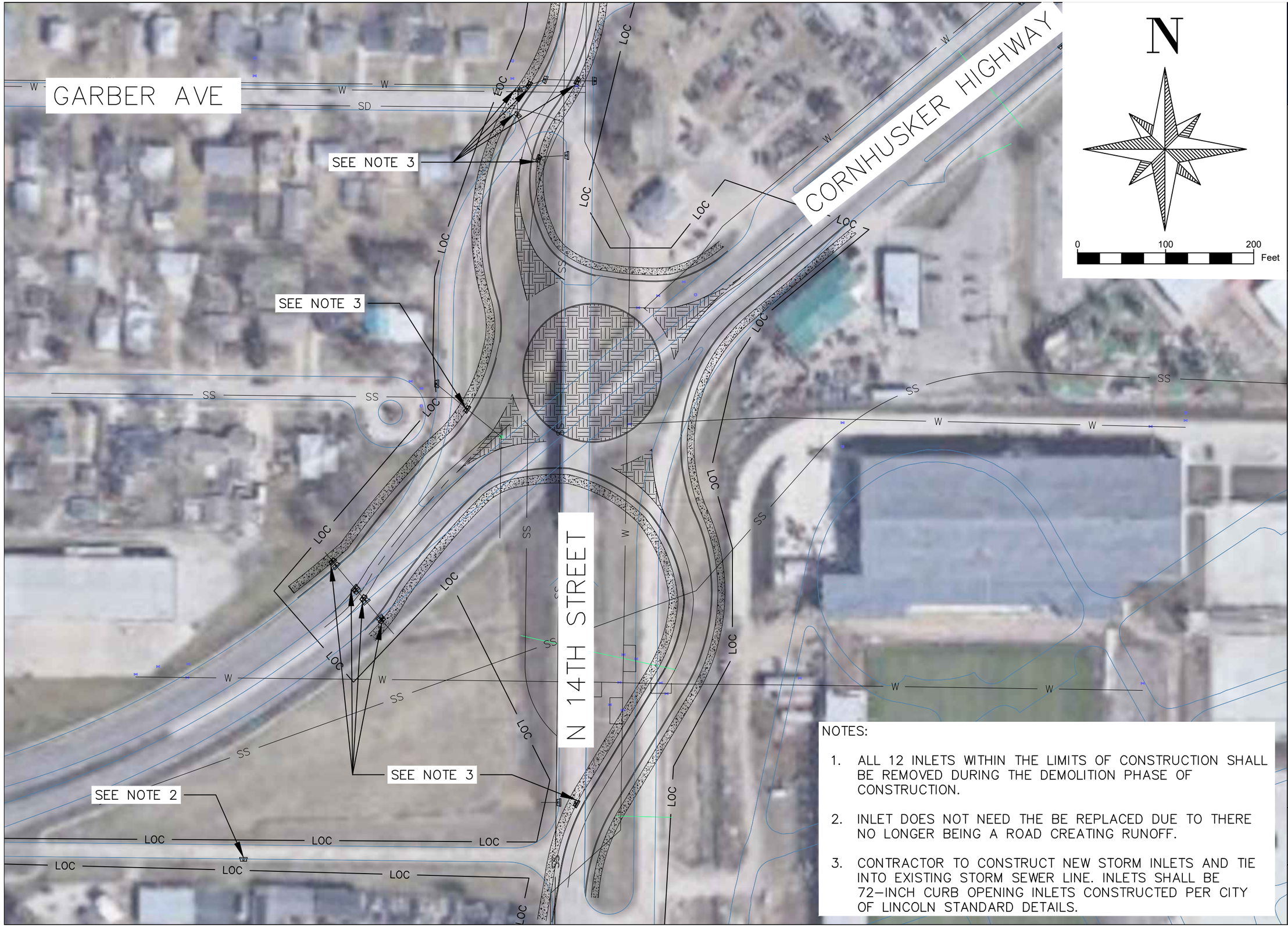
UTILITY PLAN – OAK CREEK

N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

DRAWN BY: SJC
CHECKED BY: ALN
DATE: 05/06/2022

SHEET
W–002



N

0 100 200 Feet

MAPS ENGINEERING

90% PROGRESS PLANS – NOT FOR CONSTRUCTION

NOTES:

1. ALL 12 INLETS WITHIN THE LIMITS OF CONSTRUCTION SHALL BE REMOVED DURING THE DEMOLITION PHASE OF CONSTRUCTION.
2. INLET DOES NOT NEED THE BE REPLACED DUE TO THERE NO LONGER BEING A ROAD CREATING RUNOFF.
3. CONTRACTOR TO CONSTRUCT NEW STORM INLETS AND TIE INTO EXISTING STORM SEWER LINE. INLETS SHALL BE 72–INCH CURB OPENING INLETS CONSTRUCTED PER CITY OF LINCOLN STANDARD DETAILS.

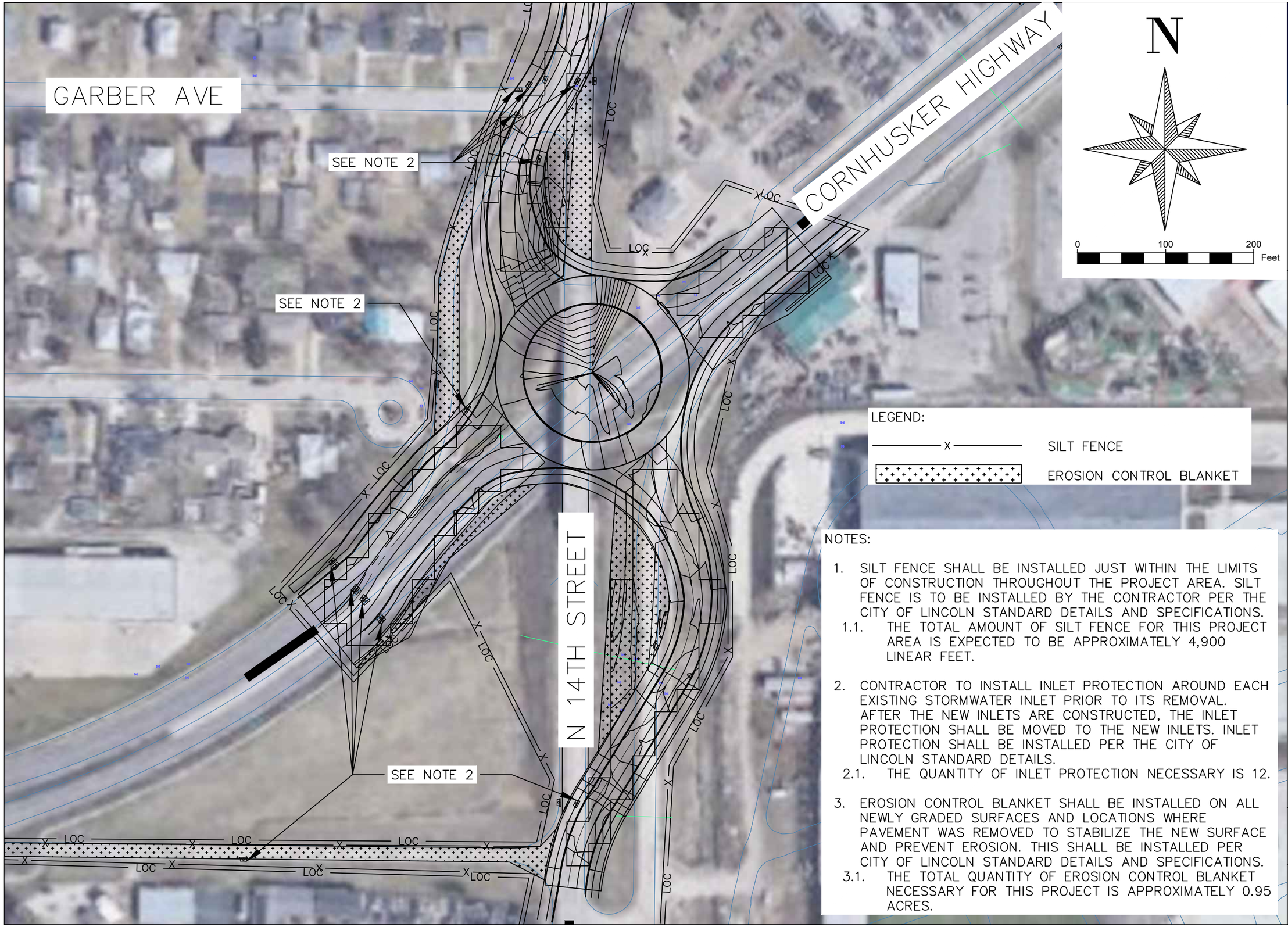
STORM SEWER RELOCATION PLAN

N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

DRAWN BY: SJC
CHECKED BY: ALN
DATE: 05/06/2022

SHEET
W–003



LEGEND:

——— X ———	SILT FENCE
	EROSION CONTROL BLANKET

NOTES:

1. SILT FENCE SHALL BE INSTALLED JUST WITHIN THE LIMITS OF CONSTRUCTION THROUGHOUT THE PROJECT AREA. SILT FENCE IS TO BE INSTALLED BY THE CONTRACTOR PER THE CITY OF LINCOLN STANDARD DETAILS AND SPECIFICATIONS.
   1.1. THE TOTAL AMOUNT OF SILT FENCE FOR THIS PROJECT AREA IS EXPECTED TO BE APPROXIMATELY 4,900 LINEAR FEET.

2. CONTRACTOR TO INSTALL INLET PROTECTION AROUND EACH EXISTING STORMWATER INLET PRIOR TO ITS REMOVAL. AFTER THE NEW INLETS ARE CONSTRUCTED, THE INLET PROTECTION SHALL BE MOVED TO THE NEW INLETS. INLET PROTECTION SHALL BE INSTALLED PER THE CITY OF LINCOLN STANDARD DETAILS.
   2.1. THE QUANTITY OF INLET PROTECTION NECESSARY IS 12.

3. EROSION CONTROL BLANKET SHALL BE INSTALLED ON ALL NEWLY GRADED SURFACES AND LOCATIONS WHERE PAVEMENT WAS REMOVED TO STABILIZE THE NEW SURFACE AND PREVENT EROSION. THIS SHALL BE INSTALLED PER CITY OF LINCOLN STANDARD DETAILS AND SPECIFICATIONS.
   3.1. THE TOTAL QUANTITY OF EROSION CONTROL BLANKET NECESSARY FOR THIS PROJECT IS APPROXIMATELY 0.95 ACRES.

MAPS ENGINEERING

90% PROGRESS PLANS – NOT FOR CONSTRUCTION

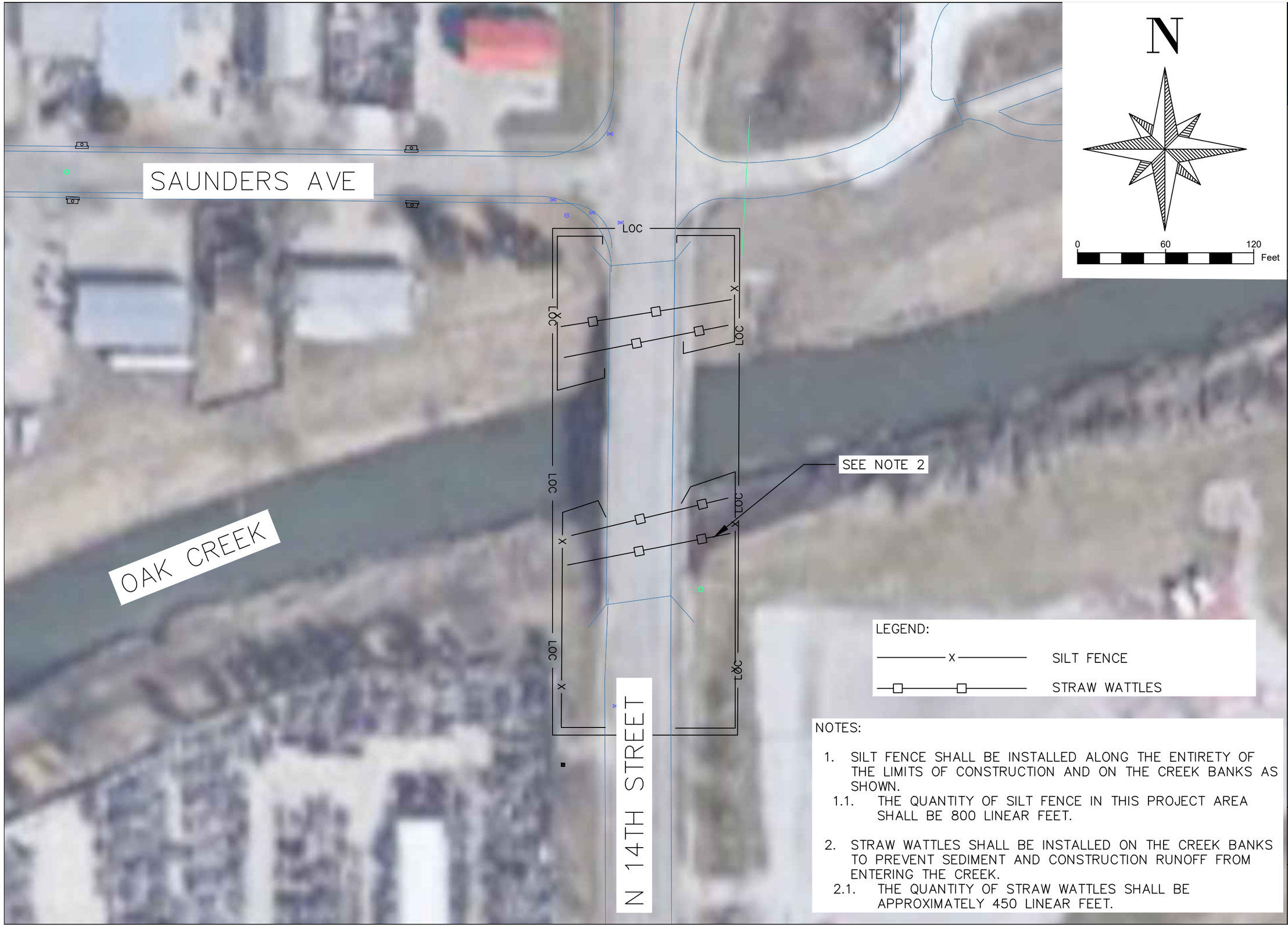
SWPPP – ROUNDABOUT

N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

DRAWN BY: SJC
CHECKED BY: ALN
DATE: 05/06/2022

SHEET
W–004



N

0 60 120 Feet

LEGEND:

SILT FENCE

STRAW WATTLES

NOTES:

1. SILT FENCE SHALL BE INSTALLED ALONG THE ENTIRETY OF THE LIMITS OF CONSTRUCTION AND ON THE CREEK BANKS AS SHOWN.
   1.1. THE QUANTITY OF SILT FENCE IN THIS PROJECT AREA SHALL BE 800 LINEAR FEET.
2. STRAW WATTLES SHALL BE INSTALLED ON THE CREEK BANKS TO PREVENT SEDIMENT AND CONSTRUCTION RUNOFF FROM ENTERING THE CREEK.
   2.1. THE QUANTITY OF STRAW WATTLES SHALL BE APPROXIMATELY 450 LINEAR FEET.

MAPS ENGINEERING

90% PROGRESS PLANS – NOT FOR CONSTRUCTION

SWPPP – OAK CREEK BRIDGE

N. 14TH STREET CORRIDOR IMPROVEMENTS

MAPS ENGINEERING

DRAWN BY: SJC
CHECKED BY: ALN
DATE: 05/06/2022

SHEET
W–005

ENGINEER'S OPINION OF PROBABLE COST - 90% DESIGN
N. 14th Street Corridor Improvements - Virginia to Adams
Lincoln, Nebraska
MAPS Engineering

Date Prepared:
May 6, 2022

ESTIMATE OF QUANTITIES

Item #	Description	Unit	Quantity	Unit Price	Total
BASE BID - 90% DESIGN ESTIMATE					
1.	Mobilization	LS	1	$1,600,000.00	$1,600,000
2.	Bonding and Insurance	LS	1	$525,000.00	$525,000
3.	Straw Wattle	LF	450	$7.00	$3,150
4.	Erosion Control Mat	SY	4,481	$3.50	$15,684
5.	Silt Fence, Low Porosity	LF	5,700	$4.00	$22,800
6.	Curb Inlet Sediment Filter	EA	12	$200.00	$2,400
7.	Adjust Manhole to Grade	EA	3	$900.00	$2,700
8.	Remove Storm Sewer Structure (< 6' deep)	EA	12	$675.00	$8,100
9.	Curb Inlet	EA	11	$3,750.00	$41,250
10.	8" Plug, MJ	EA	2	$200.00	$400
11.	Abandon Existing Well	EA	2	$1,000.00	$2,000
12.	Remove Pavement	SF	131,822	$5.00	$659,110
13.	10" Concrete Pavement	SY	150,000	$90.00	$13,500,000
14.	White Preformed Pavement Marking, Type 4, Crosswalk Bars, Grooved	EA	8	$375.00	$3,000
15.	Traffic Signs	EA	4	$200.00	$800
16.	12" White Preformed Pavement Marking, Type 4, Grooved	LF	1,350	$17.00	$22,950
17.	Install Sign and Post	EA	4	$500.00	$2,000
18.	Bridge Replacement (Oak Creek)	LS	1	$2,893,000.00	$2,066,220
19.	Bridge Removal (Cornhusker Highway)	LS	1	$50,000.00	$50,000
20.	Site Grading	CY	5,000	$500.00	$2,500,000
21.	Excavation, Established Quantity	CY	2,200	$25.00	$55,000
22.	Stripping and Topsoiling	CY	2,100	$500.00	$1,050,000
			Construction Subtotal	Base Bid	$22,132,570
			Contingency	20%	$4,426,520
			Total Opinion of Construction Cost		**$26,559,090**
			Total Engineering Fee Cost		**$4,200,000**
			Total Opinion of Project Cost		**$30,759,090**

Project Billable Hours

North 14th Street Corridor Improvements
MAPS Engineering
5/6/2022

Task	Geotechnical Engineer	Transportation Engineer	Water and Environmental Engineer	Structural Engineer
	Maricela Paramo	***Ashley Nguyen***	***Samantha Corey***	***Pooja Rajeev***
Project Management	80	80	80	80
Technical Research	200	250	250	230
Data Collection	180	70	120	160
Drafting and Design	360	360	320	240
Opinion of Cost	100	150	90	110
Specifications	150	180	120	280
Permitting Tasks	60	50	120	50
Stakeholder Coordination	50	100	90	60
Meetings	120	50	60	60
Preparing Report	250	260	300	260
QA/QC	50	50	50	50
Record Drawings	50	50	50	70
Total Hours	1650	1650	1650	1650
Hourly Billing Rate	$ 250.00	$ 250.00	$ 250.00	$ 250.00
Hourly Cost Subtotal	$ 412,500.00	$ 412,500.00	$ 412,500.00	$ 412,500.00

	Additional Engineering Services
Project Administration and Marketing	$150,000
Geotechnical Testing Services	$600,000
Surveying Fees	$900,000
Permitting Fees	$100,000
Construction Observation	$800,000
Total Engineering Fees $	**4,200,000.00**