APPENDIX A

ZORINSKY LAKE BRIDGE DESIGN CONSIDERATIONS

NDOR
Nebraska
Department of Roads

Memorandum

DATE April 17, 2015

TO Taylor Eman, Local Projects

FROM Walter Rutherford, Bridge Hydraulic Consultant Coordinator WR

THRU Kirk Harvey, Assistant Bridge Engineer - Hydraulics DKH

Project: 168th Street Improvements
STPC-3811(1)
CN: 22209
U182503110

The compliance review of the consultant's hydraulic report/design indicates it is satisfactory for the consultant to proceed with the plans.

Please find attached the Data Sheet, Plan & Profile and the TS&L, for your review and distribution.

cc: River Hwang
Jeffrey Soula
Nikolas Glennie
Sherri Bridges
File

Preliminary Data Sheet

PROJECT NO:	STPC-3811(1)	DATE:	04-03-2015
CONTROL NO:	22209	COUNTY:	Douglas
STRUCTURE NO:	U1825 03110	LOCATION:	168th Street over Zorinsky Lake
PROJECT NAME:	168th Street Improvements	SECTION:	33 T 15N R 11E
USGS DATUM:	NAVD88	DELTA DATUM:	+0.434 ft from NGVD29

SITE DESCRIPTION & DISPOSITION

Proposed improvements to 168th Street bridge over Zorinsky Lake. Existing bridge substructure to be widened and raised to accommodate 89'-8" wide proposed concrete slab bridge section.

EXISTING STRUCTURE

ORIGINAL PLAN:	Douglas Co. Proj. C-28(212)	PLAN YEAR:	1984
OTHER PLAN:		PLAN YEAR:	
STATION:	121+37.52	SUFFICIENCY RATING:	77%
TYPE:	Concrete Slab	SKEW:	0°
LENGTH:	116'-0" ft	CLEAR ROADWAY WIDTH:	28'-0" ft
SPANS:	35'-46'-35'	LOW DECK STATION:	121+95.52
LOW STRUCTURE ELEVATION:	1120.01 ft	LOW DECK ELEVATION:	1121.94 ft

PROPOSED STRUCTURE

STATION:	121+37.52	SKEW:	0°
TYPE:	Concrete Slab	CLEAR ROADWAY WIDTH:	2 @ 26' ft
LENGTH:	116'-0" ft	RAILS:	Closed
SPANS:	35'-46-'35'	CRITICAL BERM ELEVATION:	1109.4 ft
ABUT TYPE:	Extend existing wall abutment	BOTTOM OF WALL ELEVATION:	1093.4 * ft
PIER/BENT TYPE:	Extend existing wall pier	BOTTOM ENCASEMENT ELEVATION:	1097.4 ft
WING TYPE:	U-Shape	*Bottom of pier pile cap, match existing	

GRADE

BRIDGE GRADE ABUTMENT 1:	1123.72 ft	BRIDGE GRADE ABUTMENT 2:	1122.81 ft
LOW STRUCTURE ELEVATION:	1120.63 ft	SUPERSTRUCTURE DEPTH:	1'-4 ½" ft
FREEBOARD-REQUIRED:	1.0 ft	FREEBOARD-DESIGN:	2.6 ft

ROAD OVERFLOW DESIGN: Roadway low point located 350' north of the north bridge abutment. Overtopping occurs at >Q100

DESIGN HYDRAULIC DATA

STREAM: Zorinsky Lake

Q100:	12,000 cfs	(BASE FLOOD)	DRAINAGE AREA:	14.78 mi²
Q100:	12,000 cfs	(BRIDGE BASE FLOOD)	HW ELEVATION. (DS, Full Lake):	1,118.1 ft
Q( ):	n/a cfs	(OVERTOPPING FLOOD)	LOW ROAD ELEVATION:	1,119.7 ft
Q (OHW):	n/a cfs		ORDINARY HIGH WATER ELEVATION:	1,110.4 ft
ICE-AFFECTED:	No		WATERWAY AREA BELOW HW:	1,673.7 ft²

Q100 GENERAL SCOUR: 7.0 ft Q100 LOCAL SCOUR: 6.0 ft Q500 SCOUR ELEV: 1090.0 ft

CHANNEL DATA

SIDE SLOPES:	H 1.9 : V 1	BOTTOM WIDTH:	32.0 ft
BERM ELEVATION:	1,112.4 ft	BERM WIDTH:	11.0 ft
FLOWLINE ELEVATION:	1,097.0 ft	RIP RAP:	Type C

PERMITS

404: Yes CAUSEWAY/STRUCTURE: No LOCAL: Yes FEMA: Zone AE

TRAFFIC OPTIONS

ALIGNMENT SHIFT: No DETOUR: No TEMPORARY ROAD: No UNDER TRAFFIC: Yes

TEMPORARY STRUCTURE DESIGN: n/a Q( ): n/a cfs SAG ELEVATION: n/a ft

COMMENTS: Bridge constructed in phases. Phase 1: traffic on existing bridge while constructing west half of proposed bridge, Phase 2: traffic on new bridge while constructing east half of proposed bridge, Phase 3: traffic on new bridge while constructing Median.

CONTRACTOR'S ACCESS CROSSING n/a

SIZE: n/a ft Q(OVERTOPPING): n/a cfs

PROFESSIONAL ENGINEER STEPHANIE L. RATHBURN E-11928 04/03/2015 STATE OF NEBRASKA

SITE 1 OF 1
SHEET 1 OF 1

BR FORM 359A, AUGUST 2013

PROJECT NUMBER	SHEET NO.
STPC-3811(1)	24

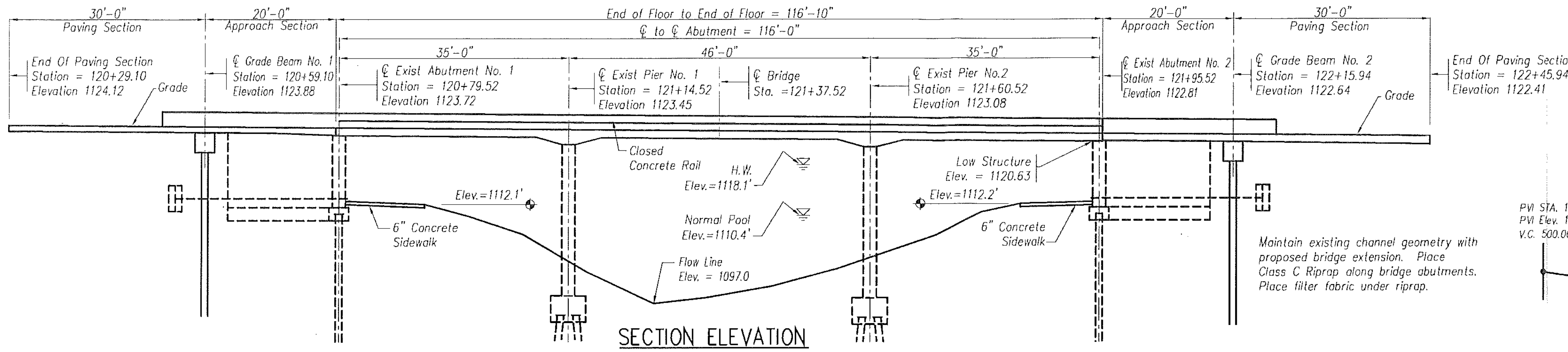
C.N. 22209

OPW 50417

STRUCTURE NUMBER U1825 03110

This Structure is Located in Douglas County On 168th St. Over Zorinsky Lake in Sec. 33, T15N, R11E.

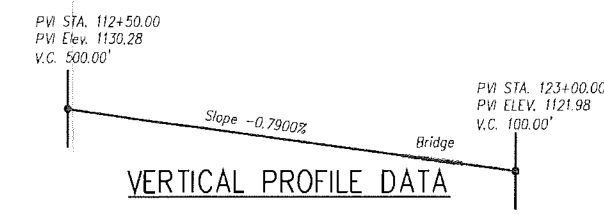
Note: Grade Elevations Shown are at Left and Right Profile Grade Lines Located at Back of median curb.



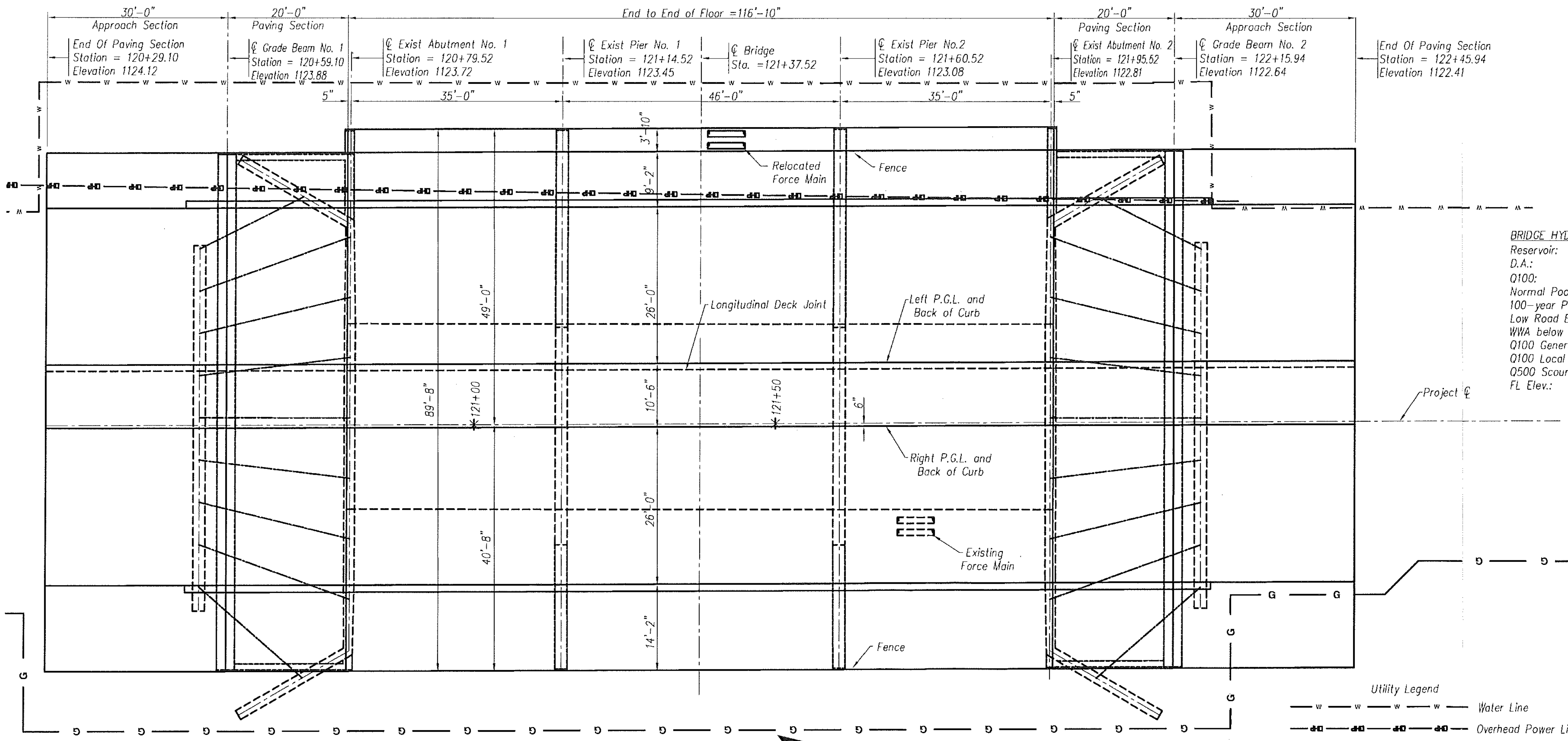
SECTION ELEVATION

Scale: 1"=20'

Maintain existing channel geometry with proposed bridge extension. Place Class C Riprap along bridge abutments. Place filter fabric under riprap.



VERTICAL PROFILE DATA



GENERAL PLAN

Scale: 1"=20'

BRIDGE HYDRAULIC INFORMATION

Reservoir:	Zorinsky Lake (Papio Creek Dam 18)
D.A.:	14.78 sq. mi.
Q100:	12,000 cfs (Design Flood)
Normal Pool Elev.:	1,110.4 ft
100-year Pool Elev.:	1,118.1 ft.
Low Road Elev.:	1,119.7 ft.
WWA below Q100 HW Elev.:	1,673.7 sq. ft.
Q100 General Scour:	7 ft
Q100 Local Scour:	6 ft
Q500 Scour Elev.:	1090
FL Elev.:	1097.0 ft

168TH STREET IMPROVEMENTS
GENERAL PLAN AND ELEVATION

COUNTY Douglas
LOCATION 168th Street over Zorinsky Lake
HWY. NO. 168th Street
SKEW 0°
REF.POST.
ROADWAY 2 @ 26'-0"
STA. 121+37.52
DESIGN LIVE LOAD HL93
DESIGNED BY KAB
DETAILED BY TJL
CHECKED BY SKG
DATE March, 2015

CITY OF OMAHA - PUBLIC WORKS DEPARTMENT

PROFESSIONAL STRUCTURAL ENGINEER KAREN A. BEXTEN E-7366 STATE OF NEBRASKA

4-7-15

SPECIAL PLAN NO. 1c 1/2

InfraStructure, LLC
ENGINEERING CONSULTING GROUP

BRIDGE TYPE SIZE & LOCATION-168th ST.

Sheet A

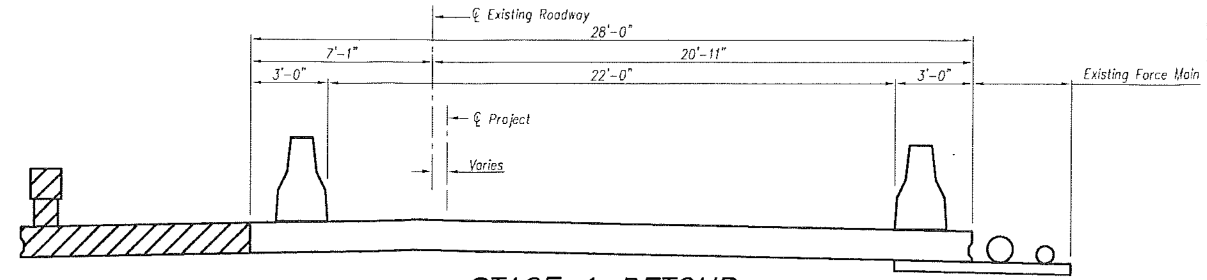
FILE: I:\projects\NE012\07P02\Dwgs & Info\ts&l\GENERAL PLAN SECTIONAL ELEVATION & PROPOSED CROSS SECTION - REVISED.dwg TS&L 1 OF 2
DATE PLOTTED: 4/16/15 2:23pm
PLOTTED BY: nmeek

PROJECT NUMBER	SHEET NO.
STPC-3811(1)	25

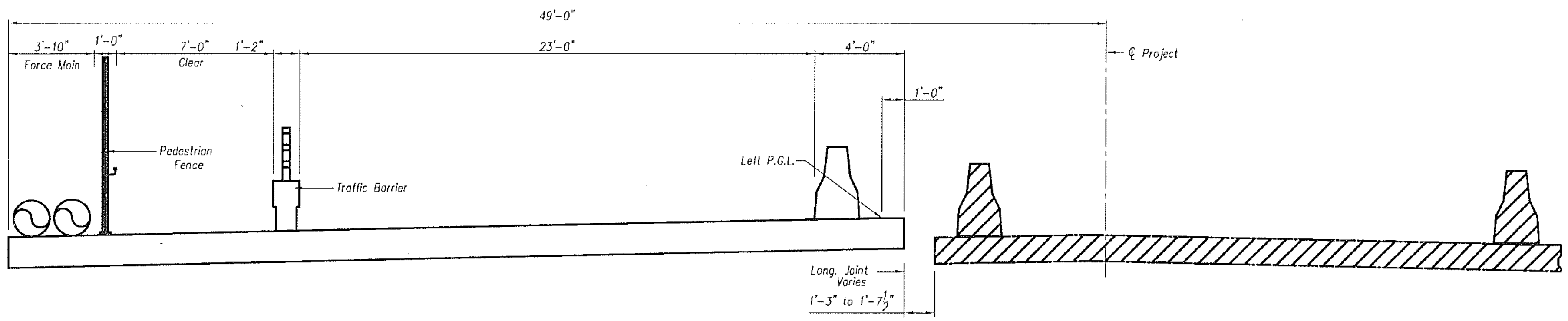
C.N. 22209

OPW 50417

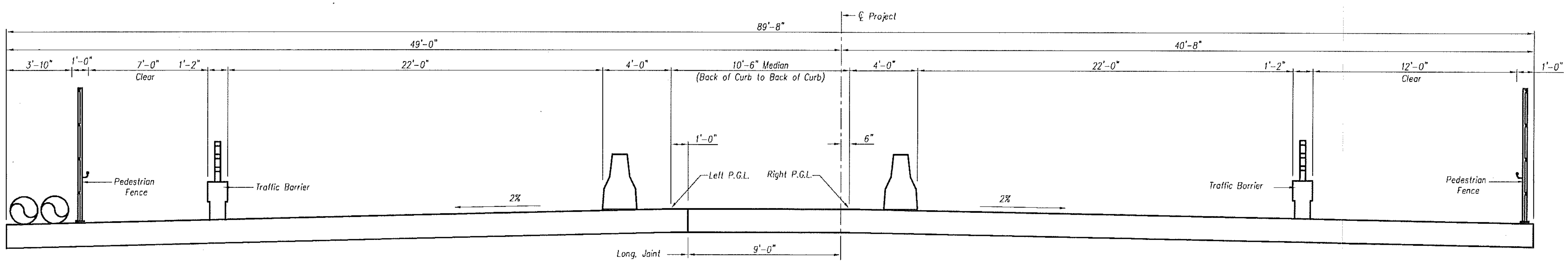
STRUCTURE NUMBER U1825 03110



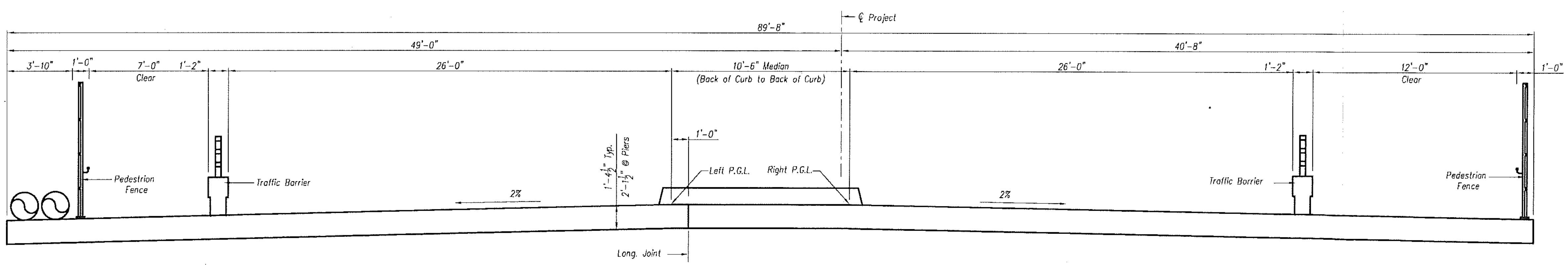
STAGE 1 DETOUR



STAGE 2 DETOUR



STAGE 3 DETOUR



TYPICAL PROPOSED BRIDGE CROSS SECTION

BRIDGE TYPE SIZE & LOCATION–168th ST.

InfraStructure, LLC
ENGINEERING CONSULTING GROUP

COUNTY Douglas
HWY. NO. 168th Street
REF.POST.
STA. 121+37.52
LOCATION 168th Street over Zorinsky Lake
SKEW 0°
ROADWAY 2 @ 26'-0"
DESIGN LIVE LOAD HL93
DESIGNED BY KAB
DETAILED BY TJL
CHECKED BY SKG
DATE March, 2015

168TH STREET IMPROVEMENTS
CONSTRUCTION STAGING

CITY OF OMAHA – PUBLIC WORKS DEPARTMENT

PROFESSIONAL STRUCTURAL ENGINEER KAREN A. BEXTEN E-7366 STATE OF NEBRASKA
4-7-15

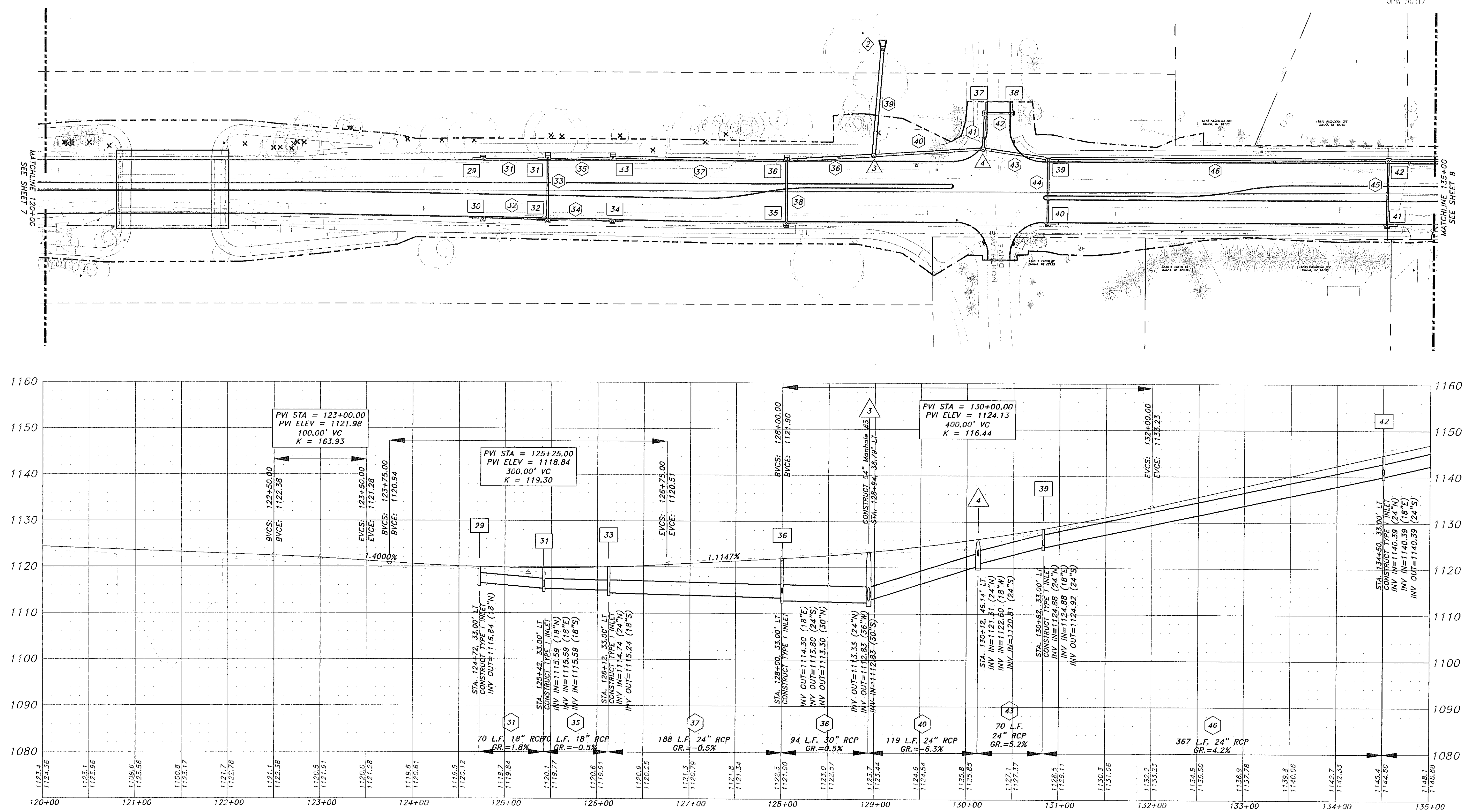
SPECIAL PLAN NO. 1c — 2/2

Sheet A
FILE: I:\projects\NE012\07P02\Dwgs & Info\ts&l\GENERAL PLAN SECTIONAL ELEVATION & PROPOSED CROSS SECTION – REVISED.dwg TS&L 2 OF 2
DATE PLOTTED: 4/16/15 2:23pm
PLOTTED BY: nmeek

PRELIMINARY PLAN
NOT FINAL - SUBJECT TO CHANGE

PROJECT NO.	SHEET NO.
STPC 3B11 (1)	7

C.N. 22209
OPW 50417



JON T. MLYER
E-7922
PROFESSIONAL CIVIL ENGINEER
STATE OF NEBRASKA

N

VERTICAL SCALE : FEET

HORIZONTAL SCALE : FEET

PLAN AND PROFILE

Dave Heineman
Governor

STATE OF NEBRASKA
DEPARTMENT OF ROADS
Randall D. Peters, P.E., Director State Engineer
1500 Highway 2 • PO Box 94759 • Lincoln NE 68509-4759
Phone (402) 471-4567 • FAX (402) 479-4325 • www.transportation.nebraska.gov

November 14, 2013

Jon Meyer, P.E.
Public Work Department
Design Division
1819 Farnam Street Suite 601
Omaha NE 68183-0601

Re: Project No. STPC-3811(1) , Control No. 22209, 168th Street, West Center – "Q" Street

Vertical Clearance for Lake Zorinsky Bridge

Mr. Meyer,

After reviewing your request to use the minimum 8 foot vertical clearance versus the recommended 10 foot, we feel that due to the existing condition of only 8 foot vertical clearance and the potential impacts required to meet the 10 foot clearance that this will be acceptable in this situation.

Regards,

Michael Kleffner, P.E.
Urban Engineer
Local Projects Section

City of Omaha
Jean Stothert, Mayor

Public Works Department
Omaha/Douglas Civic Center
1819 Farnam Street, Suite 601
Omaha, Nebraska 68183-0601
(402) 444-5220
Fax (402) 444-5248

Robert G. Stubbe, P.E.
Public Works Director

October 24, 2013

Mike Kleffner
NDOR LPA Engineer
PO Box 94759
1400 Hwy 2
Lincoln, NE 68509-4759

ATTN: Mr. Kleffner

Re:
Request to use 8 ft. minimum vertical trail clearance for CN22209 underpass of the Lake Zorinsky Bridge.

Mr. Kleffner,

As previously discussed, the City of Omaha is seeking permission from NDOR to utilize the minimum 8ft. vertical clearance on the underpass trails located at the Lake Zorinsky bridge on project CN22209 168th St. Improvements.

The existing vertical clearance for this trail is approximately 8ft. so consequently the City of Omaha is seeking the ability to utilize the 8ft. minimum vertical height criteria for trails on CN 22209. Trail users currently utilizing this trail system have the expectation that the clearance available along this trail system will provide no more than 8ft vertical clearance so the City would like to construct the new infrastructure under this same expectation to reduce the impacts to the recreational area. Increasing the vertical clearance along this trail system to the desirable criteria of 10ft. would create impacts to the existing recreational facility that are not necessary.

Please approve are request to utilize the 8ft vertical trail clearance criteria for the 168th St Improvement project CN22209.

Regards,

Jon Meyer, P.E.
Public Works Department – Design Division
City of Omaha

APPENDIX B

USACE MISSOURI RIVER PROJECT OFFICE COORDINATION

From: Pletka, Angela NWO
To: Mielke, Craig; Kresl, Zach
Subject: Submittal Checklist (UNCLASSIFIED)
Date: Wednesday, February 26, 2014 1:22:06 PM
Attachments: +RE_ApplicantChecklist.doc

Classification: UNCLASSIFIED
Caveats: NONE

Gentlemen,
Please see attached for the checklist we spoke of on the phone this afternoon. Please be aware that this is what I will need for the formal request. If you have anything that you would like to submit ahead of time (eg, flood storage mitigation volumes and locations, etc) so that I can ensure the folks downtown are tracking with us, certainly send them my way.

Talk with you soon.

Angel Pletka
Natural Resources Specialist
US Army Corps of Engineers
Missouri River Project
9901 John J Pershing Drive
Omaha, NE 68112-1547
402-996-3752

Classification: UNCLASSIFIED
Caveats: NONE

<u>Salt Creek and Papio Easement/ License Application Checklist</u>

Submit:

1. Three complete sets of:
   a. Final plans (cross sections, vicinity map, seeding specs, tree mitigation plan, erosion control measures etc.).
   b. Legal descriptions for permanent and temporary easements.

2. A lessee cover letter, which explains the project purpose, identifies the point of contact for the project and requests permission for the activity.

3. Letter(s) of concurrence from affected Corps lessee(s). (e.g. City of Omaha Parks Department, NRD, etc.)

4. A copy of state and or federal permits which may apply to the activity.
   (e.g. Will fill material be removed/placed in a wetland or waterway? (Section 404 permit) Will one or more acres of land be disturbed? (NPDES permit), etc.)

5. Will fill material be placed, or water impounded, within the Corps' flood storage zone? If so, submit volume calculations necessary to determine the amount of compensatory excavation required.

6. If any excavation work is to be done, submit a letter from the State Historical Society giving cultural/historical review of the work.

7. Identification of the party or parties responsible for maintenance of finished project where applicable.

The requestor should allow sufficient lead-time for the review of the plans by Natural Resources staff (3-6 weeks depending on the complexity of the proposed activity and completeness of the submittal). The plans will next be reviewed by Omaha District Office staff (2-4 wks) who will then submit the approved plan to the Real Estate Branch for processing. A real estate appraisal may be necessary to determine fair market value of the land impacted. This appraisal could take approx. 6 to 8 weeks to complete once the request reaches the Real Estate Branch. The appropriate real estate instrument will then be issued usually within 15 working days.

Send the application materials to:
Missouri River Project Office
Attn: Angel Pletka
9901 J.J. Pershing Dr.
Omaha, NE 68112

Questions - contact Angel Pletka (402) 996-3752

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
MISSOURI RIVER PROJECT OFFICE
9901 JOHN J. PERSHING DRIVE
OMAHA NE 68112-1500

REPLY TO
ATTENTION OF

CENWO-OD-MR

06 APRIL 2015

Jon Meyer
Engineer III
Design Division
Public Works Dept.
Omaha/Douglas Civic Center
1819 Farnam St., Suite 604
Omaha, NE 68183

Dear Mr. Meyer:

It has come to our attention that the City of Omaha's planned improvements to 168th Street at Zorinsky Lake will have an impact on the flood warning system that is installed on the bridge crossing the lake. This flood warning system was installed in 1993 and has not been in use for several years. The City may remove the flood warning system and associated staff gauge during the construction of the project without any adverse impacts.

For any questions regarding the flood warning system, or further coordination on the 168th Street project, please contact Angel Pletka at (402) 996-3752 or Angela.Pletka@usace.army.mil

Matthew S. Krajewski
Matthew S. Krajewski, P.E.
Operations Project Manager
Missouri River Project Office

CC:
Mr. Craig Mielke
Alfred Benesch & Company
14748 West Center Road, Suite 200
Omaha, NE 68144-2209

APPENDIX C

ENVIRONMENTAL JUSTICE CONCURRENCE

Dave Heineman
Governor

STATE OF NEBRASKA
DEPARTMENT OF ROADS
Randall D. Peters, P.E., *Director – State Engineer*
1500 Highway 2 • PO Box 94759 • Lincoln NE 68509-4759
Phone (402) 471-4567 • FAX (402) 479-4325 • www.transportation.nebraska.gov

22 October 2014

Craig Mielke
Project Manager
Alfred Benesch & Company

Mr. Mielke,

I have reviewed the Environmental Justice Technical Memo, created for inclusion in the Draft Environmental Assessment document, for the following project:

NDOR Control Number:	22209 & 22210
Project Number:	STPC-3811(1) & STPC-3811(2)
Project Name:	168th Street Improvements, Omaha

Based on my review of your work, as well as my independent analysis of the scope of this project and the demographics of the project area and detour route, I concur with the data and the conclusions presented in the Environmental Justice Technical Memo.

To summarize briefly, in the areas surveyed, I agree that none of the data indicates the presence of a Limited English Proficiency (LEP) population that reaches the NDOR LEP outreach triggers of 5% or 1,000 persons. Additionally, I agree with your finding that there will be no disproportionately high and adverse human health or environmental effects visited upon minority and low-income populations, as defined in FHWA Order 6640.23A.

If you require further assistance or have any questions, please don't hesitate to contact me.

Thank you,

Christopher Hassler
Highway Civil Rights Specialist
Civil Rights Office, Nebraska Department of Roads
1500 Highway 2, P.O. Box 94759
Lincoln, NE 68509
christopher.hassler@nebraska.gov
402.479.3553

APPENDIX D

SECTION 106 AND TRIBAL COORDINATION/CONCURRENCE

U.S. Department of Transportation
Federal Highway Administration

NEBRASKA DIVISION

100 Centennial Mall North
Room 220
Lincoln, NE 68508
(402)742-8460

February 18, 2014

Nebraska State Historic Preservation Office Received FEB 19 2014 NSHS

RECEIVED FEB 26 2014 BY:

L. Robert Puschendorf
Deputy State Historic Preservation Officer
Nebraska State Historical Society
Box 82554
Lincoln, NE 68508

0704-120-01
HP# 0746
County DO
STA. X ARCHEO X
Resp. SPH Date 20140305

Dear Mr. Puschendorf:

Projects STPC-3811(1); STPC-3811(2), CN 22209, 22210
168th Street Improvements – Poppleton Ave to Ehlers Street
Douglas County
Supplemental Section 106 Concurrence
Cultural Resources Survey

Please review this document on historic resources for the subject project as required under Section 106 of the National Historic Preservation Act of 1966 as amended and implementing regulations at 36 CFR Part 800. The Iowa Tribe of Kansas and Nebraska is also a consulting party.

An evaluation of the potential for cultural resources, both archeology and standing structures, is included below [and in enclosures].

Previous Section 106 Consultation
Under HP # 0704-120-01, on May 10, 2007, the Nebraska State Historic Preservation Office (NeSHPO) made a determination of 'no historic properties affected' in a letter to HWS, a consulting firm in Omaha (Enclosure 1). The Federal Highway Administration (FHWA) or the Nebraska Department of Roads (NDOR) was not directly involved in this consultation effort and therefore the Section 106 consultation process is being re-initiated.

Project Description
The Proposed Alternative is a four-lane roadway, with raised medians and curbs, and separated, parallel sidewalks or combination sidewalk/bike paths as appropriate.

The proposed project would remove the existing two-lane rural asphalt roadway and construct a four- lane divided urban concrete roadway with raised medians. Additional auxiliary lanes would be added to accommodate turning movements and to improve the traffic capacity of the roadway. The typical four- lane divided roadway cross-sections would consist of two 12.5-foot-wide lanes (i.e. for a total of 25 feet from back-of-curb to back-of-curb) in each direction. The driving lanes would be separated by a 16-foot- wide median, for an overall total width of 66 feet. These medians are required to accommodate the addition of dedicated left-turn lanes at several locations. The proposed pavement would be ten inch (10") thick concrete with six inch (6") high integral curbs. The medians would have, at a minimum, hard- surfaced "mow strips" (i.e. 28-inch-wide by six-inch-thick concrete) adjacent to the inside back of curb.

The proposed roadway shoulders would consist of 7.5-foot-wide grassed areas, with an adjacent 5-foot- wide concrete sidewalk and 1-foot-wide clear area. A 10-foot-wide bicycle trail would be constructed in place of the 8-foot-wide trail along the east and west sides of 168th Street through the Zorinsky Lake Recreation Area, and a 6-foot-wide sidewalk would be constructed along the west side of the roadway south of the lake, where no sidewalk exists today. On the bridge over Zorinsky Lake, there would be a 12-foot-wide trail on the east side, with a 6-foot-wide sidewalk on the west side. There would remain a 10-foot-wide trail under the bridge on both the north and south sides of the lake. Sidewalk ramps conforming to *Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG)* would be constructed to accommodate pedestrians crossing at stop-controlled intersections.

Grading activities, storm sewer, and proposed roadway and sidewalk features would require utility relocations and retaining wall construction. The majority of construction would occur within existing right-of-way, with only minor strips of ROW required at a few locations. Retaining walls would be used to minimize the impacts to property outside the right-of-way. One house may be acquired due to the resulting proximity of the house to the edge of the new roadway. This house was built using county road ROW standards before the area was annexed by the City, and is also situated sideways along the roadway, rather than with its back yard facing the roadway. The acquisition process will follow the Uniform Act.

An intermittent tributary along the west side of 168th Street between Hickory and Pine Streets would be avoided by using retaining walls. A new drainage structure (i.e. culvert) would be constructed to replace the existing culvert where this tributary passes under 168th Street. Erosion control best management practices (BMPs) would be used at the outlet of the culvert to minimize erosion. Additional storm sewers, inlets, and outlets would be constructed where open roadside ditches currently exist, and connections would be made to existing drainage facilities where necessary. These improvements would meet the drainage requirements of the Omaha Regional Stormwater Design Manual. Two permanent stormwater detention basins will be constructed, on the north and south sides of Zorinsky Lake, to treat runoff prior to it entering the lake, which are described in greater detail below.

The bridge over Zorinsky Lake would be reconstructed, using the existing piers, with a new, wider deck at a slightly higher elevation (i.e. maximum of approximately one foot), to achieve at least 8 feet of vertical clearance for the existing trails under the bridge. This would improve the clearance for the north trail, which is currently less than 8 feet. The reconstructed bridge would be four lanes wide, with sidewalks and trails as described above. The earthen embankment north and south of the bridge may be minimally raised and widened to accommodate the additional lanes, wider trail, and the required profile change. This fill would be minimized to the extent practicable using acceptable engineering design standards, retaining walls, and appropriate slopes as required by the Corps of Engineers to minimize runoff. Exposed slopes would be re-seeded with native vegetation.

The placement of fill material (for the slightly raised roadway profile) into the flood storage zone of Dam Site 18 (i.e. Zorinsky Lake Recreation Area) would result in a minor loss of flood storage capacity at this flood-control reservoir project. The Corps of Engineers requires a balance of cut and fill at reservoir projects; therefore, it would be necessary to mitigate for the loss of flood storage capacity. This mitigation would involve excavating fill material at two areas within the flood storage zone between the elevations 1110 mean sea level (msl) and 1128 msl. Excavation would occur in upland areas above the existing ordinary high water mark (OHWM) of Zorinsky Lake and outside of wetlands where possible. It is currently estimated that approximately 11,000 cubic yards would need to be excavated due to fill activities. The excavation sites are located west of 168th Street just north and south of the west basin of Zorinsky Lake. A management agreement would be signed with the USACE Operations Branch for the City to maintain these facilities. The excavated material would be used elsewhere on the project site if deemed suitable to meet the necessary fill requirements. If the fill material is deemed unsuitable for project requirements, it will be hauled off-site. After excavation, these sites would be utilized as stormwater detention areas to improve the water quality of the runoff before being released into Zorinsky Lake.

Alternate routes for through traffic will be posted using adjacent major roadways including 156th Street, 180th Street, Pacific Street, West Center Road, and Q Street. No improvements would be made to these routes.

Alternate routes would be available during the full closure of 168th Street from Frances Street to Pine Street, and would use West Center Road and either 156th Street or 180th Street. In addition, motorists would be able to use Q Street and Pacific Street to avoid the area completely during construction. No improvements would be made to these routes.

Construction is proposed to be accomplished in phases, with the entire project occurring over two construction seasons. The first construction season would focus on the construction of 168th Street from Poppleton Avenue to Gold Street. The second construction season would focus on the construction of 168th Street from Oak Street to Ehlers Street. Phasing for the re-construction of the bridge would allow one lane in each direction to remain open for vehicular traffic throughout construction of the project. Pedestrians would be diverted around the bridge, and would not be allowed under the bridge during construction. At-grade crossings would be provided both north and south of the bridge. Phasing for the roadway construction would allow one lane to remain open in both directions for all but a short closure (i.e. 3 months) to reconstruct 168th Street between Frances Street and the east leg of Pine Street. This closure is needed to lower the roadway profile. Alternate routes would be available using 156th Street, 180th Street, West Center Road, Pacific Street, and Q Street. No improvements would be made to the detour routes.

Enclosure 2 depicts the project location and the detour route.

Area of Potential Effects (APE)
The APE for archeological properties and standing structures was chosen to adequately identify any historic properties that may be potentially altered by this undertaking (Enclosure 3). The APE for *direct* effects includes all construction areas along the entire length of the project as

described above. In general, this includes an area about 50 feet beyond existing right-of-way. In addition, two proposed borrow areas on the north and south sides of Zorinsky Lake are included in the APE. The undertaking will expand roadways from 2-lanes to 4 lanes and therefore a broader potential *visual* impacts APE includes all properties adjacent to the roadways throughout the entire length of the project. There is no construction activity required for the detour routes and all pass through modern commercial and residential areas with all buildings less than 50 years in age. Therefore, the detour routes do not need to be considered in the APE definition. Definition of a broader APE for secondary or cumulative impacts is also not required in this instance.

Archeology

An archeological assessment for this undertaking was completed in two phases. Stacy Stupka-Burda, then affiliated with Historic Resources Group, Inc. (HRG), completed a review of the Nebraska Cultural Resources Geographic Information System and archeological site files in January, 2014. This review determined that three archeological sites (25DO28, 25DO39, and 25DO41) were previously discovered in the central portion of the APE during cultural resource studies associated with Zorinsky Lake (Fisher and Shipman 2011 and Peterson and Pepperl 1981). An HRG field visit resulted in a determination that these three properties no longer retain the sufficient research potential or physical integrity required for National Register eligibility (see Enclosure 4).

Other portions of the APE had not been formally evaluated for the presence of archeological properties. Those project areas were the subject of a field investigation completed by Highway Archeology Program Manager, Rob Bozell on January 19, 2014. Some project areas had been extensively modified through suburban development (deep cuts) with no potential for intact archeological deposits and these tracts were not examined. All other tracts were examined with negative results (see Enclosure 5.

There are no archeological historic properties in the expanded APE.

Standing Structures

A consideration of standing structures was completed through a field reconnaissance undertaken by Melissa Dirr Gengler of HRG in January of 2014. All structures within the APE were constructed in the 1980s and later and do not meet the minimum age threshold to qualify for listing in the National Register of Historic Places (see Enclosure 4).

There are no structural or architectural historic properties in the expanded APE.

Recommended Effects

The proposed undertaking will not affect historic properties and the Federal Highway Administration has made a determination of "no historic properties affected" and respectfully requests NeSHPO concurrence with this finding.

If you have any questions regarding this information, please do not hesitate to contact me at your earliest convenience.

Sincerely yours,

for Melissa Maiefski
Program Delivery Team Lead

Enclosures

CONCUR:

for BP

Deputy Historic Preservation Officer — Date 3-13-14

REFERENCES CITED:

Fisher, Toni and Rebecca Shipman

2011 *Archeological Survey and Assessment: Papillion Creek Projects Glen Cunningham Lake Recreation Area North of Highway 36, Zorinsky Lake Recreation Area and Standing Bear Lake Recreation Area, Douglas County, Nebraska.* U.S. Army Corps of Engineers (Omaha District). On file, Nebraska State Historical Society.

Peterson, J.E. and R.E. Pepperl

1981 *Cultural Resources Investigation within Proposed Structures 18 and 20: Papillion Creek Tributaries Project, Douglas and Sarpy Counties, Nebraska.* University of Nebraska-Lincoln, Department of Anthropology (Division of Archeological Research) Technical Report 81-01. On file, Nebraska State Historical Society.

NDOR
Nebraska
Department of Roads

Memorandum

DATE April 2, 2014

TO Jill Thomann, Environmental Specialist, Planning and Project Development

FROM Stacy Stupka-Burda, Section 106 Specialist, Planning and Project Development SSB

SUBJECT Tribal Consultation CN 22209_STPC-3811(1)_ 168th Street Improvements
Tribal Consultation CN 22210_STPC-3811(2)_Poppleton Ave-Ehlers St

A Section 106 consultation letter was sent to the Iowa Tribe of Kansas and Nebraska by FHWA regarding the projects referenced above on 2/18/2014. To date, a response from the Iowa Tribe of Kansas and Nebraska has not been received.

An email from FHWA dated 06/05/2012 provides guidance regarding the Section 106 Tribal Coordination process. Item 1 indicates that "if, based on the nature of the work, there is no potential to effect Native American sites (archaeological/historic/TCP), but the project is on tribal lands or within a known tribal affiliated area, then tribal coordination would consist of one letter with a 30-comment period asking for their concurrence. If they do not respond within 30 days, the FHWA would assume the tribe has no concerns for the project and no further coordination is required, keeping in mind that a tribe may voice concerns at any time in the life of the project."

The 30-day comment period for the letter sent to the Iowa Tribe of Kansas and Nebraska has passed without receiving their response. Therefore, these projects may proceed as planned.

APPENDIX E

WATERS OF THE UNITED STATES COORDINATION AND PRELIMINARY JURISDICTION DETERMINATION

Memorandum

Nebraska Department of Roads

Planning and Project Development
Highway Environmental Program Dept.

Date: November 7, 2013

To: Barney Helton, Local Projects Section

From: Mary Schroer, NDOR Highway Biologist

Subject: **Project No. STPC-3811(2)**
Control No. 22210 (22209)
168th St., West Center – Pacific St., Omaha

NDOR has reviewed the wetland delineation for the above referenced project. It contains the appropriate information and appears accurate. NDOR approves the delineation for use in coordination with the US Army Corps of Engineers (USACE) to obtain a 404 permit.

NDOR will need to review the 404 permit application package prior to submittal to the USACE. Please carbon copy (cc) me on all coordination efforts with the USACE.

rrl2510

NDOR
Nebraska Department of Roads
Planning and Project Development
Highway Environmental Program Dept.

Memorandum

Date: June 20, 2014

To: Jeff Soula, Local Projects Section
Craig Mielke, Benesch

From: Mary Schroer, NDOR Highway Biologist

Subject: **Project No. STPC-3811(2)**
Control No. 22210 (22209)
168th St., West Center – Pacific St., Omaha

NDOR has reviewed the *Addendum 1 to the 2012 Waters of the United States Investigation Report* for the above referenced project. It contains the appropriate information and appears accurate. NDOR approves the *Addendum* for use with the currently approved wetland delineation, in coordination with the US Army Corps of Engineers (USACE) to obtain a 404 permit.

REMINDER - NDOR will need to review the 404 permit application package prior to submittal to the USACE. Please upload the permit package to the NDOR FTP site and notify me, by email (mary.t.schroer@nebraska.gov), when it is available. Also notify (carbon copy) Tony Ringenberg (Tony.Ringenberg@nebraska.gov), and the appropriate Project Coordinator in the Local Projects Division.

JUN 1 1 2007

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
NEBRASKA REGULATORY OFFICE-WEHRSPANN
8901 SOUTH 154TH STREET, SUITE 1
OMAHA, NEBRASKA 68138-3621

https://www.nwo.usace.army.mil/html/od-rne/nehome.html

June 8, 2007

Mr. Frank Uhlarik
HWS Consulting Group
14748 West Center Road, Suite 200
Omaha, Nebraska 68144-2209

RE: Request for a Determination of Jurisdiction
168th Street, West Center Road to Q Street
168th Street, West Center Road to Poppleton Avenue

Dear Mr. Uhlarik:

This letter is in response to email correspondence received in our office on June 6, 2007, regarding the above-referenced project and request for a jurisdictional determination. This project is located in Sections 27, 28, 33, and 34, Township 15 North, Range 11 East, and Sections 3 and 4, Township 14 North, Range 11 East, Douglas County, Nebraska. Based on the information collected on my site visit of June 8, 2007, there is a defined channel that appears to be jurisdictional for the U. S. Army Corps of Engineers, located at the site in question between West Center Road and Poppleton Avenue (map enclosed). This unnamed tributary enters West Papillion Creek, which enters Papillion Creek, which enters the Missouri River. I did not identify any wetlands at this site. This is preliminary jurisdictional determination

The impacts that will occur at the Zorinsky Lake bridge crossing are also jurisdictional for the U. S. Army Corps of Engineers. This is also preliminary jurisdictional determination.

A Department of the Army Section 404 permit is required to place fill material into any water of the United States (rivers, streams, ponds, lakes, etc) on the property.

If you have any questions, you can write to the above address or call (402) 896-0896 and refer to file number **NE 2007-1180-WEH.**

Sincerely,

Laura Banker

Laura Banker
Project Manager

Enclosure
Copy Furnished:
Jon Meyer, City of Omaha
Len Sand, Nebraska Department of Roads
Terry Hickman, Nebraska Department of Environmental Quality
Ed Kosola, Federal Highway Administration

168th Street, West Center Road to Poppleton Avenue

APPENDIX F

THREATENED & ENDANGERED SPECIES COORDINATION/CONCURRENCE

NDOR
Nebraska
Department of Roads

Memorandum

DATE	1/21/14
TO	Local Public Agency
FROM	Zach Cunningham, HWY Environmental Biologist
THRU	Jeffrey Soula - Local Projects Section
SUBJECT	168th St., West Center - Q St., Omaha, STPC-3811(1), 22209 & 168th St., & West Center - Pacific St., Omaha, STPC-3811(2), 22210 Threatened & Endangered Species Concurrence

The attached concurrence package signed on 1/21/14 by NDOR is the documentation required for threatened & endangered species concurrence in the NEPA document.

The project, as proposed has been determined to have "**no effect**" to all state or federally listed species or their designated critical habitat.

Below are the Conservation Conditions and survey protocol (if applicable) that will be required for this project. They must be included verbatim in the "green sheet" **and** NEPA document.

General Conservation Conditions for All Projects (Responsible Party for the measure is found in parentheses):

A-1 **Changes in Project Scope**. If there is a change in the project scope, the project limits, or environmental commitments, the NDOR Environmental Section must be contacted to evaluate potential impacts prior to implementation. Environmental commitments are not subject to change without prior written approval from the Federal Highway Administration. *(District Construction, Contractor)*

A-2 **Conservation Conditions**. Conservation conditions are to be fully implemented within the project boundaries as shown on the plans. *(District Construction, Contractor)*

A-3 **Early Construction Starts**. Request for early construction starts must be coordinated by the Project Construction Engineer with NDOR Environmental for approval of early start to ensure avoidance of listed species sensitive lifecycle timeframes. Work in these timeframes will require approval from the Federal Highway Administration and could require consultation with the USFWS and NGPC. *(District Construction, Contractor)*

A-4 **E&T Species**. If federal or state listed species are observed during construction, contact NDOR Environmental. Contact NDOR Environmental for a reference of federal and state listed species. *(NDOR Environmental, District Construction, Contractor)*

A-5 **Refueling**. Refueling will be conducted outside of those sensitive areas identified on the plans, in the contract, and/or marked in the field. *(Contractor)*

A-6 **Restricted Activities**. The following project activities shall, to the extent possible, be restricted to between the beginning and ending points (stationing, reference posts, mile markers, and/or section-township-range references) of the project, within the right-of-way designated on the project plans: borrow sites, burn sites, construction debris waste disposal areas, concrete and asphalt plants, haul roads, stockpiling areas, staging areas, and material storage sites.

For activities outside the project limits, the contractor should refer to the Nebraska Game and Park Commission website to determine which species ranges occur within the off-site area. The contractor should plan accordingly for any species surveys that may be required to approve the use of a borrow site, or other off-site activities. The contractor should review Chapter 11 of the Matrix (on NDOR's website), where species survey protocol can be found, to estimate the level of effort and timing requirements for surveys.

Any project related activities that occur outside of the project limits must be environmentally cleared/permitted with the Nebraska Game and Parks Commission as well as any other appropriate agencies by the contractor and those clearances/permits submitted to the District Construction Project Manager prior to the start of the above listed project activities. The contractor shall submit information such as an aerial photo showing the proposed activity site, a soil survey map with the location of the site, a plan-sheet or drawing showing the location and dimensions of the activity site, a minimum of 4 different ground photos showing the existing conditions at the proposed activity site, depth to ground water and depth of pit, and the "Platte River depletion status" of the site. The District Construction Project Manager will notify NDOR Environmental which will coordinate with FHWA for acceptance if needed. The contractor must receive notice of acceptance from NDOR, prior to starting the above listed project activities. These project activities cannot adversely affect state and/or federally listed species or designated critical habitat. (*NDOR Environmental, District Construction, Contractor*).

A-7 **Waste/Debris**. Construction waste/debris will be disposed of in areas or a manner which will not adversely affect state and/or federally listed species and/or designated critical habitat. *(Contractor)*

S-3 **Revegetation**. All permanent seeding and plantings (excluding managed landscaped areas) shall use species and composition native to the project vicinity as shown in the Plan for the Roadside Environment. However, within the first 16 feet of the road shoulder, and within high erosion prone locations, tall fescue or perennial ryegrass may be used at minimal rates to provide quick groundcover to prevent erosion, unless state or federally listed threatened or endangered plants were identified in the project area during surveys. If listed **plants** were identified during survey, any seed mix requirements identified during resource agency consultations shall be used for the project. (NDOR Environmental)

Project Name: 168th St., West Center - Q St., Omaha & 168th St., & West Center - Pacific St., Omaha
Updated 1/2/13
Federal-aid Number: STPC-3811(1) & STPC-3811(2)
Control Number: 22209 & 22210

Overview of Effects and Required Conservation Conditions

Threatened and Endangered Species Effect Determination:

☒ This project will have "no effect" to all listed species and their habitats.
**If an IPLE was written to justify the no effect determination, the BA is sent to FHWA for concurrence.*

☐ A "may affect, not likely to adversely affect" determination is made for the following species/critical habitat with the conservation conditions listed below *(and will have "no effect" on all other listed species, except for any listed in the 3rd check box)*:

☐ A "may affect, likely to adversely affect" determination is made for the following species/critical habitat with the conservation conditions listed below *(and will have "no effect" on all other listed species, except for any listed above)*:

Platte River Flow Depletions and Borrow:
If the excavation of borrow sites will occur within the Platte River Basin and result in open water that could constitute a depletion to the Platte River system, upstream of the Loup confluence, the Nebraska Department of Natural Resources will be contacted. If a borrow site will result in a depletion to the Platte River system, downstream of the Loup confluence, NDOR will coordinate with the Nebraska Game and Parks Commission.

Migratory Bird Treaty Act:
NDOR has developed an Avian Protection Plan (APP) to reduce conflicts between construction of NDOR projects and the laws governing migratory birds. This procedure is designed to protect and conserve avian populations and reduce avian conflicts through changes in project scheduling (i.e. tree clearing outside of primary nesting period), increased migratory bird surveys, and changes in project construction timelines. NDOR will utilize its APP to reduce conflicts with migratory birds on this project.

Bald and Golden Eagle Protection Act:
This project was also reviewed for potential impacts to bald and golden eagles. NDOR believes the project site does not have appropriate habitat for eagles. Due to the lack of suitable habitat and information that there are no known bald eagle nests within the project area, NDOR has determined that there will be no impact to these species.

Fish and Wildlife Coordination Act:
This project will result in less than ½ acre of wetland impacts and less than 100 feet of stream channel impacts. A Section 404 permit will be required from the US Army Corps of Engineers.

Conservation Conditions: *Responsible Party for conservation condition shown in parentheses.*

Listed below are the required Conservation Conditions that apply to this project. These measures are not subject to change without the prior written approval of the Federal Highway

Administration. **Copy and paste the conditions listed below verbatim in the NEPA document, the Green Sheet, and in the contract documents:**

A-1 **Changes in Project Scope**. If there is a change in the project scope, the project limits, or environmental commitments, the NDOR Environmental Section must be contacted to evaluate potential impacts prior to implementation. Environmental commitments are not subject to change without prior written approval from the Federal Highway Administration. *(District Construction, Contractor)*

A-2 **Conservation Conditions**. Conservation conditions are to be fully implemented within the project boundaries as shown on the plans. *(District Construction, Contractor)*

A-3 **Early Construction Starts**. Request for early construction starts must be coordinated by the Project Construction Engineer with NDOR Environmental for approval of early start to ensure avoidance of listed species sensitive lifecycle timeframes. Work in these timeframes will require approval from the Federal Highway Administration and could require consultation with the USFWS and NGPC. *(District Construction, Contractor)*

A-4 **E&T Species**. If federal or state listed species are observed during construction, contact NDOR Environmental. Contact NDOR Environmental for a reference of federal and state listed species. *(NDOR Environmental, District Construction, Contractor)*

A-5 **Refueling**. Refueling will be conducted outside of those sensitive areas identified on the plans, in the contract, and/or marked in the field. *(Contractor)*

A-6 **Restricted Activities**. The following project activities shall, to the extent possible, be restricted to between the beginning and ending points (stationing, reference posts, mile markers, and/or section-township-range references) of the project, within the right-of-way designated on the project plans: borrow sites, burn sites, construction debris waste disposal areas, concrete and asphalt plants, haul roads, stockpiling areas, staging areas, and material storage sites.

For activities outside the project limits, the contractor should refer to the Nebraska Game and Park Commission website to determine which species ranges occur within the off-site area. The contractor should plan accordingly for any species surveys that may be required to approve the use of a borrow site, or other off-site activities. The contractor should review Chapter 11 of the Matrix (on NDOR's website), where species survey protocol can be found, to estimate the level of effort and timing requirements for surveys.

Any project related activities that occur outside of the project limits must be environmentally cleared/permitted with the Nebraska Game and Parks Commission as well as any other appropriate agencies by the contractor and those clearances/permits submitted to the District Construction Project Manager prior to the start of the above listed project activities. The contractor shall submit information such as an aerial photo showing the proposed activity site, a soil survey map with the location of the site, a plan-sheet or drawing showing the location and dimensions of the activity site, a minimum of 4 different ground photos showing the existing conditions at the proposed activity site, depth to ground water and depth of pit, and the "Platte River depletion status" of the site. The District Construction Project Manager will notify NDOR Environmental which will coordinate with FHWA for acceptance if needed. The contractor must receive notice of acceptance from NDOR, prior to starting the above listed project activities. These project activities cannot adversely affect state and/or federally listed species or designated critical habitat. (*NDOR Environmental, District Construction, Contractor*).

A-7 **Waste/Debris**. Construction waste/debris will be disposed of in areas or a manner which will not adversely affect state and/or federally listed species and/or designated critical habitat. *(Contractor)*

S-3 **Revegetation**. All permanent seeding and plantings (excluding managed landscaped areas) shall use species and composition native to the project vicinity as shown in the Plan for the Roadside Environment. However, within the first 16 feet of the road shoulder, and within high erosion prone locations, tall fescue or perennial ryegrass may be used at minimal rates to provide quick groundcover to prevent erosion, unless state or federally listed threatened or endangered plants were identified in the project area during surveys. If listed **plants** were identified during survey, any seed mix requirements identified during resource agency consultations shall be used for the project. (NDOR Environmental)

The overall Biological Assessment package was prepared by:

[signature]	Zach Cunningham	Biologist/NDOR	1/21/14
Signature	*Printed Name*	*Title and Agency/Firm*	*Date*

Approved by the following qualified NDOR biologist:

Mary Schroer	MARY SCHROER	1/21/14
Signature	*Printed Name*	*Date*

☐ Check if FHWA signature required *(NDOR Environmental use only).*
Approved by FHWA Environmental *(FHWA signature only needed when an Individual Project Level Evaluation, modified Conservation Conditions, or Individual BA is required.):*

Signature	*Printed Name*	*Date*

☐ Check if USFWS and/or NGPC concurrence is required *(NDOR Environmental use only).*

☐ Check if the project occurs on federal or tribal land *(NDOR Environmental use only).*
If yes, provide federal or tribal agency name: _____

Sent: Tuesday, April 15, 2014 1:53 PM
To: Soula, Jeffrey; Fitzpatrick, Caitlin
Cc: Barber, Jon
Subject: Reevaluation - 168th St., West Center - Q St., Omaha, STPC-3811(1), 22209 & 168th St., & West Center - Pacific St., Omaha, STPC-3811(2), 22210

I have reevaluated the project: 168th St., West Center - Q St., Omaha, STPC-3811(1), 22209 & 168th St., & West Center - Pacific St., Omaha, STPC-3811(2), 22210 due to the recent proposed federal listing of the northern long-eared bat.
The NDOR Activity Checklist indicated that clearing and grubbing, bridge work, culvert work, and removal of structures and obstructions will be included as part of this project. These activities have the potential to impact northern long-eared bats.
The project, as proposed has been determined to "**may affect, not likely to adversely affect**" the **northern long-eared bat**, and will have "no effect" to all other state or federally listed species.

Below are the conservation conditions that must be included for this project.

Northern Long-Eared Bat:

NLEB-1 Tree clearing, bridge deck joint replacements over the bridge deck, bridge/>5-ft box-culvert removal activities will be scheduled to occur between October 1st – March 31th to avoid impacts to the northern long-eared bat roosting period. (NDOR Environmental, Construction, Contractor)

OR

NLEB-2 If tree clearing, bridge deck joint replacement over the bridge deck, or removal of bridge/>5-ft box-culvert structures occurs during the northern long-eared bat maternal roosting period (April 1st – September 30th),NDOR or a qualified biologist will perform surveys prior to the start of these activities at the following locations: __length of project_ (location of suitable habitat). If the species is absent, work may proceed. If the species is found, NDOR Environmental Section will consult with the USFWS, NGPC, and FHWA prior to the start of construction. (NDOR Environmental, Construction, Contractor)

Zach Cunningham
Environmental Biologist
Nebraska Department of Roads
1500 Highway 2
P.O. Box 94759
Lincoln, NE 68509-4759
Phone: 402-479-4464
E-mail: zach.cunningham@nebraska.gov

APPENDIX G

NOISE STUDY

Traffic Noise Analysis

Will Packard

Digitally signed by Will Packard
Date: 2016.11.03 13:52:08 -05'00'

168th Street – Poppleton Avenue to Ehlers Street

Omaha, NE

STPC-3811(1), CN 22209

STPC-3811(2), CN 22210

PREPARED FOR

City of Omaha

1819 Farnam Street

Omaha, NE 68183

November, 2016

Benesch Project Number 72470186.00

Table of Contents

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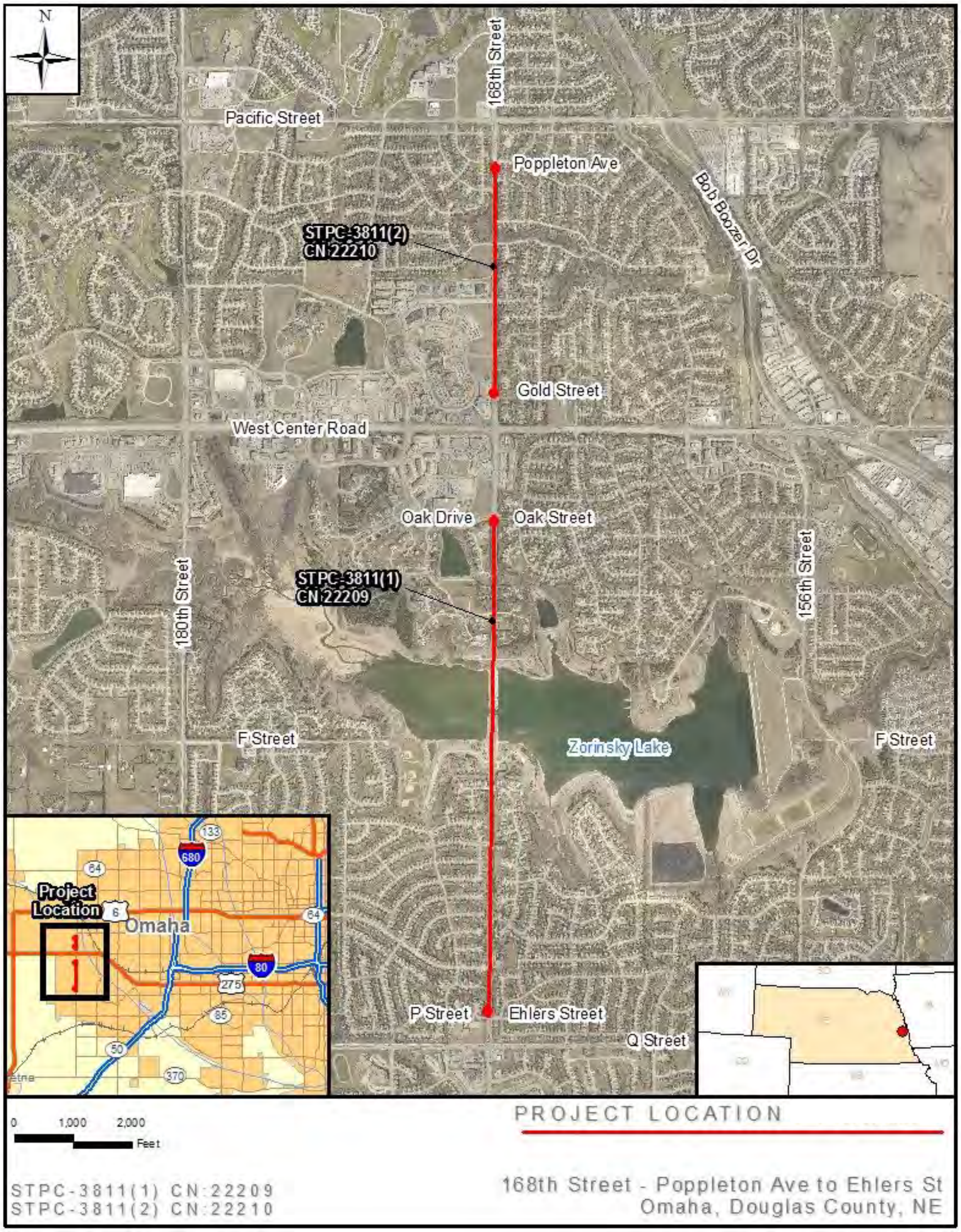
1.0 Introduction

The City of Omaha, Nebraska (City), in cooperation with the Federal Highway Administration (FHWA) and the Nebraska Department of Roads (NDOR), is proposing to widen 168th Street from a two-lane rural roadway to a four-lane urban divided roadway with turn lanes, generally between Pacific Street and Q Street. Specifically, the proposed project includes widening 168th Street from Poppleton Avenue to Gold Street and from Oak Street to Ehlers Street, as shown in **Figure 1**. The proposed project does not include widening the segments of 168th Street that have already been widened to four lanes as part of previous projects, including Q Street to Ehlers Street (i.e., Q Street improvements), just south of Oak Drive to Gold Street (i.e., West Center Road improvements), and from Poppleton Avenue to Pacific Street (i.e., Pacific Street improvements).

Alfred Benesch & Company (Benesch) was contracted by the City to prepare an Environmental Assessment (EA) for the proposed project, including this traffic noise analysis.

The purpose of this noise analysis is to evaluate the impact of the proposed 168th Street widening to the adjacent properties. NDOR's document, *Noise Analysis and Abatement Policy, July 13, 2011* (noise policy), was used as the criteria for determination of noise impacts on this roadway construction project.

Figure 1. Project Location



2.0 Methodology

2.1 Nature of Noise

Noise is defined as unwanted sound. Sound is the sensation produced in the hearing organs when waves are created in the surrounding air by the vibration of some material body. The impact that sound waves have on the hearing organs is dependent on the pressure generated by the wave. The unit of measure of sound pressure level in common use is the decibel (dB), which can be simply defined as a logarithmic function of the actual sound pressure. The logarithmic function is used because the range of sound pressures is too great to be accommodated on a linear scale. The reference for sound pressure measurements is 0 dB which corresponds to 0.0002 microbars. This represents the weakest sound that can be heard by a person with very good hearing in an extremely quiet place. A sound level of 100 decibels corresponds to a pressure of 20 microbars, or 100,000 times the pressure that corresponds with 0 decibels. The range of sound pressure levels most frequently encountered in evaluating traffic-generated noise on highways is 50 to 95 dB.

2.2 Measurement of Sound

The sound-level meter is the basic instrument of noise measurement. The American Standard (ANSI Sl.4-1971) specifies that sound level meters have the capability of measuring three alternate frequency response characteristics designated as A, B, and C. The different frequency responses are used to account for different responses to sound pressure levels. C-weighting is essentially linear. B-weighting reflects the ear's response to sounds of moderate pressure level. A-weighting reflects the ear's response to sounds of lower pressure level; therefore, A-weighting is the most widely used for assessing transportation related noise. FHWA has specified that noise be predicted and evaluated in decibels weighted with the A-level frequency response, using the unit of measure referred to as dBA. Measurements in dBA incorporate the ear's reduced sensitivity to both low frequency and very-high frequency noises, thereby correlating well with our subjective impression of loudness. **Table 1** displays noise levels (in dBA) common to our everyday activities.

Table 1. Common Noise Levels

Common Noise Levels	Noise Level (dBA)
Rock Band at 16 ft	110
Jet Flyover at 985 ft	105
Gas Lawn Mower at 3 ft	95
Diesel Truck at 50 ft	85
Same Truck at 110 ft	80
Gas Lawn Mower at 100 ft	70
Normal Speech at 3 ft	65
Birds Chirping	50
Leaves Rustling	40
Very Quiet Soft Whisper	30
Threshold of Hearing	0

Courtesy FHWA's *Public Roads* Magazine, July/August 2003

2.3 23 CFR Part 772 Standards

FHWA's regulations for mitigation of highway traffic noise in the planning and design of federally-aided highways are contained in Title 23, Part 722 of the US Code of Federal Regulations (23 CFR 772), which was last updated on July 13, 2010. The regulations require the following during the planning and design of highway projects:

1. Identification of traffic noise impacts
2. Examination of potential mitigation measures
3. Incorporation of reasonable and feasible noise mitigation measures into the highway project
4. Coordination with local officials to provide helpful information on compatible land-use planning and control.

The regulations also contain noise abatement criteria (NAC), which represent the upper limit of acceptable highway traffic noise for different types of land uses and human activities. The regulations do not require meeting the abatement criteria in every instance. Rather, they require highway agencies make every reasonable and feasible effort to provide noise mitigation when the criteria are approached or exceeded. Compliance with the noise regulations is a prerequisite for the granting of Federal-aid highway funds for construction or reconstruction of a highway. This noise analysis addresses the first three requirements; the fourth requirement is handled through regional and local planning processes.

2.4 Noise Abatement Criteria

The noise abatement criteria (NAC) contained in 23 CFR 772 are based on the one-hour equivalent level (Leq) noise descriptor. Leq(h) is the equivalent steady state sound level, which during the hour under consideration contains the same acoustic energy as the time-varying traffic sound level during that same hour, and is measured in dBA. The NAC varies depending on the Activity Category assigned to receptors under consideration, which are based on land use. **Table 2** contains the various Activity Categories and the upper limits of desirable hourly Leq(h) noise levels for each category. Noise levels that approach or exceed the NAC would not be desirable, and would be referred to as a noise impact.

Most land uses along 168th Street where the proposed improvements would occur are considered Activity Category B (outdoor areas of residential homes), with a few areas of Activity Category C (outdoor areas of non-residential uses, e.g., daycare centers, hospitals, medical facilities, parks, churches), Activity Category E (outdoor areas of non-residential areas that are less susceptible to noise, e.g., offices and restaurants), and one area of Activity Category F (land uses not sensitive to noise, e.g., retail facilities).

There have not been any Activity Category A land uses (i.e., highly-sensitive areas where quiet and serenity are of extraordinary significance) designated for this project.

Activity Category D (interior areas of Activity Category C facilities) is only used in cases where exterior noise abatement measures are determined to be not feasible and reasonable. No receptors along the project corridor were found to warrant the use of Activity Category D.

For Activity Category G (undeveloped lands), noise analysis is conducted using the permitted future use if possible. Otherwise, only future levels are determined, and any abatement that is considered would not be eligible for federal funding. There are no areas of Activity Category G land use on this project.

Table 2. FHWA Noise Abatement Criteria

Activity Category	Hourly Noise Levels Leq(h) dBA	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 (Exterior)	Residential
C	67 (Exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	52 (Interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E	72 (Exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F
F	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	--	Undeveloped lands

2.5 Noise Prediction Method

Traffic noise levels shown in this study resemble “peak hour” noise levels and are predicted in hourly Leq(h) dBA. The traffic volume used for this hour time period is usually the Design Hourly Volume (DHV) traffic. However, if the DHV is not that predictable, a peak hour volume that occurs on a regular basis during the design year might be used. The Leq(h) descriptor is reliable for low-volume as well as high-volume roadways, is simpler in most instances for highway designers to work with, and is more flexible in terms of permitting noise levels from different sources to be included in the analysis of the total ambient noise.

The "FHWA Highway Traffic Noise Prediction Model" is the method used in this report to predict Leq(h) dBA noise levels, developed and approved for use by FHWA. The procedures included in the FHWA Model permit an analysis of variations in traffic noises in terms of traffic parameters, roadway and observer characteristics. These parameters are then identified for a particular traffic situation and transformed into noise level estimates through the use of this prediction method, which has been set up on a computer, using the FHWA Traffic Noise Model (TNM), Version 2.5.

In analyzing the traffic noise, emphasis was given to the two main noise criteria of a traffic noise impact, as set forth in 23 CFR 772. A comparison was made between the predicted traffic noise levels and the NAC levels to determine if traffic noise impacts exist due to the noise levels approaching or exceeding the NAC. Also, a comparison was made between existing noise levels and future predicted traffic noise levels to determine the level of noise impact that would be expected to occur.

As stated in the noise policy, NDOR generally considers that an impact occurs and abatement measures will be considered for receptors if:

1. The predicted design year noise levels approach or exceed the FHWA NAC. NDOR has established that a noise level of 1 dBA less than the NAC constitutes “approaching” the NAC.

2. Predicted future noise levels are 15 dBA or more above existing levels. For purposes of interpreting the FHWA noise standards, this would be considered a “substantial increase” over existing levels.

3.0 Noise Model Inputs

3.1 Traffic Volumes

The 2011 turning movement counts with vehicle classifications were provided by the City. Following guidance from the Metropolitan Area Planning Agency (MAPA), the 2011 traffic volumes were grown at 2% per year, compounded annually, to project the 2035 traffic volumes. The 2011 and 2035 PM traffic volumes are displayed in **Table 3** and **Table 4**.

In spring 2014, MAPA released the latest update to its travel demand model that includes the 2040 traffic forecast. Project stakeholders (City of Omaha, NDOR, and FHWA) directed Benesch to compare the new 2040 projections to the 2035 projections that were used in the noise analysis to determine whether the change in the traffic projections would require re-analysis of the traffic noise using the 2040 projections.

Comparing the 2035 projections to the 2040 projections, the maximum percent change is approximately 19%. This amount of change is less than the 25% change stipulated by NDOR for a re-evaluation of noise impacts, and therefore, does not significantly change the findings of the noise analysis. Additionally, the 19% change using the 2040 projections was actually a decrease in traffic (i.e. the 2040 projections resulted in lower traffic volumes than the 2035 projections); therefore, using the 2035 projections produces a more conservative analysis that would result in higher noise levels than the 2040 projections. As a result, the current findings of the noise analysis should be considered valid. For a more in-depth discussion of the traffic volume update, please see the approved 2040 Traffic Volume Update Memo (**Attachment 1**).

Table 3. Year 2011 Traffic Volumes

Cross Street	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Pacific St	102	351	46	327	710	219	30	1023	119	133	1313	96
Poppleton Ave	0	0	0	4	0	6	0	1166	13	13	1673	0
William St	0	0	0	5	0	5	0	1174	5	5	1672	0
Pine St West	2	0	14	0	0	0	16	1177	0	0	1629	48
Pine St East	0	0	0	7	0	8	0	1185	27	6	1637	0
Shirley St / Hickory St	3	0	15	2	1	8	9	1201	8	5	1630	9
Frances St	299	33	92	15	3	45	22	874	11	54	1461	132
Lakeside Hills Plz	157	0	185	0	0	0	95	750	0	0	1475	93
Gold St	0	0	0	10	0	10	0	835	10	10	1650	0
West Center Rd	166	900	208	381	1489	284	184	395	164	262	1216	182
Elm St	10	0	10	0	0	0	0	733	0	0	1795	10
Oak St / Oak Dr	110	23	197	29	25	68	179	555	28	69	1708	28
Ontario St	5	0	22	1	0	1	13	756	1	5	1918	11
Zorinsky North	2	0	0	0	0	6	0	762	1	3	1936	2
Zorinsky South	33	0	42	0	0	5	19	725	2	7	1892	37
H Cir / 167th Ave	5	5	5	5	5	15	5	726	5	50	1874	10
Patterson Dr	92	0	32	0	0	0	31	644	0	0	1689	195
Rolling Ridge Rd	0	0	0	35	0	34	0	641	20	75	1646	0
Orchard Ave	21	0	62	6	0	8	78	632	6	4	1612	65
P St / Ehlers St	0	0	32	0	0	18	2	698	24	0	1656	24
Q St	98	754	96	348	1926	183	190	443	98	442	1072	174

Table 4. Year 2035 Traffic Volumes

Cross Street	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Pacific St	164	565	74	526	1142	352	48	1645	191	214	2112	154
Poppleton Ave	0	0	0	6	0	10	0	1875	21	21	2691	0
William St	0	0	0	8	0	8	0	1888	8	8	2689	0
Pine St West	3	0	23	0	0	0	26	1893	0	0	2620	77
Pine St East	0	0	0	11	0	13	0	1906	43	10	2633	0
Shirley St / Hickory St	5	0	24	3	2	13	14	1932	13	8	2622	14
Frances St	481	53	148	24	5	72	35	1406	18	87	2350	212
Lakeside Hills Plz	253	0	298	0	0	0	153	1206	0	0	2372	150
Gold St	0	0	0	16	0	16	0	1343	16	16	2654	0
West Center Rd	267	1448	335	613	2395	457	296	635	264	421	1956	293
Elm St	16	0	16	0	0	0	0	1179	0	0	2887	16
Oak St / Oak Dr	177	37	317	47	40	109	288	893	45	111	2747	45
Ontario St	8	0	35	2	0	2	21	1216	2	8	3085	18
Zorinsky North	3	0	0	0	0	10	0	1226	2	5	3114	3
Zorinsky South	53	0	68	0	0	8	31	1166	3	11	3043	60
H Cir / 167th Ave	8	8	8	8	8	24	8	1168	8	80	3014	16
Patterson Dr	148	0	51	0	0	0	50	1036	0	0	2717	314
Rolling Ridge Rd	0	0	0	56	0	55	0	1031	32	121	2647	0
Orchard Ave	34	0	100	10	0	13	125	1017	10	6	2593	105
P St / Ehlers St	0	0	51	0	0	29	3	1123	39	0	2664	39
Q St	158	1213	154	560	3098	294	306	713	158	711	1724	280

3.2 Vehicle Types

TNM requires the traffic volumes to be split into five vehicles types, as shown in **Table 5**.

Table 5. TNM Vehicles Types

TNM Type	Axles	Tires	Dominant Noise Source
Auto*	2	4	Tire/pavement contact
Medium Truck	2	6	Engine
Heavy Truck	>2	>6	Exhaust stack
Bus	2	6	Engine
Motorcycle	2	2	Engine

* - includes cars, vans, SUVs, and pickup trucks

Using the traffic count data and engineering judgment, the vehicle classifications were converted into percentages to apply to the turning movement volumes. The vehicle type percentages used in the noise model are displayed in **Table 6**.

Table 6. Vehicle Type Percentages Used in TNM

Type	168th St Northbound & Southbound	Pacific Street, West Center Road, and Q Street	Other Side Streets
Auto	98%	98%	100%
Medium Truck	1%	1%	0%
Heavy Truck	1%	1%	0%
Bus	0%	0%	0%
Motorcycle	0%	0%	0%

Total truck volumes were inputted at 2% because 168th Street is not a designated truck route and does not have any major truck generators located along the primarily residential corridor. In addition, the 2% truck total during the peak commuter period is consistent with the heavy vehicles provided by the city in their base Synchro files.

3.3 Land Uses

Land uses were verified through aerial photography and multiple field visits. The land uses adjacent to 168th Street where the proposed project improvements would occur are mostly residential, with a few recreation and commercial locations. The corresponding Activity Category was assigned to each receptor.

3.4 Receptors

Four-hundred one (401) receptors were identified for this project. Fourteen are commercial receptors (five are undeveloped but permitted, six correspond to restaurants, one corresponds to an office building, and two correspond to retail areas[1]), five correspond to a church and childcare, and five are recreational receptors[2]. The remaining three-hundred seventy-seven (377) receptors are residential, thirty-three (33) of which are part of a multi-family dwelling.

In accordance with NDOR and FHWA guidelines, the receptors were situated in areas of frequent human use for all Activity Categories. For residential homes and multi-family dwellings (Activity Category B),

[1] According to 23 CFR 772, no noise analysis is required for Activity Category F, which includes retail facilities.
[2] Four of the five receptors for the Edward Zorinsky Recreation Area represent the Zorinsky Lake Trail.

this was typically in the side or back yard (e.g., balconies, decks, patios). For commercial establishments (Activity Categories C and E), this as typically at the edge of the building near an entrance or other area of frequent human use, such as an outdoor seating area, playground, or other gathering area. For Activity Category B, one receptor was used for each residence. In the instance of a multi-family dwelling (e.g. apartment), one receptor was used for each dwelling unit with an outdoor area of frequent human use (e.g. patio, balcony), as well as any outdoor common use areas. Please refer to the NDOR Noise Policy for specific details on the number and placement of receptors for Activity Categories C and E. The receptor ID's were named based upon the subdivision in which they are located. The subdivisions are displayed in **Table 7**. **Exhibit 1** through **Exhibit 10** display the receptor locations.

Table 7. Subdivision Names

Abbreviation	Subdivision Name
AA	Armbrust Acres
AR	Autumn Ridge
AV	Armbrust Village
AW	Autumn Woods
BP	Broderson Place
BS	Bay Shores
EA	Elshire Acres
HL	The Heritage at Legacy
LE	Living Hope Evangelical Church & Our Precious Lambs Daycare
LG	The Shops of Legacy
LH	Lakeside Hills
LS	Lake Shore
LV	Legacy Villas
LW	Leawood Southwest
LZ	Lake Zorinsky
MS	Property Owner Initials
PH	Pacific Heights
PP	Prairie Pointe
RC	Property Owner Initials
RG	Rose Garden Estates
SH	South Shore Heights
TP	The Pointe
TR	The Reserve

3.5 Study Area

According to the NDOR Noise Policy, this project meets the definition of a Type I project because it includes the "physical alteration of an existing highway where there is ... the addition of a through traffic lane(s)." Therefore, the limits of investigation for this study generally begin and end at the limits of construction of the proposed improvements. Although the area between Oak Drive and just south of Gold Street is not included within the limits of construction (i.e. would not be widened), it is located between two segments of roadway that would be widened, and is therefore included in the limits of investigation. This determination is based on FHWA guidance that the proposed improvements would be expected to increase traffic on this segment of roadway, and thereby has the potential to increase noise even without widening the roadway.

The minimum distance to look for receptors is 300 feet from the edge of pavement (600 feet for Activity Category C), and if an impact is identified at 300 feet, the next closest receptors need to be analyzed until a distance where impacts no longer occur. Therefore, receptors were placed at each “front-row” residence, business, or other noise-sensitive receptor along the entire project corridor, and also at several locations farther back from the road to identify possible “second-row” impacts. If impacts were identified at these locations, additional receptors were added until no further impacts were identified.

4.0 Noise Analysis Results

The following sections identify impacted receptors and discuss noise abatement for the build alternative.

4.1 Existing Noise Levels

4.1.1 Modeled 2011 Noise Levels

Existing noise levels were modeled in TNM using the existing roadway configuration and traffic volumes from 2011. Based on the model, there are ninety-three (93) impacted receptors under existing conditions. The existing impacts are denoted in **Table 9** with an asterisk (*) on the existing noise level.

4.1.2 Measured 2014 Noise Levels

In addition to modeling the existing noise levels, measurements were taken to validate predicted noise levels from TNM. Noise meter readings were taken on April 8, 2014, at three locations along the 168th Street:

1. Between Shirley and Frances Streets on the west side of 168th Street (see **Exhibit 2**)
2. North of Patterson Drive on the west side of 168th Street (see **Exhibit 8**)
3. North of Orchard Drive on the east side of 168th Street (see **Exhibit 10**)

Two fifteen-minute noise measurements (30 minutes total) were conducted at each location with a Larson Davis Model 831 ANSI Type I noise meter. The sound meter complies with ANSI requirements for precision sound level measurement. Concurrently with the noise measurements, two 15-minute traffic counts for northbound and southbound 168th Street were conducted; the resulting 15-minute traffic counts were added to represent the half-hour values, and were then multiplied by a factor of 2 to represent one-hour traffic volumes and one-hour noise levels. The results are shown in **Table 8**.

The purpose of the noise level measurements was to verify the accuracy the TNM and ensure the noise model is closely reproducing the sound environment. The location of the measurement, existing roadway geometry, vehicle counts and estimated speeds were obtained and input into the noise model. The measured noise readings were compared to the predicted sound levels produced from TNM. The predicted noise levels from were within 3 dB(A) of the field measured noise levels, which validates the noise model.

Table 8. Measured Noise Levels

<table>
<tr><th>Location</th><th>Direction</th><th>Cars</th><th>Heavy Trucks</th><th>Medium Trucks</th><th>Distance from Noise Source (ft)</th><th>Field Reading (dBA)</th><th>TNM value (dBA)</th><th>Difference</th></tr>
<tr><td rowspan="2">Noise Meter 1</td><td>NB</td><td>576</td><td>4</td><td>16</td><td rowspan="2">43</td><td rowspan="2">71.2</td><td rowspan="2">69.4</td><td rowspan="2">1.8</td></tr>
<tr><td>SB</td><td>698</td><td>2</td><td>14</td></tr>
<tr><td rowspan="2">Noise Meter 2</td><td>NB</td><td>454</td><td>0</td><td>8</td><td rowspan="2">37</td><td rowspan="2">66.7</td><td rowspan="2">66.1</td><td rowspan="2">0.6</td></tr>
<tr><td>SB</td><td>320</td><td>2</td><td>10</td></tr>
</table>

Location	Direction	Cars	Heavy Trucks	Medium Trucks	Distance from Noise Source (ft)	Field Reading (dBA)	TNM value (dBA)	Difference
Noise Meter 3	NB	330	4	2	24	69.7	67.7	2.0
	SB	302	6	14				

4.2 Future Noise Levels

The following **Table 9** lists the modeled receptors, along with the following details:

- Receptor ID
- Land use activity category
- Computed noise levels in hourly Leq(h) dBA for the existing system (2011 traffic)
  - Asterisk denotes existing impact
- Computed noise levels in hourly Leq(h) dBA for future design year 2035 (build alternative)
- Impact level (1 dBA less than the FHWA Noise Abatement Criteria)
- Receptors that are impacted in the 2035 traffic conditions with the build alternative
- Abatement area of the impacted receptor (where applicable)
  - Abatement areas are named based on the direction of traffic on 168th Street, either southbound (SB-on the west side) or northbound (NB-on the east side). Serial numbers generally increase south-to-north for northbound abatement areas, and north-to-south for southbound abatement areas.

The *red, italicized* receptors are the locations where the build alternative noise level is above the NAC. As stated in **Section 2.5**, a receptor is impacted if the predicted noise level is within 1 dBA of the NAC (e.g., 66 dBA for Activity Categories B and C, and 71 dBA for Activity Category E) or if the build noise levels increase 15 dBA or more over the existing noise levels. One-hundred thirty-six (136) receptors are anticipated to have noise impacts resulting from the build alternative. None of the noise impacts identified in this report are considered to be a “substantial increase” (i.e., ≥ 15dBA) over the existing noise levels.

The receptors impacted by the build alternative were grouped together in abatement areas for abatement analysis. The locations of the receptors and the abatement areas are illustrated on **Exhibit 1** through **Exhibit 10**.

Table 9. Noise Levels at Receptors

Receptor ID	Land Use Activity Category	TNM 2011 Existing Noise Level (dBA)	TNM 2035 Build Noise Level (dBA)	Impact Level (dBA)	2035 Build Impacted	Abatement Area
AA01	B	57	60	66	No	-
AA02	B	59	62	66	No	-
AA03	B	60	62	66	No	-
AA04	B	60	61	66	No	-
AA05	B	58	60	66	No	-
AA06	B	54	56	66	No	-
AA07	B	54	56	66	No	-
AA08	B	57	59	66	No	-
AA09	B	62	63	66	No	-
AA10	B	63	65	66	No	-
AA11	B	59	61	66	No	-
AA12	B	56	58	66	No	-
AA13	B	55	57	66	No	-
AA14	B	60	62	66	No	-
AA15	*B*	*63*	*67*	*66*	*Yes*	*NB06(A)*
AA16	*B*	*63*	*68*	*66*	*Yes*	*NB06(A)*
AA17	B	59	62	66	No	-
AA18	B	53	56	66	No	-
AA19	B	52	53	66	No	-
AR02	*B*	*68**	*69*	*66*	*Yes*	*SB09*
AR03	*B*	*71**	*72*	*66*	*Yes*	*SB09*
AR04	*B*	*68**	*70*	*66*	*Yes*	*SB09*
AR05	B	52	56	66	No	-
AR06	B	51	53	66	No	-
AR07	B	54	56	66	No	-
AV01	E	61	63	71	No	-
AV02	E	61	63	71	No	-
AW01	B	54	58	66	No	-
AW02	B	53	56	66	No	-
AW03	B	62	64	66	No	SB09
AW04	*B*	*66**	*70*	*66*	*Yes*	*SB09*
AW05	B	63	65	66	No	SB09
AW06	B	53	56	66	No	-
BP01	B	50	54	66	No	-
BS01	B	52	52	66	No	-
BS02	B	57	57	66	No	-

Receptor ID	Land Use Activity Category	TNM 2011 Existing Noise Level (dBA)	TNM 2035 Build Noise Level (dBA)	Impact Level (dBA)	2035 Build Impacted	Abatement Area
BS03	B	59	61	66	No	-
BS04	B	58	61	66	No	-
BS05	B	55	57	66	No	-
BS06	B	54	54	66	No	-
BS07	B	54	55	66	No	-
BS08	B	56	57	66	No	-
BS09	B	55	58	66	No	-
BS10	B	55	58	66	No	-
BS11	B	50	52	66	No	-
BS12	B	51	53	66	No	-
BS13	B	50	52	66	No	-
BS14	B	50	50	66	No	-
BS15	B	48	48	66	No	-
BS16	B	56	57	66	No	-
BS17	*B*	*67**	*69*	*66*	*Yes*	*NB04*
BS18	B	*56*	*59*	*66*	*No*	*NB04*
BS19	B	50	51	66	No	-
BS20	B	54	54	66	No	NB04
BS21	*B*	*66**	*66*	*66*	*Yes*	*NB04*
BS22	B	63	65	66	No	NB04
BS23	B	49	52	66	No	-
BS24	B	57	57	66	No	-
BS25	B	58	62	66	No	NB04
BS26	B	44	46	66	No	-
BS27	B	47	48	66	No	-
BS28	B	47	49	66	No	-
BS29	B	45	47	66	No	-
BS30	B	51	54	66	No	-
BS31	B	56	62	66	No	-
BS32	B	56	62	66	No	-
BS33	*B*	*67**	*69*	*66*	*Yes*	
EA01	*B*	*62*	*68*	*66*	*Yes*	*NB06*
EA02	B	53	58	66	No	-
EA03	B	58	62	66	No	-
EA04	B	48	56	66	No	-
EA05	B	51	55	66	No	-
HL01	B	60	62	66	No	-

Receptor ID	Land Use Activity Category	TNM 2011 Existing Noise Level (dBA)	TNM 2035 Build Noise Level (dBA)	Impact Level (dBA)	2035 Build Impacted	Abatement Area
HL02	B	62	64	66	No	-
HL03	B	62	64	66	No	-
HL04	*B*	*66**	*68*	*66*	*Yes*	*SB11*
HL05	*B*	*67**	*69*	*66*	*Yes*	*SB11*
HL06	*B*	*67**	*69*	*66*	*Yes*	*SB11*
HL07	*B*	*67**	*68*	*66*	*Yes*	*SB11*
HL08	*B*	*67**	*70*	*66*	*Yes*	*SB11*
HL09	*B*	*67**	*69*	*66*	*Yes*	*SB11*
HL10	*B*	*67**	*69*	*66*	*Yes*	*SB11*
HL11	*B*	*68**	*70*	*66*	*Yes*	*SB11*
HL12	*B*	*67**	*69*	*66*	*Yes*	*SB11*
HL13	*B*	*67**	*69*	*66*	*Yes*	*SB11*
HL14	*B*	*68**	*70*	*66*	*Yes*	*SB11*
HL15	*B*	*67**	*69*	*66*	*Yes*	*SB11*
HL16	*B*	*67**	*69*	*66*	*Yes*	*SB11*
HL17	*B*	*68**	*70*	*66*	*Yes*	*SB11*
HL18	*B*	*67**	*70*	*66*	*Yes*	*SB11*
HL19	*B*	*67**	*69*	*66*	*Yes*	*SB11*
HL20	*B*	*68**	*70*	*66*	*Yes*	*SB11*
HL21	*B*	*67**	*69*	*66*	*Yes*	*SB11*
HL22	*B*	*68**	*70*	*66*	*Yes*	*SB11*
HL23	*B*	*68**	*70*	*66*	*Yes*	*SB11*
HL24	*B*	*67**	*69*	*66*	*Yes*	*SB11*
HL25	*B*	*68**	*70*	*66*	*Yes*	*SB11*
HL26	*B*	*67**	*69*	*66*	*Yes*	*SB11*
HL27	*B*	*68**	*70*	*66*	*Yes*	*SB11*
HL28	*B*	*68**	*70*	*66*	*Yes*	*SB11*
HL29	*B*	*68**	*70*	*66*	*Yes*	*SB11*
HL30	*B*	*67**	*69*	*66*	*Yes*	*SB11*
HL31	*B*	*68**	*70*	*66*	*Yes*	*SB11*
HL32	*B*	*67**	*69*	*66*	*Yes*	*SB11*
HL33	*B*	*68**	*70*	*66*	*Yes*	*SB11*
LE01	B	56	62	66	No	-
LE02	C	54	60	66	No	-
LE03	C	52	56	66	No	-
LE04	C	46	49	66	No	-
LE05	C	57	62	66	No	-

Receptor ID	Land Use Activity Category	TNM 2011 Existing Noise Level (dBA)	TNM 2035 Build Noise Level (dBA)	Impact Level (dBA)	2035 Build Impacted	Abatement Area
LE06	C	52	56	66	No	-
LG01	E	61	63	71	No	-
LG02	F	67	69	-	No	-
LG03	E	52	54	71	No	-
LH01	F	64	66	-	No	-
LH02	E	67	70	71	No	-
LH03[1]	E	67	71	71	No	-
LH04[1]	E	67	70	71	No	-
LH05[1]	E	65	70	71	No	-
LH06[1]	E	65	70	71	No	-
LH07[1]	E	61	64	71	No	-
LH09	E	62	64	71	No	-
LH08	E	62	66	71	No	-
LS01	*B*	*66**	*70*	*66*	*Yes*	*SB09*
LS02	B	59	60	66	No	-
LS03	B	53	57	66	No	-
LS04	B	53	57	66	No	-
LS05	B	50	53	66	No	-
LS06	*B*	*66**	*70*	*66*	*Yes*	*SB07/SB08*
LS07	B	60	65	66	No	-
LS08	B	55	59	66	No	-
LS09	B	53	56	66	No	-
LS10	B	50	53	66	No	-
LS11	B	54	56	66	No	-
LS12	B	54	57	66	No	-
LS13	*B*	*63*	*67*	*66*	*Yes*	*SB07/SB08*
LS14	*B*	*67**	*71*	*66*	*Yes*	*SB07/SB08*
LS15	*B*	*67**	*70*	*66*	*Yes*	*SB07/SB08*
LS16	B	62	65	66	No	-
LS17	B	57	60	66	No	-
LS18	B	53	55	66	No	-
LS19	B	52	54	66	No	-
LS20	B	52	54	66	No	-
LS21	B	55	57	66	No	-
LS22	B	61	63	66	No	-
LS23	*B*	*64*	*66*	*66*	*Yes*	*SB07/SB08*
LS24	*B*	*67**	*69*	*66*	*Yes*	*SB07/SB08*

Receptor ID	Land Use Activity Category	TNM 2011 Existing Noise Level (dBA)	TNM 2035 Build Noise Level (dBA)	Impact Level (dBA)	2035 Build Impacted	Abatement Area
LS25	*B*	*63*	*66*	*66*	*Yes*	*SB07/SB08*
LS26	B	57	60	66	No	-
LS27	B	54	58	66	No	-
LS28	B	51	52	66	No	-
LS29	B	53	55	66	No	-
LS30	B	58	60	66	No	-
LS31	B	60	62	66	No	SB07/SB08
LS32	B	63	65	66	No	SB07/SB08
LS33	B	63	65	66	No	SB07/SB08
LS34	B	58	61	66	No	-
LS35	B	54	58	66	No	-
LS36	B	52	56	66	No	-
LS37	B	51	54	66	No	-
LS38	B	53	56	66	No	-
LS39	B	57	60	66	No	-
LS40	B	62	65	66	No	SB07/SB08
LS41	B	62	65	66	No	SB07/SB08
LS42	B	61	64	66	No	SB07/SB08
LS43	B	56	58	66	No	-
LS44	B	53	55	66	No	-
LS45	B	51	53	66	No	-
LS46	B	54	56	66	No	-
LS47	B	55	58	66	No	-
LS48	B	62	64	66	No	SB07/SB08
LS49	*B*	*66**	*67*	*66*	*Yes*	*SB07/SB08*
LS50	B	*64*	*66*	*66*	*Yes*	*SB07/SB08*
LS51	B	*64*	*66*	*66*	*Yes*	*SB07/SB08*
LS52	B	63	65	66	No	SB07/SB08
LS53	B	*64*	*66*	*66*	*Yes*	*SB07/SB08*
LS54	*B*	*68**	*71*	*66*	*Yes*	*SB07/SB08*
LS55	*B*	*68**	*70*	*66*	*Yes*	*SB07/SB08*
LS56	*B*	*65*	*68*	*66*	*Yes*	*SB07/SB08*
LS57	B	51	53	66	No	-
LS58	B	54	57	66	No	-
LS59	B	55	58	66	No	-
LS60	B	50	53	66	No	-
LS61	B	53	55	66	No	-

Receptor ID	Land Use Activity Category	TNM 2011 Existing Noise Level (dBA)	TNM 2035 Build Noise Level (dBA)	Impact Level (dBA)	2035 Build Impacted	Abatement Area
LS62	B	54	56	66	No	-
LS63	*B*	*65*	*70*	*66*	*Yes*	*SB06*
LS64	*B*	*65*	*70*	*66*	*Yes*	*SB06*
LS65	B	61	65	66	No	SB06
LS66	*B*	*70**	*73*	*66*	*Yes*	*SB06*
LS67	*B*	*69**	*72*	*66*	*Yes*	*SB06*
LS68	*B*	*65*	*67*	*66*	*Yes*	*SB06*
LS69	B	56	61	66	No	-
LS70	B	51	55	66	No	-
LS71	B	50	53	66	No	-
LS72	B	56	59	66	No	-
LV01	B	54	58	66	No	-
LV02	B	56	59	66	No	-
LV03	*B*	*65*	*70*	*66*	*Yes*	*SB03*
LV04	*B*	*69**	*71*	*66*	*Yes*	*SB03*
LV05	*B*	*63*	*66*	*66*	*Yes*	*SB03*
LV06	*B*	*64*	*67*	*66*	*Yes*	*SB03*
LV07	*B*	*68**	*70*	*66*	*Yes*	*SB03*
LV08	*B*	*66**	*69*	*66*	*Yes*	*SB03*
LV09	B	53	55	66	No	-
LV10	*B*	*67**	*69*	*66*	*Yes*	*SB03*
LV11	B	61	63	66	No	SB03
LV12	*B*	*64*	*66*	*66*	*Yes*	*SB03*
LV13	B	61	63	66	No	-
LV14	B	50	53	66	No	-
LW01	*B*	*69**	*71*	*66*	*Yes*	*NB07*
LW02	*B*	*68**	*71*	*66*	*Yes*	*NB07*
LW03	B	57	60	66	No	-
LW04	*B*	*64*	*66*	*66*	*Yes*	*NB08*
LW05	*B*	*67**	*69*	*66*	*Yes*	*NB08*
LW06	*B*	*65*	*67*	*66*	*Yes*	*NB08*
LW07	*B*	*67**	*69*	*66*	*Yes*	*NB08*
LW08	*B*	*66**	*70*	*66*	*Yes*	*NB08*
LW09	B	58	61	66	No	-
LW10	B	55	58	66	No	-
LW11	B	54	57	66	No	-
LW12	B	54	57	66	No	-

Receptor ID	Land Use Activity Category	TNM 2011 Existing Noise Level (dBA)	TNM 2035 Build Noise Level (dBA)	Impact Level (dBA)	2035 Build Impacted	Abatement Area
LW13	B	53	55	66	No	-
LW14	B	53	55	66	No	-
LW15	B	53	55	66	No	-
LW16	B	51	54	66	No	-
LW17	B	54	57	66	No	-
LW18	B	55	58	66	No	-
LW19	B	54	56	66	No	-
LW20	B	55	58	66	No	-
LW21	B	52	54	66	No	-
LW22	B	50	51	66	No	-
LW23	B	50	52	66	No	-
LW24	B	52	54	66	No	-
LW25	B	56	57	66	No	-
LW26	*B*	*65*	*67*	*66*	*Yes*	*NB09*
LW27	*B*	*67**	*70*	*66*	*Yes*	*NB09*
LW28	*B*	*68**	*70*	*66*	*Yes*	*NB09*
LW29	B	62	62	66	No	-
LW30	B	57	57	66	No	-
LW31	B	52	54	66	No	-
LW32	B	49	51	66	No	-
LW33	B	53	56	66	No	-
LW34	B	54	55	66	No	-
LW35	B	63	65	66	No	NB09
LW36	*B*	*69**	*71*	*66*	*Yes*	*NB09*
LW37	*B*	*69**	*71*	*66*	*Yes*	*NB09*
LW38	B	63	65	66	No	NB09
LW39	B	56	56	66	No	-
LW40	B	54	58	66	No	-
LW41	B	49	52	66	No	-
LW42	B	50	54	66	No	-
LW43	B	52	56	66	No	-
LW44	B	58	58	66	No	-
LW45	B	55	60	66	No	-
LW46	*B*	*65*	*66*	*66*	*Yes*	*NB09*
LW47	B	58	62	66	No	-
LW48	B	56	60	66	No	-
LW49	B	56	60	66	No	-

Receptor ID	Land Use Activity Category	TNM 2011 Existing Noise Level (dBA)	TNM 2035 Build Noise Level (dBA)	Impact Level (dBA)	2035 Build Impacted	Abatement Area
LW50	*B*	*67**	*69*	*66*	*Yes*	*NB10*
LW51	*B*	*68**	*70*	*66*	*Yes*	*NB10*
LW52	*B*	*68**	*71*	*66*	*Yes*	*NB10*
LW53	*B*	*69**	*72*	*66*	*Yes*	*NB10*
LW54	*B*	*68**	*72*	*66*	*Yes*	*NB10*
LW55	B	55	58	66	No	-
LW56	B	53	56	66	No	-
LW57	B	48	51	66	No	-
LW58	B	50	53	66	No	-
LW59	B	52	54	66	No	-
LW60	B	49	52	66	No	-
LW61	B	49	52	66	No	-
LW62	B	47	49	66	No	-
LW63	B	48	51	66	No	-
LW64	B	50	52	66	No	-
LW65	*B*	*69**	*71*	*66*	*Yes*	*NB07*
LW66	*B*	*69**	*71*	*66*	*Yes*	*NB07*
LW67	*B*	*69**	*71*	*66*	*Yes*	*NB07*
LW68	*B*	*67**	*69*	*66*	*Yes*	*-*
LW69	*B*	*65*	*67*	*66*	*Yes*	*-*
LW70	B	59	62	66	No	-
LW71	B	56	58	66	No	-
LZ01	C	29	37	66	No	-
LZ02	*C*	*64*	*76*	*66*	*Yes*	*-*
LZ03	*C*	*73**	*74*	*66*	*Yes*	*-*
LZ04	*C*	*74**	*76*	*66*	*Yes*	*-*
LZ05	*C*	*73**	*74*	*66*	*Yes*	*-*
MS01	B	58	61	66	No	-
PH01	*B*	*68**	*72*	*66*	*Yes*	*NB10*
PH02	*B*	*65*	*70*	*66*	*Yes*	*NB10*
PH03	B	59	63	66	No	-
PH04	B	55	60	66	No	-
PH05	B	53	56	66	No	-
PH06	*B*	*63*	*68*	*66*	*Yes*	*NB10*
PH07	*B*	*66**	*71*	*66*	*Yes*	*NB10*
PH08	*B*	*65*	*72*	*66*	*Yes*	*NB10*
PH09	*B*	*63*	*68*	*66*	*Yes*	*NB10*

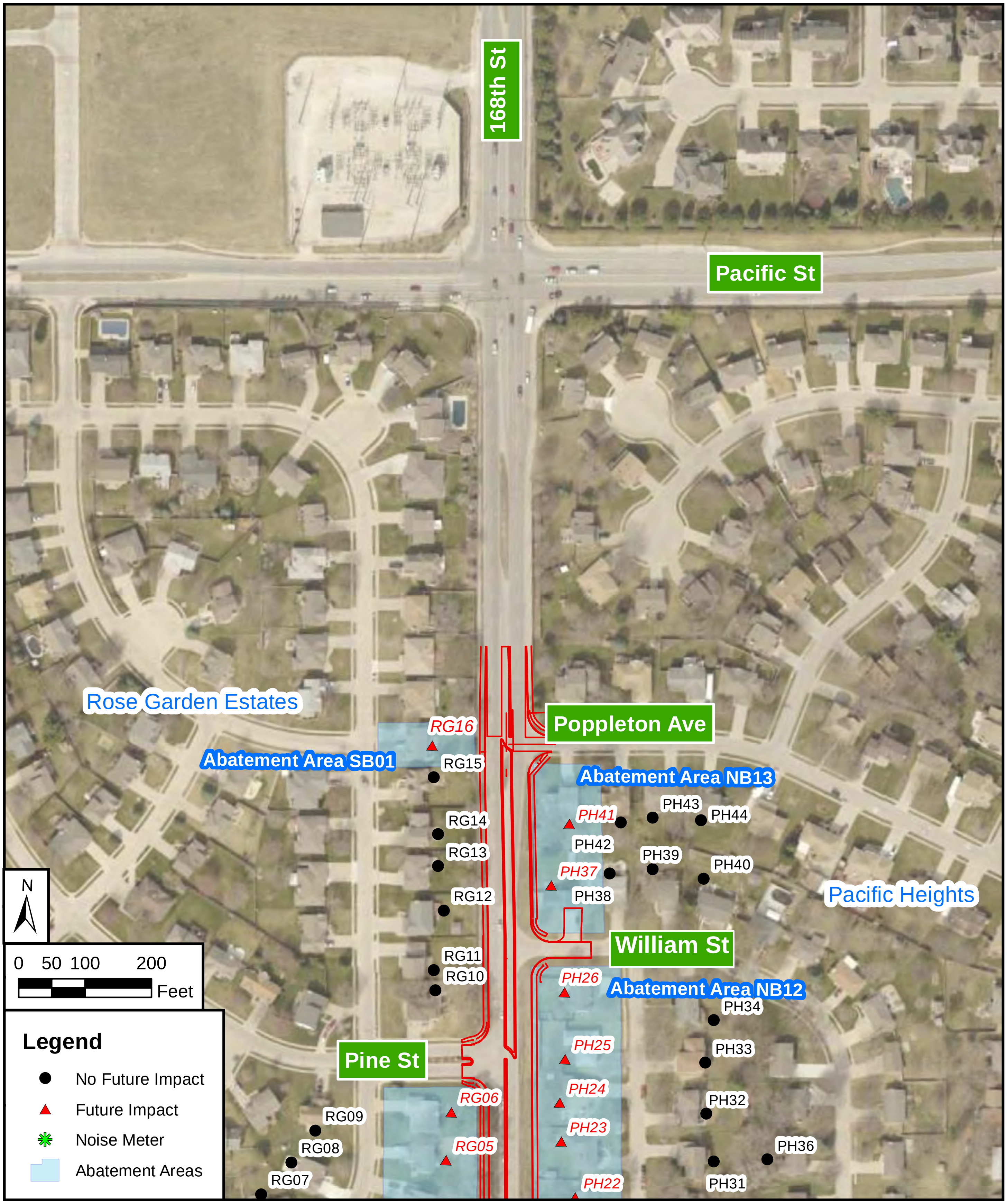
Receptor ID	Land Use Activity Category	TNM 2011 Existing Noise Level (dBA)	TNM 2035 Build Noise Level (dBA)	Impact Level (dBA)	2035 Build Impacted	Abatement Area
PH10	B	53	57	66	No	-
PH11	B	50	56	66	No	-
PH12	B	53	56	66	No	-
PH13	B	57	62	66	No	-
PH14	B	49	53	66	No	-
PH15	*B*	*68**	*70*	*66*	*Yes*	*NB11*
PH16	*B*	*64*	*67*	*66*	*Yes*	*NB11*
PH17	B	58	63	66	No	-
PH18	B	59	63	66	No	-
PH19	*B*	*69**	*72*	*66*	*Yes*	*NB12*
PH20	*B*	*69**	*71*	*66*	*Yes*	*NB12*
PH21	*B*	*68**	*70*	*66*	*Yes*	*NB12*
PH22	*B*	*68**	*71*	*66*	*Yes*	*NB12*
PH23	*B*	*69**	*72*	*66*	*Yes*	*NB12*
PH24	*B*	*68**	*71*	*66*	*Yes*	*NB12*
PH25	*B*	*68**	*70*	*66*	*Yes*	*NB12*
PH26	*B*	*68**	*71*	*66*	*Yes*	*NB12*
PH27	B	56	60	66	No	-
PH28	B	53	57	66	No	-
PH29	B	55	59	66	No	-
PH30	B	54	58	66	No	-
PH31	B	54	57	66	No	-
PH32	B	54	57	66	No	-
PH33	B	52	55	66	No	-
PH34	B	52	55	66	No	-
PH35	B	51	57	66	No	-
PH36	B	49	54	66	No	-
PH37	*B*	*70**	*72*	*66*	*Yes*	*NB13*
PH38	B	58	61	66	No	-
PH39	B	58	61	66	No	-
PH40	B	53	57	66	No	-
PH41	*B*	*63*	*66*	*66*	*Yes*	*NB13*
PH42	B	55	58	66	No	-
PH43	B	58	61	66	No	-
PH44	B	53	57	66	No	-
PP03	*B*	*64*	*66*	*66*	*Yes*	*NB01*
PP04	B	*64*	*66*	*66*	*Yes*	*NB01*

Receptor ID	Land Use Activity Category	TNM 2011 Existing Noise Level (dBA)	TNM 2035 Build Noise Level (dBA)	Impact Level (dBA)	2035 Build Impacted	Abatement Area
PP05	B	63	65	66	No	NB01
PP06	B	63	64	66	No	NB01
PP07	B	63	64	66	No	NB01
PP08	B	63	65	66	No	NB01
PP09	*B*	*65*	*67*	*66*	*Yes*	*NB01*
PP10	*B*	*65*	*68*	*66*	*Yes*	*NB01*
PP11	B	64	64	66	No	NB01
PP12	*B*	*65*	*68*	*66*	*Yes*	*NB01*
PP13	*B*	*65*	*69*	*66*	*Yes*	*NB01*
PP14	*B*	*67**	*69*	*66*	*Yes*	*NB01*
PP15	B	58	61	66	No	-
PP16	B	54	59	66	No	-
PP17	B	51	54	66	No	-
PP19	B	51	53	66	No	-
PP20	B	50	51	66	No	-
PP21	B	50	52	66	No	-
PP22	B	49	50	66	No	-
RC01	B	55	58	66	No	-
RG01	B	55	62	66	No	-
RG02	*B*	*61*	*66*	*66*	*Yes*	*SB02*
RG03	*B*	*67**	*69*	*66*	*Yes*	*SB02*
RG04	*B*	*69**	*71*	*66*	*Yes*	*SB02*
RG05	*B*	*65*	*70*	*66*	*Yes*	*SB02*
RG06	*B*	*68**	*71*	*66*	*Yes*	*SB02*
RG07	B	51	55	66	No	-
RG08	B	52	55	66	No	-
RG09	B	51	54	66	No	-
RG10	B	63	65	66	No	-
RG11	B	60	63	66	No	-
RG12	B	60	63	66	No	-
RG13	B	58	61	66	No	-
RG14	B	57	60	66	No	-
RG15	B	62	64	66	No	-
RG16	B	*64*	*66*	*66*	*Yes*	*SB01*
SH01	B	52	53	66	No	-
SH02	B	49	51	66	No	-
SH03	B	53	55	66	No	-

Receptor ID	Land Use Activity Category	TNM 2011 Existing Noise Level (dBA)	TNM 2035 Build Noise Level (dBA)	Impact Level (dBA)	2035 Build Impacted	Abatement Area
SH04	B	58	59	66	No	-
SH05	*B*	*67**	*70*	*66*	*Yes*	*NB02*
SH06	*B*	*68**	*70*	*66*	*Yes*	*NB02*
SH07	*B*	*64*	*66*	*66*	*Yes*	*NB02*
SH08	*B*	*66**	*68*	*66*	*Yes*	*NB03*
SH09	B	60	63	66	No	-
SH10	B	60	62	66	No	-
SH11	B	52	54	66	No	-
SH12	B	51	53	66	No	-
SH13	B	46	49	66	No	-
SH14	B	50	52	66	No	-
SH15	B	59	60	66	No	-
SH16	B	62	63	66	No	-
SH17	B	61	62	66	No	-
SH18	B	58	59	66	No	-
SH19	B	53	53	66	No	-
SH20	B	49	50	66	No	-
SH21	B	50	52	66	No	-
SH22	B	51	53	66	No	-
SH23	B	46	47	66	No	-
TP01	*B*	*63*	*66*	*66*	*Yes*	*SB06*
TP02	*B*	*63*	*67*	*66*	*Yes*	*SB06*
TP03	B	58	63	66	No	SB06
TP04	*B*	*66**	*69*	*66*	*Yes*	*SB05*
TP05	B	60	65	66	No	-
TR01	B	53	60	66	No	-
TR02	*B*	*65*	*68*	*66*	*Yes*	*SB04*
TR03	*B*	*68**	*71*	*66*	*Yes*	*SB04*
TR04	B	56	60	66	No	-
TR05	B	62	65	66	No	-
TR06	B	56	61	66	No	-
TR07	B	57	61	66	No	-

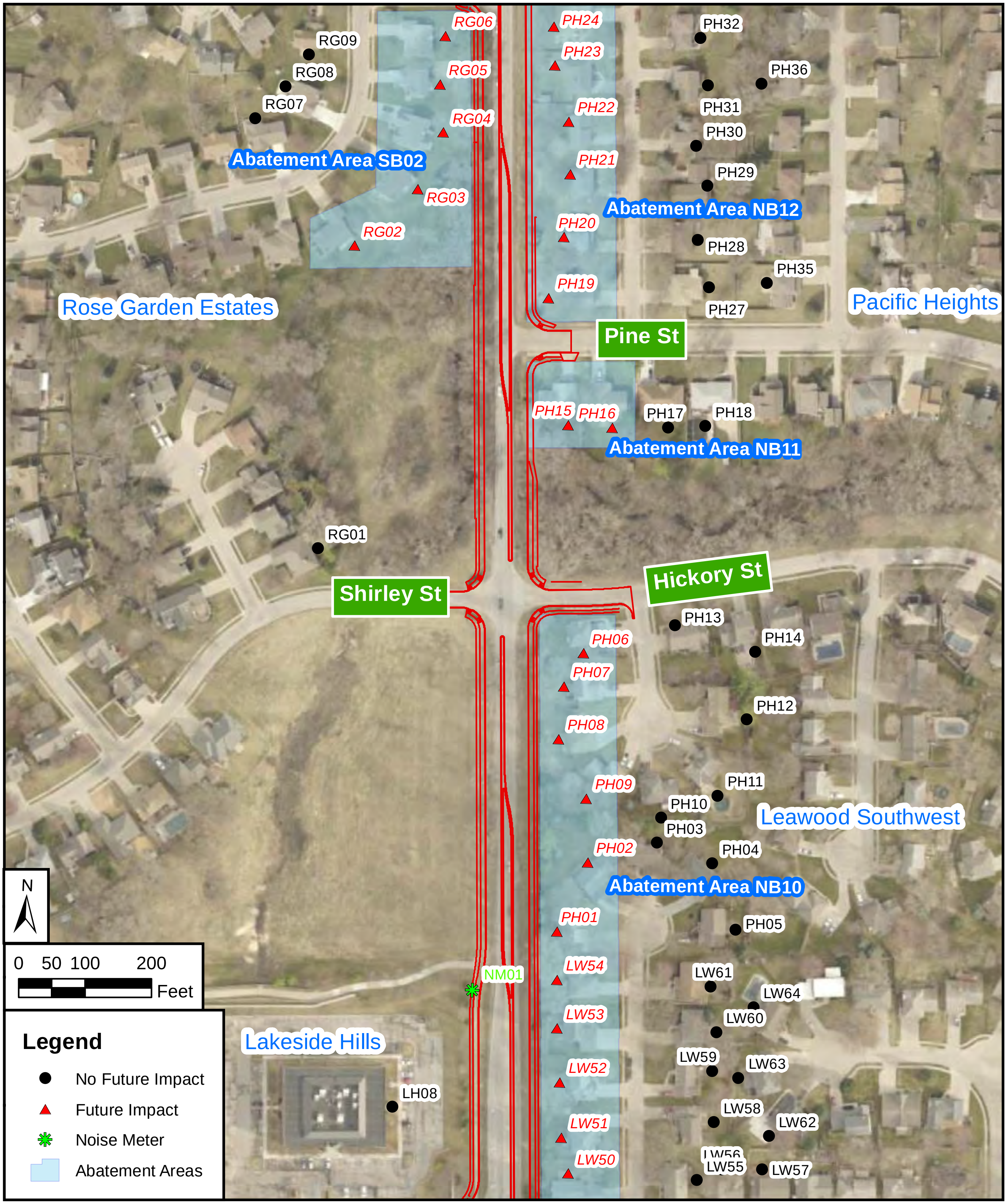
* – Existing Noise Impact
1 – Undeveloped commercial properties planned for development

Exhibit 1. Receptor Locations: Poppleton Ave to Pine St (west leg)



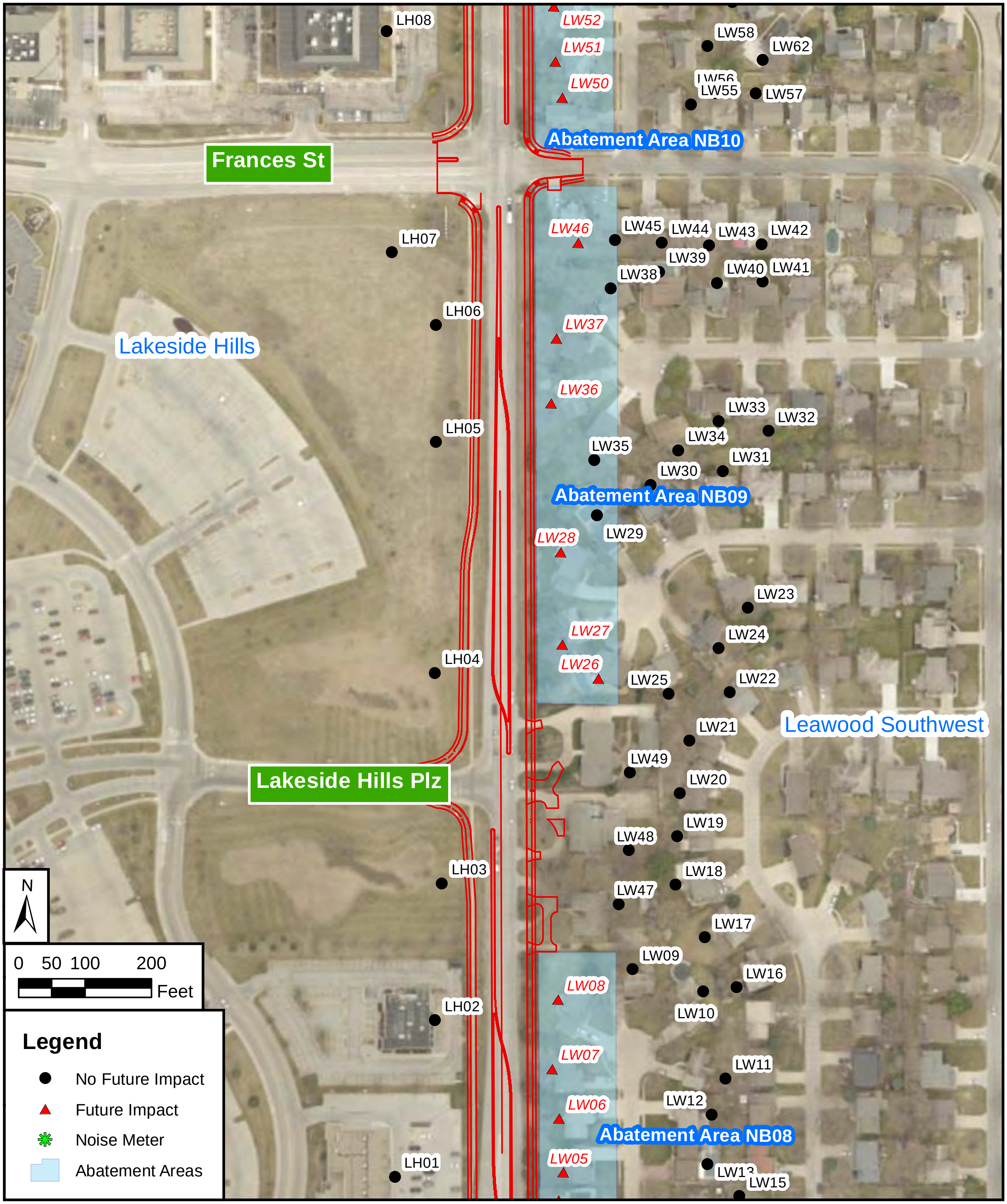
STPC-3811(1), CN 22209
STPC-3811(2), CN 22210

Exhibit 2. Receptor Locations: Pine St (west leg) to Frances St



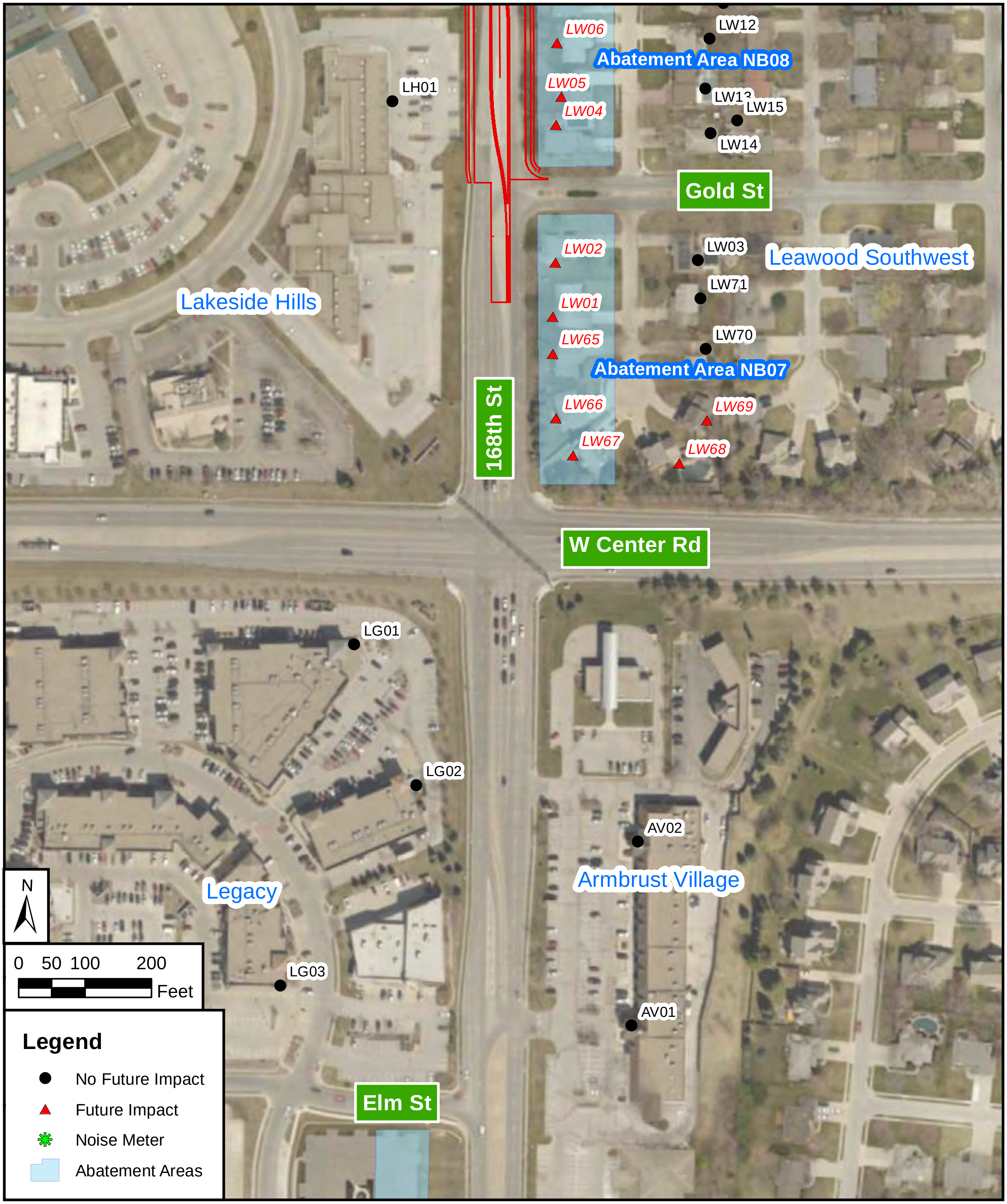
STPC-3811(1), CN 22209
STPC-3811(2), CN 22210

Exhibit 3. Receptor Locations: Frances St to Gold St



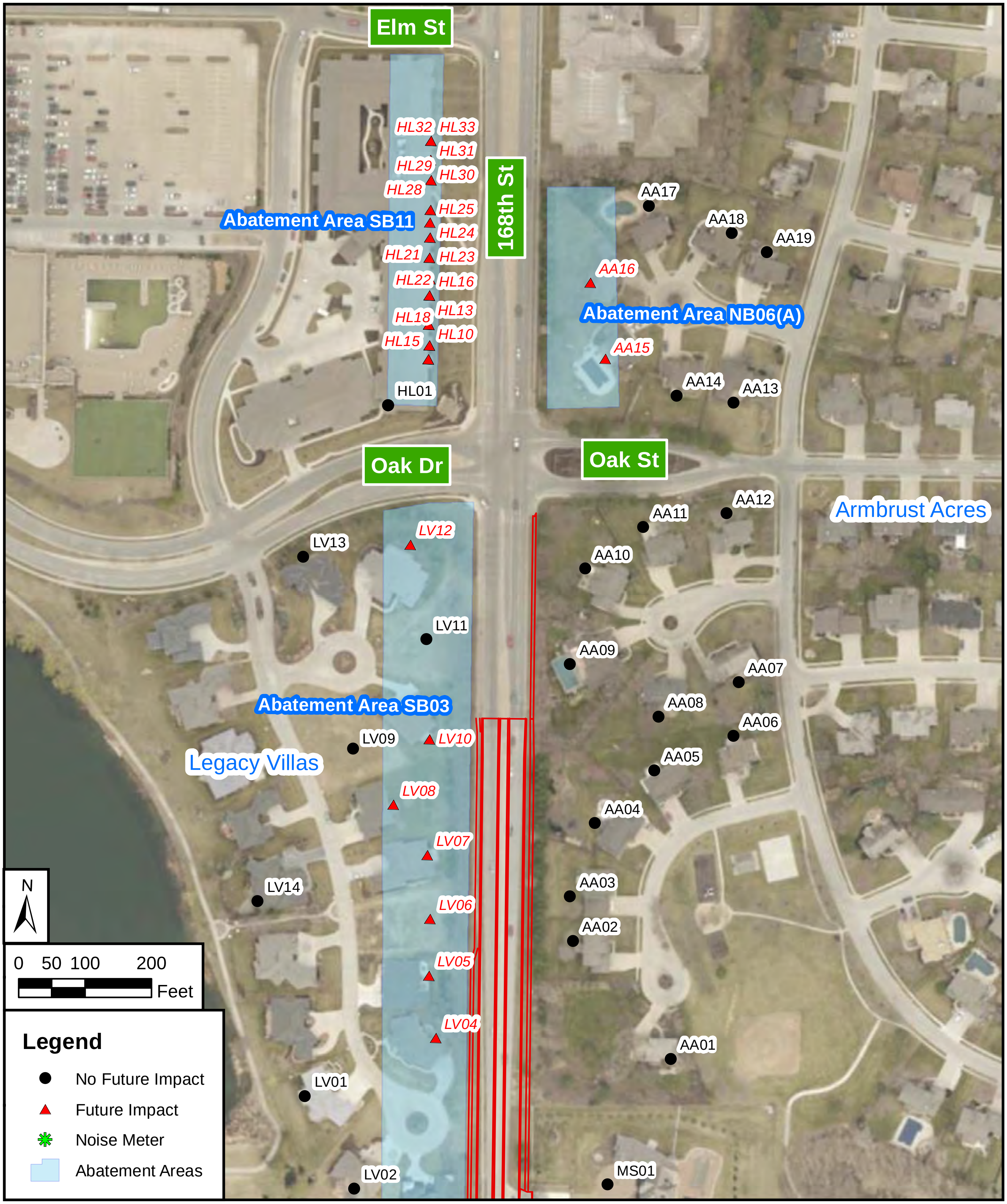
STPC-3811(1), CN 22209
STPC-3811(2), CN 22210

Exhibit 4. Receptor Locations: Gold St to Elm St



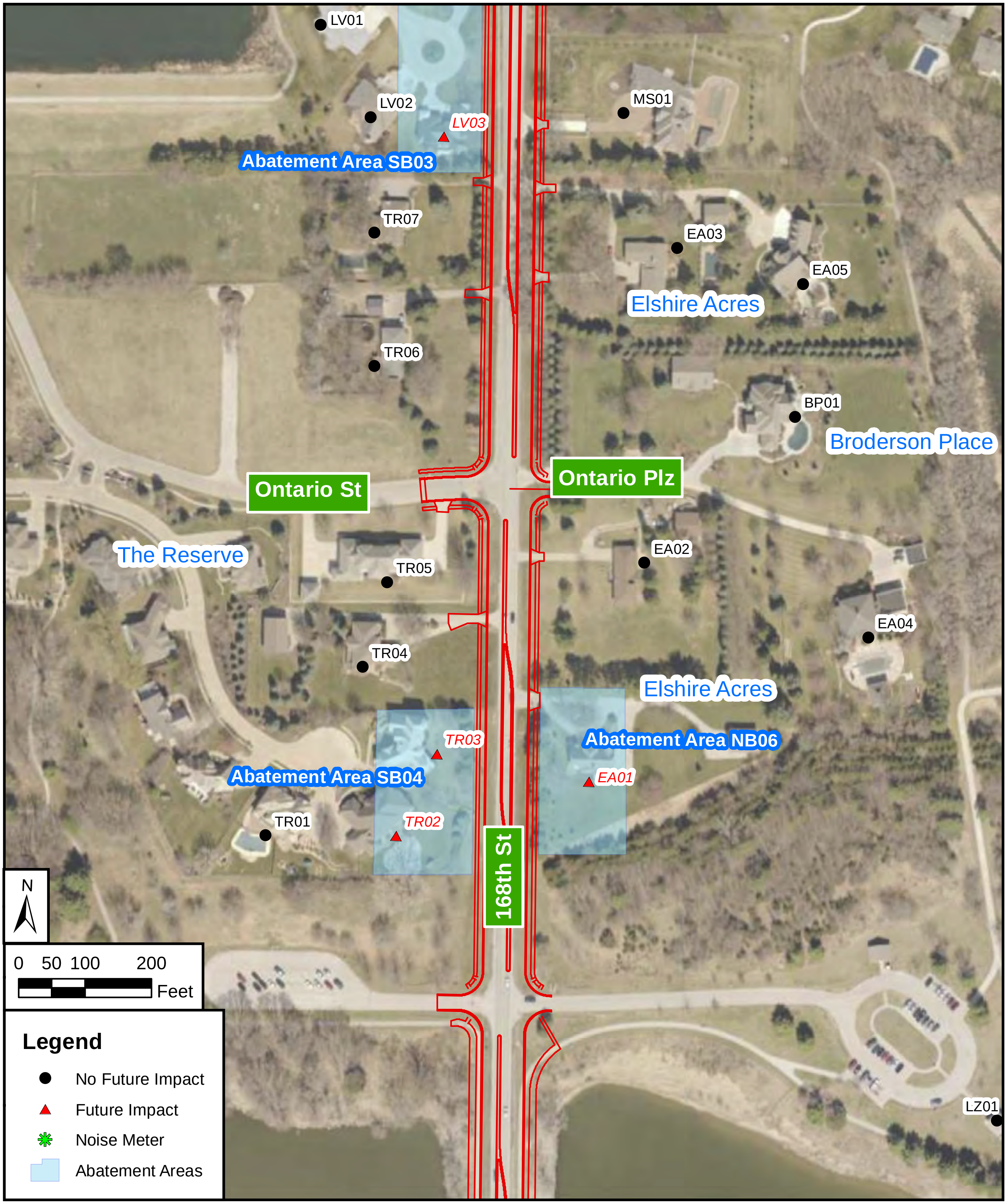
STPC-3811(1), CN 22209
STPC-3811(2), CN 22210

Exhibit 5. Receptor Locations: Elm St to Ontario St



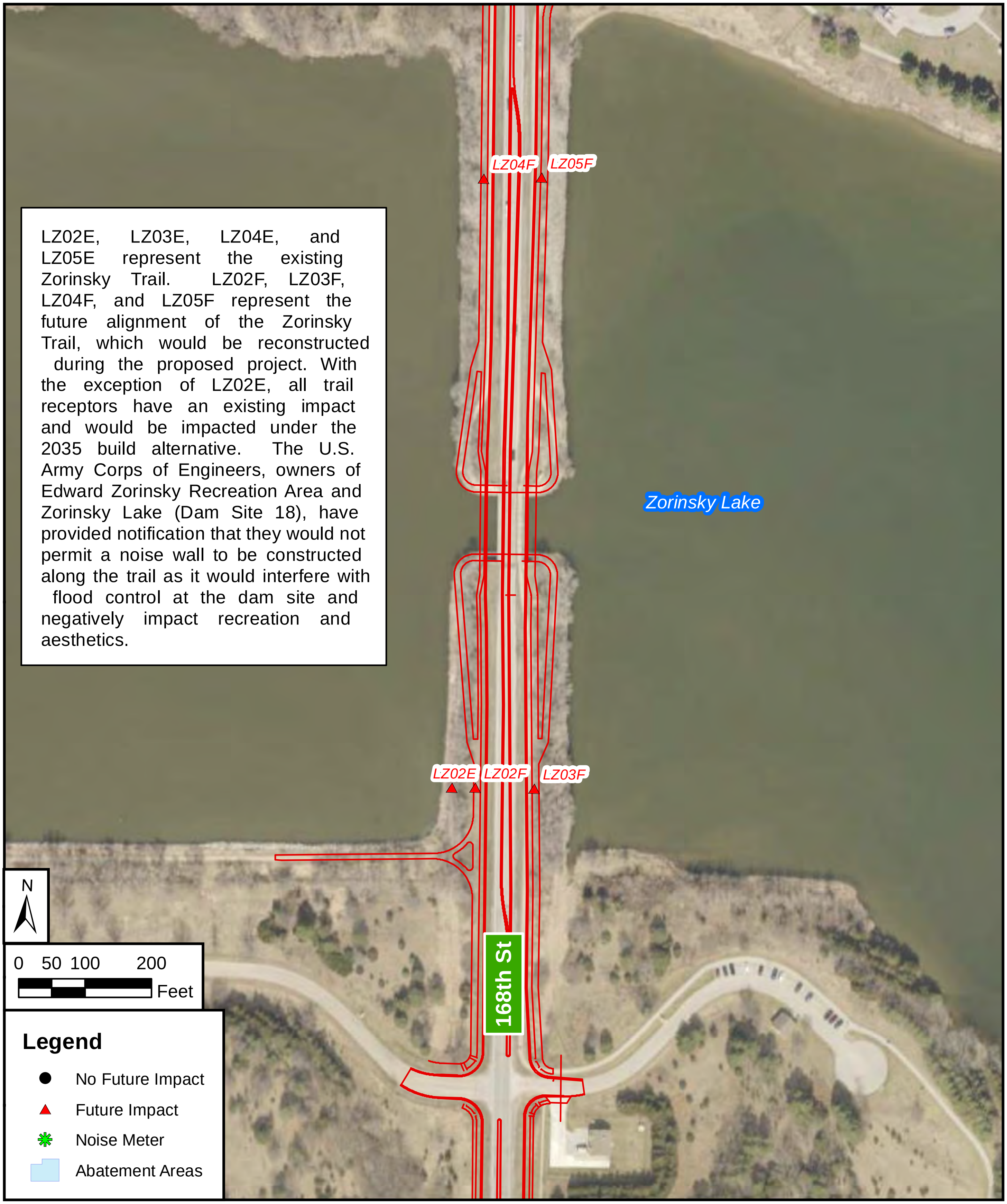
STPC-3811(1), CN 22209
STPC-3811(2), CN 22210

Exhibit 6. Receptor Locations: Ontario St to Zorinsky Lake North Access Rd



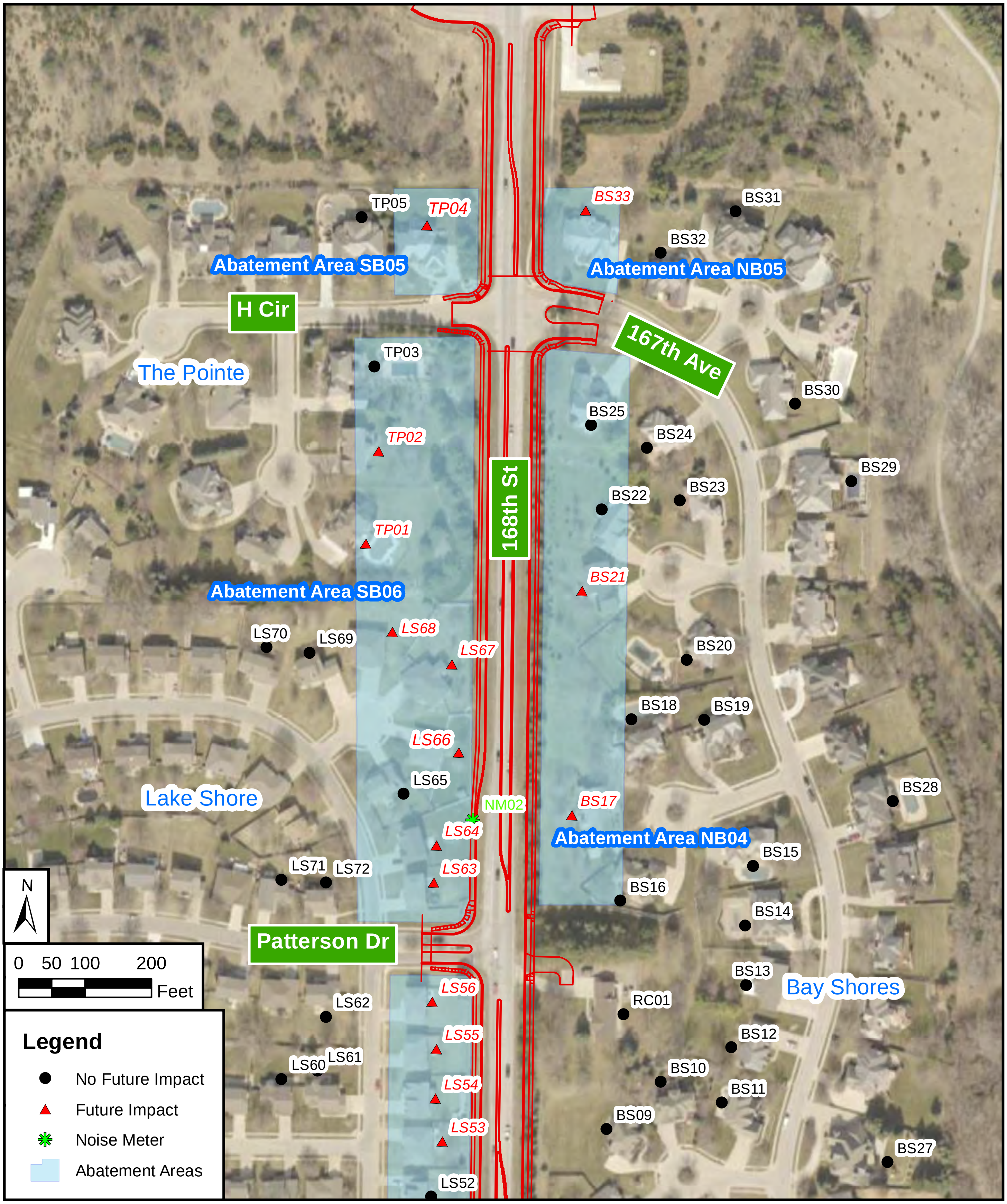
STPC-3811(1), CN 22209
STPC-3811(2), CN 22210

Exhibit 7. Receptor Locations: Zorinsky Lake North Access Rd to Zorinsky Lake South Access Rd



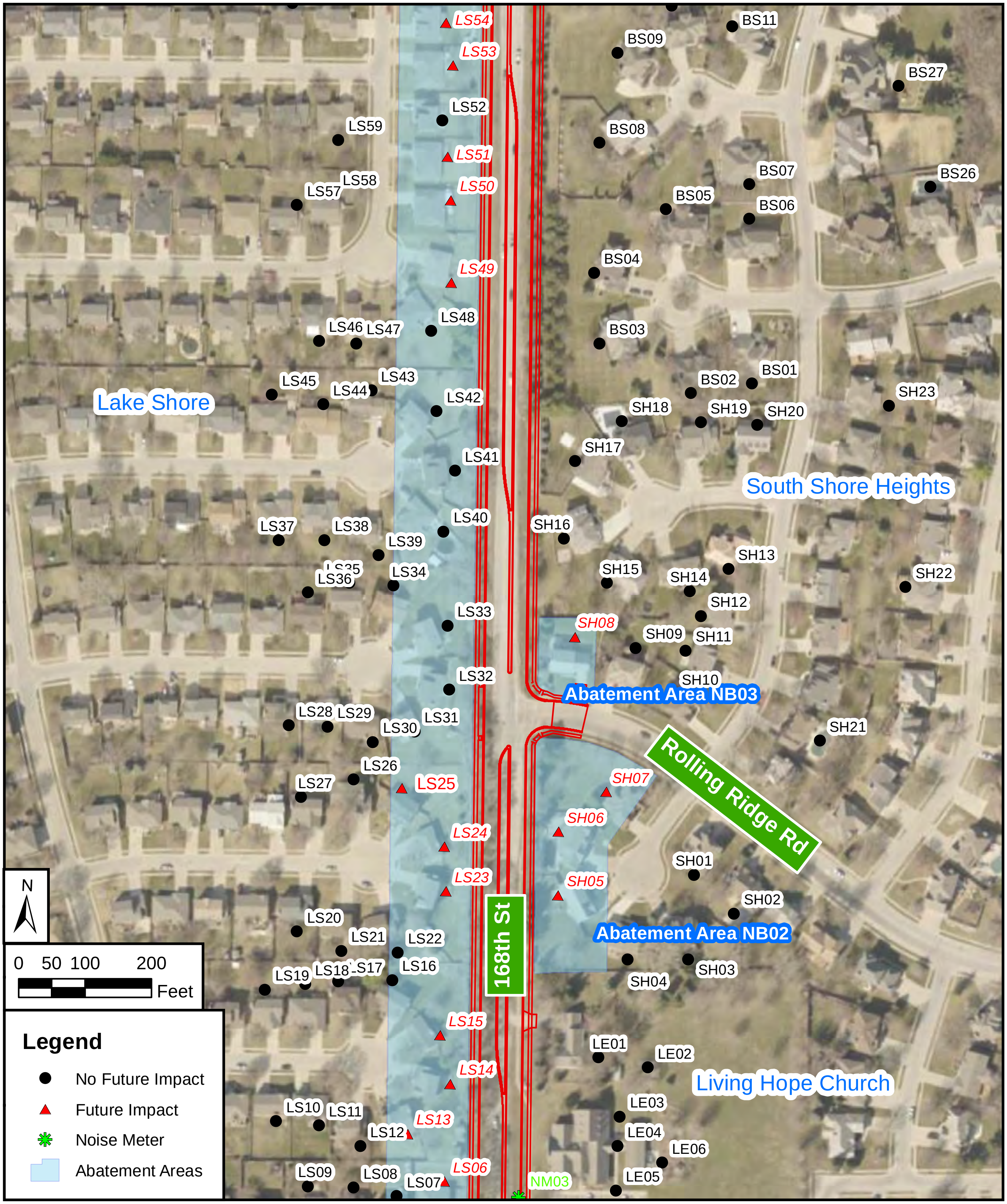
STPC-3811(1), CN 22209
STPC-3811(2), CN 22210

Exhibit 8. Receptor Locations: Zorinsky Lake South Access Rd to Patterson Dr



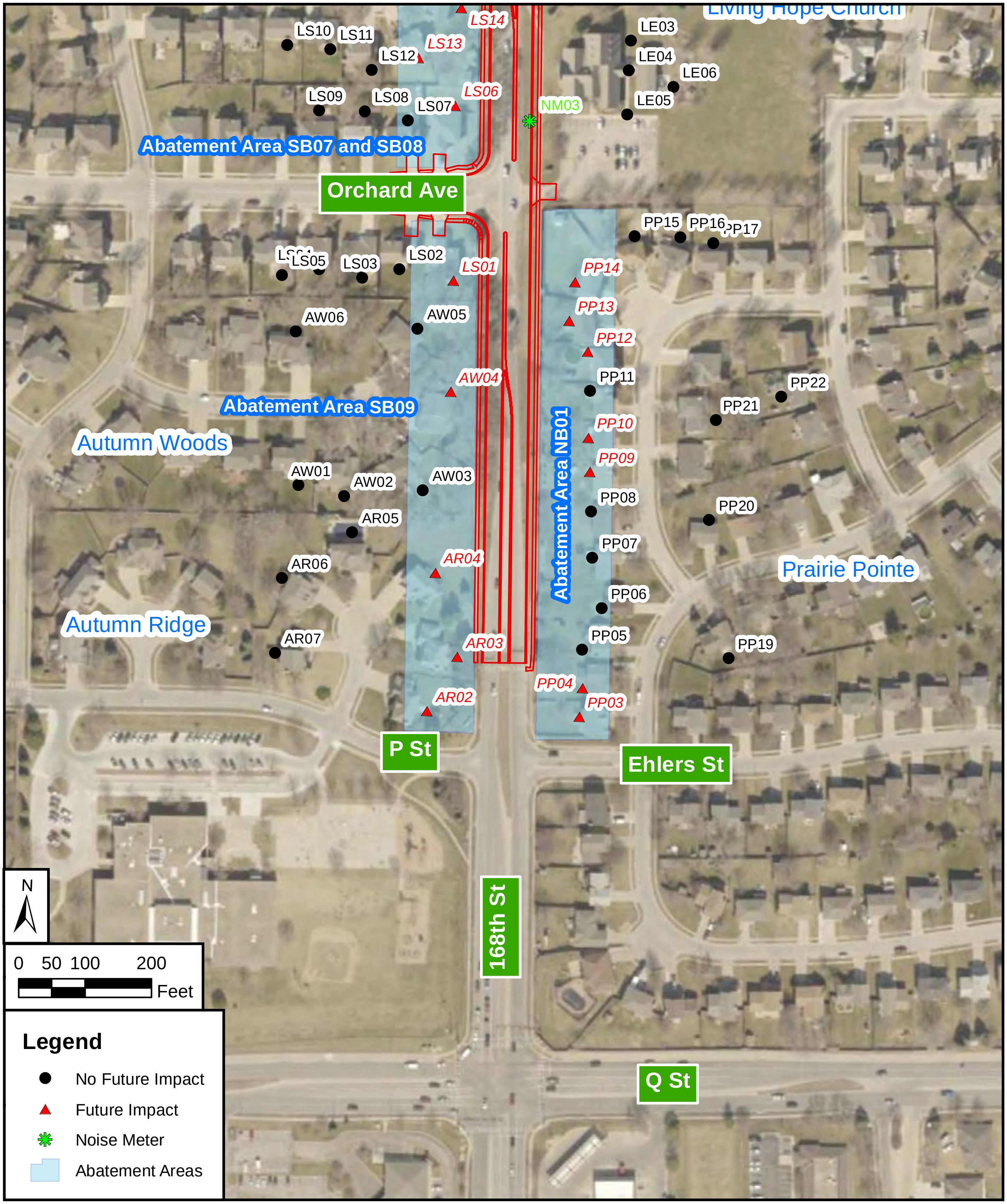
STPC-3811(1), CN 22209
STPC-3811(2), CN 22210

Exhibit 9. Receptor Locations: Patterson Dr to Orchard Ave



STPC-3811(1), CN 22209
STPC-3811(2), CN 22210

Exhibit 10. Receptor Locations: Orchard Ave to P St/Ehlers St



STPC-3811(1), CN 22209
STPC-3811(2), CN 22210

4.2 Noise Abatement Measures

In accordance with the NDOR noise policy, noise abatement measures must be considered for each of the impacted receptors. When considering abatement measures, judgments are made in each area, weighing the costs and effects of each abatement measure against the amount of benefit. Even if a noise abatement measure is feasible, it might not be reasonable. The following sections discuss various noise abatement methods and requirements.

Feasibility

The feasibility requirements of noise abatement measures are detailed in Section VII of the NDOR noise policy. The noise abatement measure must provide at least a 5 dBA reduction for 60% of front-row impacted receptors. Engineering and site factors must also be considered, including safety, topography, barrier height, and maintenance.

Reasonableness

The reasonableness requirements are also discussed in the NDOR noise policy in Section VII. All three factors must be met for a noise abatement measure to be considered reasonable.

1. Noise reduction design goal of 7 dBA
   A minimum of 40% of benefitted front-row receptors directly behind the noise wall (noise wall must extend entirely across benefitted receptor's property line) must receive a 7 dBA noise reduction.

2. Cost-effectiveness
   Noise abatement must be cost effective. NDOR defines cost effectiveness as dollars per benefited receiver. Based on construction price estimates for 2010, NDOR will use $44/ft^2 (re-evaluated every 5 years) for barrier costs. If the cost per benefited receiver is greater than $40,000, the site will be considered not reasonable. The cost of utility relocation, drainage control, and ROW acquisition will be factored into the cost effectiveness of noise abatement. Aesthetic treatment is not factored into cost.

3. Viewpoints of property owners and residents of the benefitted receptors
   Viewpoints of benefitted property owners and residents must be solicited regarding noise impacts and incorporation of abatement measures, if it is determined that it would be feasible and reasonable to provide noise abatement for a site. Noise abatement would be provided only if at least 75% of the points from returned votes are in favor of the proposed noise barrier. Please see the noise policy for the description of the public outreach and voting process.

4.2.1 Traffic Management Measures

This measure would utilize traffic control devices to mitigate traffic noise levels. Some of these measures may include prohibiting certain types of vehicles, restricting time-use for certain types of vehicles, and modifying the speed limit. However, these measures are not reasonable for this project because 168th Street is an arterial roadway facility, and the purpose of an arterial roadway is to move traffic, including trucks, through the area.

4.2.2 Alteration of Horizontal and Vertical Alignment

In some instances, it may be possible to relocate a roadway either horizontally or vertically to reduce traffic noise impacts where the receptors are typically on one side of the roadway, or where the elevation is relatively constant. Shifting of the centerline horizontally away from the receptors may reduce noise levels since sound intensity decreases with distance.

For this project, the local topography is highly variable, so a major alteration of the vertical alignment is not practical. Additionally, 168th Street is being widened on both sides of the roadway and lanes are being added within the existing right-of-way (ROW); therefore a major horizontal shift of the centerline is not feasible for this project.

4.2.3 Buffer Zones

The purpose of a buffer zone is to provide enough distance between the noise source and any future developments in order to minimize future noise impacts. Buying substantial right-of-way in undeveloped areas adds that extra distance to allow for more noise reduction.

For the most part, the impacted areas within this project area are already developed. Buffer zone options would not be feasible in the developed areas.

4.2.4 Noise Barriers

Noise barriers are considered as a possible means of noise abatement in areas where the traffic is creating a noise impact. A noise barrier must be continuous and have substantial length and height to be effective. Noise abatement using barriers must be feasible and reasonable, based on the several factors listed above.

Earth Berm

An earth berm can be incorporated into a project to help minimize traffic noise levels. The earth berm can be placed between the impacted receptors and the roadway in areas where a structural noise barrier would not be a reasonable option. This type of abatement measure is not only effective for reducing noise levels but can be aesthetically pleasing as well.

To be effective, construction of this type of abatement measure requires a wide area. Due to the significant area needed and the limited amount of right-of-way, this measure would not be feasible for this particular project.

Noise Wall

Noise walls can be placed between impacted receptors and roadways in areas where there is limited space. A noise wall must be continuous and have substantial length and height to be effective.

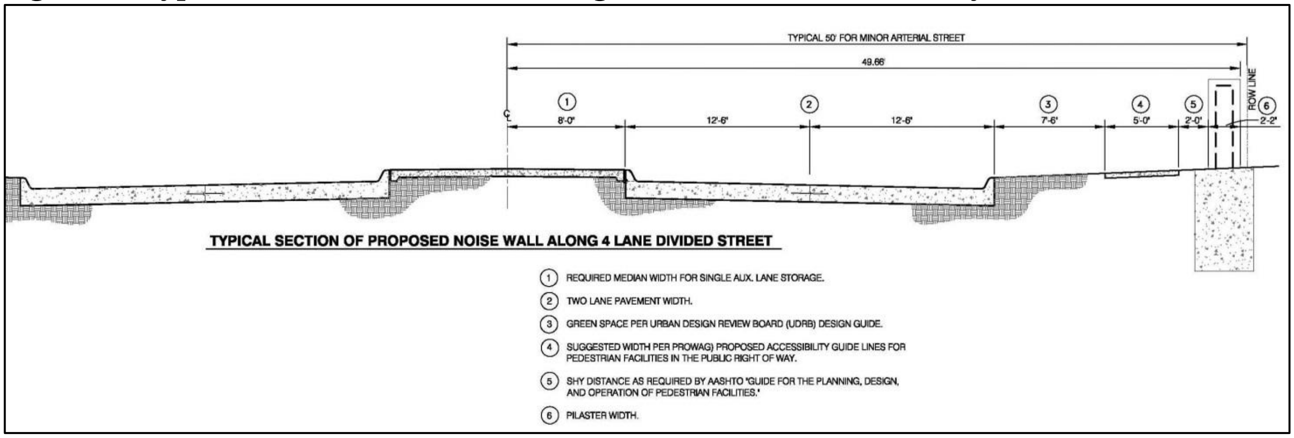
Noise walls can be costly to construct. As a result, several adjacent receivers in a row are typically needed to meet the reasonableness criteria.

Section 4.3 discusses the areas that were considered for noise barrier abatement.

4.2.5 Noise Wall Location Considerations

After identifying impacted receptors, the next step is determining where to place noise walls for analysis of effectiveness. Placement of a noise wall is just one component within an urban corridor. Other key factors include proper lane configuration, medians, sidewalks, street lighting, and landscaping. Furthermore, a noise wall needs to be located a safe distance from the roadway. This distance is defined as the clear zone and is dependent on several factors such as: roadway speeds, traffic volume, and terrain beyond the traveled way. **Figure 2** depicts a typical wall location.

Figure 2. Typical Section - Noise Wall along a 4-Lane Divided Roadway



On City of Omaha arterial projects like 168th Street, with multiple lots backing up to the street, it is desirable to place a noise wall with the back of the wall on the right-of-way line. This allows for the wall to act as a clear barrier between the public right-of-way and the private lots. If a wall is placed inside of the right-of-way boundary, maintenance and access to this strip of land behind the noise wall would be extremely challenging for the City. This would encourage property owners to encroach on the right-of-way. Also, by placing the noise wall on the right-of-way line, it allows the City expandability options for future turn lanes or sidewalk modifications.

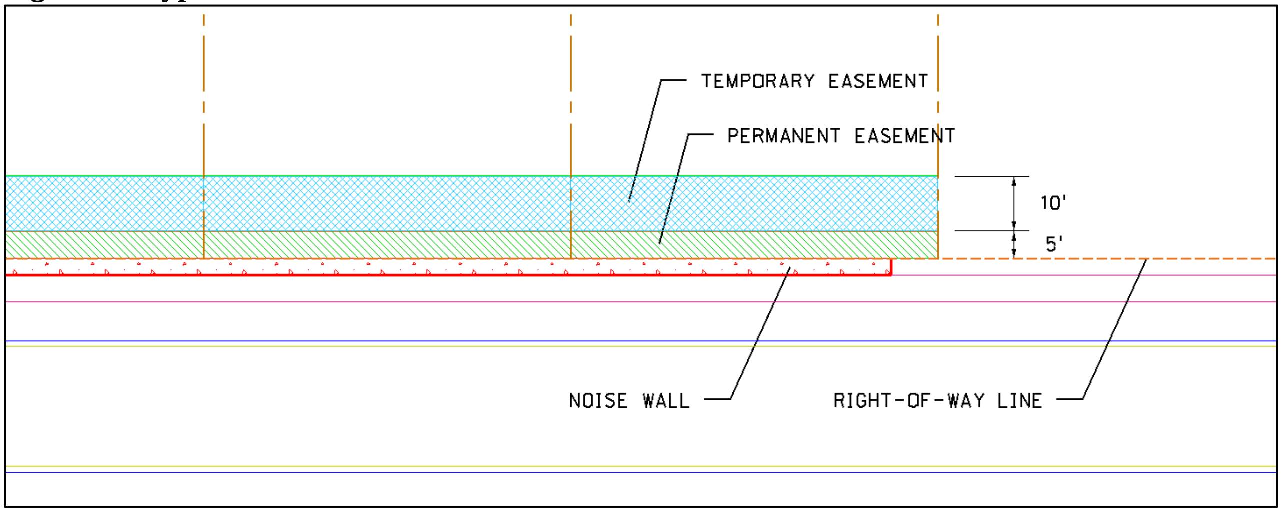
Easements

When buying right-of-way, it is important to consider the easements required to both construct and maintain the wall, or any other elements associated with the wall (e.g., concrete ditch lining). The City needs to be able to adequately access and maintain this system after completion of the project. This area behind the noise wall required for access and maintenance will be purchased as a permanent easement.

Additionally, temporary easements will be required to construct the wall. This includes drilling shafts for the pilaster footings, pouring the concrete for footings, setting the pilasters into place, hoisting the wall panels into position between pilasters, constructing any drainage collection systems, and all seeding and erosion control work behind the wall. At times, these operations become complex and require additional equipment and/or temporary supports.

Taking these factors into consideration, it becomes clear that some additional easements should be expected for the construction of a noise wall. The City Right-of-Way Department recommends buying roughly 15 feet of easement behind the back of the noise wall, ten feet of which would be temporary easement for construction and five feet of which would be permanent easement, as shown in **Figure 3**. *Please note, although construction of the proposed noise walls may require easement purchases, the cost effectiveness requirements of the noise walls were evaluated solely with NDOR's unit price of $44 per square feet of wall, unless otherwise noted.*

Figure 3. Typical Noise Wall Construction Easement



Damages

Some of the additional work caused by noise wall construction on the project includes fence removal, masonry column removal, tree removal, and sprinkler modification. While the contractor is paid to remove these items within the contract, the Right-of-Way Department also incurs additional expense to compensate the lot owners for loss of property. *Please note, although construction of the proposed noise walls may incur damages, the cost effectiveness requirements of the noise walls were evaluated solely with NDOR's unit price of $44 per square feet of wall, unless otherwise noted.*

Utilities

Additional utility conflicts will be caused by the placement of noise walls. Wall construction will conflict with multiple utilities in existing backyard utility easements that utility companies have along the fence lines. The large drilled shafts may conflict with underground facilities in the vicinity of the fence, while poles for overhead facilities may need to be relocated off the fence line. *Please note, although construction of the proposed noise walls may impact utilities, the cost effectiveness requirements of the noise walls were evaluated solely with NDOR's unit price of $44 per square feet of wall, unless otherwise noted.*

Drainage

The placement of noise walls can also cause additional drainage control to become necessary. When private lots are draining into the right-of-way, a supplemental drainage system is required to collect the runoff from the base of the noise wall and transfer it into the storm sewer system.

For retaining walls on this project, a two-foot wide concrete swale with spaced drains and piping has been proposed to alleviate the same drainage issue along retaining walls. This same system will be assumed for the proposed noise walls. *Please note, although construction of the proposed noise walls may require additional drainage control, the cost effectiveness requirements of the noise walls were evaluated solely with NDOR's unit price of $44 per square feet of wall.*

Retaining Walls

Retaining walls and noise walls may be needed/proposed at the same location, and in such event, the noise wall would be co-located with the retaining wall. Where a retaining wall and noise wall are proposed at the same location, a combination wall would be constructed to function as both a retaining wall and a noise wall. Co-locating a noise wall with a retaining wall may increase the costs of the noise wall (i.e. the noise wall would need to function as a retaining wall and may need to have additional footings or additional height). In some cases, existing retaining walls would need to be removed and/or replaced to allow a noise walls to be built, resulting in additional costs for the proposed walls. In some cases, however, existing retaining walls are already planned to be removed or replaced as part of the proposed action; therefore, the cost for these walls would not factored into the cost of the noise walls. *Please note, although constructing the proposed noise walls to function as retaining walls may require additional costs, the cost effectiveness requirements of the noise walls were evaluated solely with NDOR's unit price of $44 per square feet of wall, unless otherwise noted.*

4.3 Abatement Areas

Twenty-three (23) abatement areas were evaluated for feasibility and reasonableness. Fourteen abatement areas are along the northbound traffic lanes of 168th Street (on the east side of the roadway) and nine are along the southbound lanes (on the west side). The following sections detail the locations, and feasibility and reasonableness checks of each abatement area.

Regarding engineering feasibility, in addition to the requirements named by NDOR, the noise walls should not encroach upon the sight distance "triangles" for drivers entering or exiting the roadway from side streets. These sight distance impacts will be assessed and any modifications will be made as part of final design. Typical modifications to noise walls to accommodate sight triangles include shortening the length or height of a wall, and adding a "wing" to the wall to maintain the noise reduction benefits. These minor modifications typically do not affect the overall feasibility or reasonableness of an individual wall; however, adding a wing could result in additional property impacts. If this modification is found to be necessary on any wall during final design, coordination with NDOR would occur to assess additional impacts.

Where appropriate, specific design considerations for potential noise abatement areas are described in each of the following sections. These design considerations explain specific constraints that were encountered, or accommodations that would need to be made to effectively construct a noise wall for that abatement area. It should also be noted that numerous potential wall locations and designs were considered for each abatement area. Wherever possible, the proposed walls were designed to provide the minimum required noise abatement to the maximum number of homes while still being considered feasible and reasonable.

Concerning the cost effectiveness reasonableness requirements for all abatement areas, the costs of the walls in this report are based solely on the NDOR unit cost of $44 per square foot of wall.

Finally, the viewpoints of property owners and residents benefitted by walls has been determined. Those walls that were determined to be feasible and preliminarily reasonable were voted upon by the benefitted property owners and residents. Voting ballots were sent out to benefitted owners and residents in October and December of 2014 (abatement areas NB01, NB02, NB08, NB09, NB10, NB13, SB07/08, and SB09), and in August and September of 2016 (abatement areas NB07 and SB11). Public meetings were also held to provide information to those benefitted by these noise walls on November 18, 2014 and September 15, 2016 respectively. Voting ballots were also accepted at the noise meetings. The results of the voting for each abatement area are included below, where applicable.

Abatement Area NB01

Single-family residential along the east side of 168th St from Ehlers St to Orchard Ave

Receptors PP03, PP04, PP09, PP10, PP12, PP13, and PP14 (7 homes), shown below in **Figure 4**, are anticipated to have a noise impact in the future year 2035 build conditions. A noise wall was evaluated at this location to abate the impacts. The proposed wall is 870 feet long and 6-12 feet tall, shown in **Exhibit 11**.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front-row impacted receptors (7 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

1. The proposed wall would be expected to provide a 7 dBA reduction to 5 out of the 12 benefitted front-row receptors, which corresponds to 42%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is estimated at $328,074, or $27,340 per benefitted receptor (12 total). Therefore, the wall satisfies the cost effectiveness requirements.

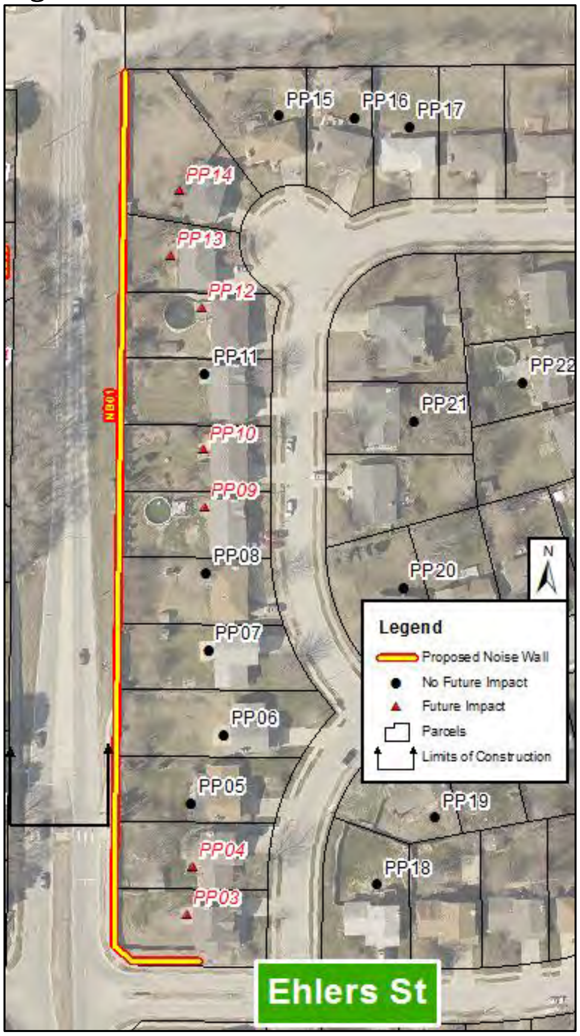
3. The viewpoints of the property owners and residents of the benefitted receptors have been determined. Nine out of thirteen voters responded (69%), with 89% of the voters in favor of the noise wall (one voter was opposed to the wall). Therefore, the wall satisfies the viewpoints requirements.

A noise wall at this location would feasibly provide noise abatement. Also, a preliminary determination has been made that noise abatement would be reasonable.

Design Considerations

There is an existing segmental block retaining wall along the ROW line for receptors PP03-PP06. This wall was constructed as part of the previous widening project for Q Street that included a portion of 168th Street. This wall was not originally proposed to be removed as part of this project. However, to construct a noise wall in this location, the retaining wall would need to be removed and replaced with a combination retaining/noise wall. The total costs associated with removing and replacing this wall are expected to be minimal, and would not greatly increase the cost per benefitted receptor. Therefore, NB01 would remain feasible and reasonable.

Figure 4. Abatement Area NB01



Abatement Area NB02

Single-family residential along the east side of 168th St, south of Rolling Ridge Rd

Receptors SH05, SH06, and SH07 (3 homes), shown below in **Figure 5**, are anticipated to have a noise impact in the future year 2035 build conditions. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall is 365 feet long and varies in height from 6 feet to 8 feet, as shown in **Exhibit 12**. The proposed wall follows the existing fenceline along the back of SH07 to avoid impacts to the large, brick neighborhood monument on the southeast corner of 168^{th} Street & Rolling Ridge Road

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front-row impacted receptors (3 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

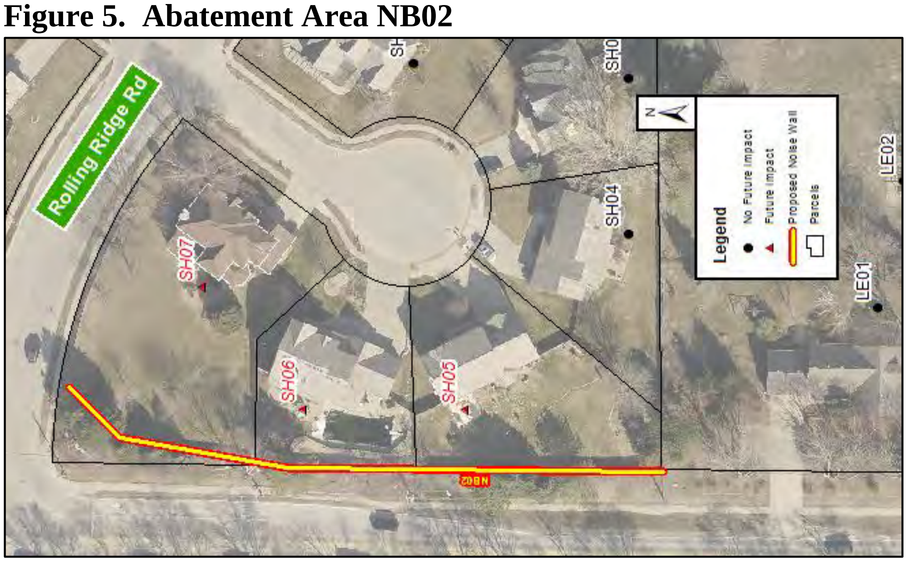
1. The proposed wall would be expected to provide a 7 dBA reduction to 2 out of the 3 benefitted front-row receptors, which corresponds to 67%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is $112,690, or $37,563 per benefitted receptor (3 total). Therefore, the wall satisfies the cost effectiveness requirements.

3. The viewpoints of the property owners and residents of the benefitted receptors have been determined. Three out of three voters responded (100%), with 100% of the voters in favor of the noise wall. Therefore, the wall satisfies the viewpoints requirements.

A noise wall at this location would feasibly provide noise abatement. Also, a preliminary determination has been made that noise abatement would be reasonable.

Figure 5. Abatement Area NB02



<u>Abatement Area NB03</u>

Single-family residential along the east side of 168th St, north of Rolling Ridge Rd

Receptor SH08 (1 home), shown below in **Figure 6**, is anticipated to have a noise impact in the future year 2035 build situation. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall would have been 163 feet long, varying in height from 20 feet to 30 feet.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front row impacted receptors (1 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

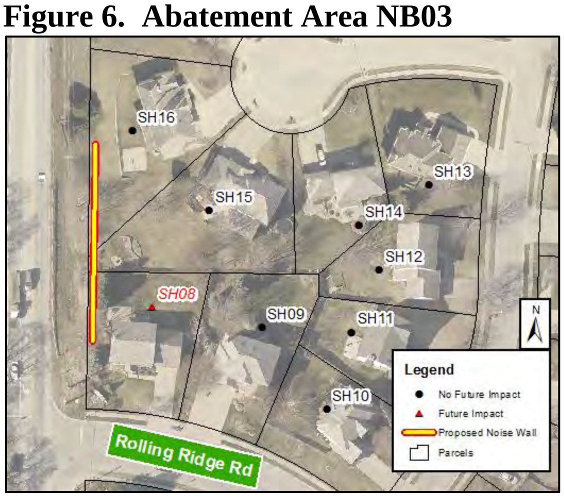
1. The proposed wall would be expected to provide a 7 dBA reduction to the one benefitted front row receptor. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is estimated at $173,466, or $173,466 per benefitted receptor (1 total). With only one potentially benefitted receptor, the cost per benefitted receptor is equal to the cost of the wall. Therefore, the wall does not satisfy the cost effectiveness requirements. In addition, the other receptors adjacent to the noise wall do not receive a benefit, and would therefore not be able to vote on the proposed noise wall.

3. The viewpoints of the property owners and residents of the benefitted receptors do not need to be considered, because the proposed wall is not reasonable due to not meeting the cost effectiveness requirements.

A noise wall at this location would feasibly provide noise abatement. However, a preliminary determination has been made that noise abatement would <u>not</u> be reasonable due to not meeting the cost effectiveness requirements.

Figure 6. Abatement Area NB03



Abatement Area NB04

Single-family residential along the east side of 168th St, south of 167th Ave

Receptors BS17 and BS21 (2 homes), shown below in **Figure 7**, are anticipated to have a noise impact in the future year 2035 build situation. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall would have been 785 feet long, varying in height from 6 feet to 10 feet.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front row impacted receptors (2 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

1. The proposed wall would be expected to provide a 7 dBA reduction to 2 out of the 5 benefitted front row receptors (BS17, BS18, BS21, BS22, and BS25) which corresponds to 40%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is estimated at $264,120, or $52,824 per benefitted receptor (5 total). Therefore, the wall does not satisfy the cost effectiveness requirements.

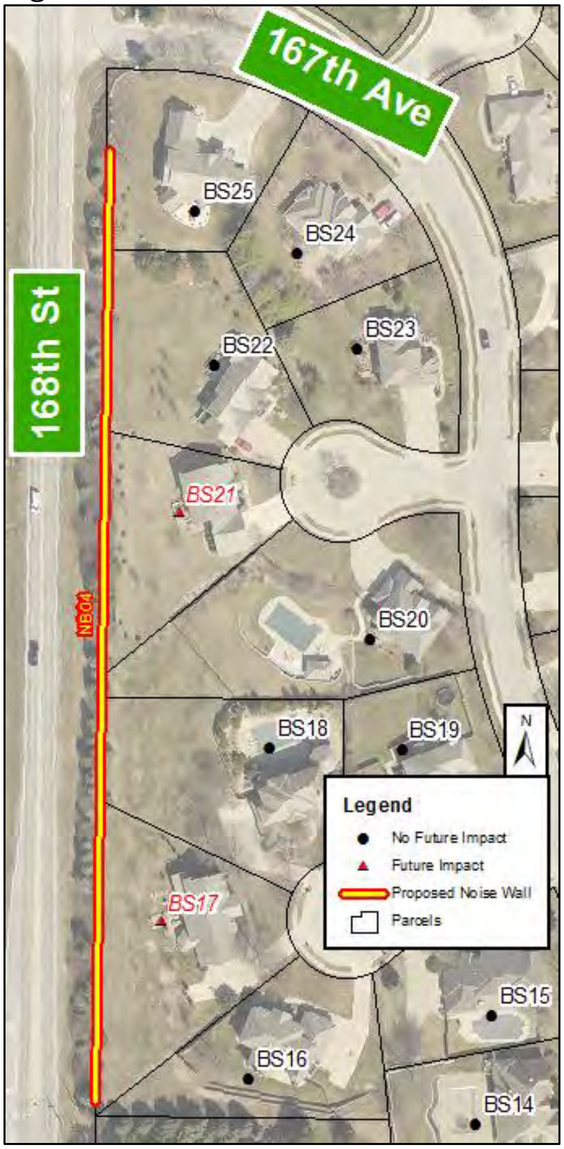
3. The viewpoints of the property owners and residents of the benefitted receptors do not need to be considered, because the proposed wall is not reasonable due to not meeting the cost effectiveness requirements.

A noise wall at this location would feasibly provide noise abatement. However, a preliminary determination has been made that noise abatement would not be reasonable due to not meeting the cost effectiveness requirements.

Alternate Wall Designs

Receptor BS20 is a non-impacted front row receiver which does not receive a benefit from this noise wall. This receiver is located approximately 220 feet from the roadway, and the property only has approximately 15 feet of frontage to the roadway. An additional noise wall was evaluated which would benefit BS20; however, benefitting BS20 only raises the cost per benefitted receiver, and the wall would still not be reasonable due to cost effectiveness. Additionally, receptor BS16 cannot be benefitted due to its location and orientation to the roadway (i.e., the wall cannot extend far enough south due to the driveway and orientation of the adjacent house to the south that faces the road).

Figure 7. Abatement Area NB04



<u>Abatement Area NB05</u>

Single-family residential along the east side of 168th St, north of 167th Ave

Receptor BS33 (1 home), shown below in **Figure 8**, is anticipated to have a noise impact in the future year 2035 build situation. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall would have been 171 feet long, varying in height from 12 feet to 16 feet.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front row impacted receptors (1 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

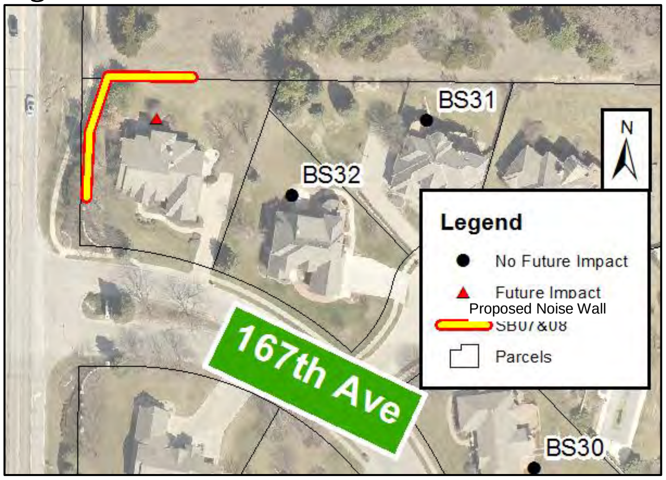
1. The proposed wall would be expected to provide a 7 dBA reduction to the one benefitted front row receptor. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is estimated at $107,242, or $107,242 per benefitted receptor (1 total). With only one potentially benefitted receptor, the cost per benefitted receptor is equal to the cost of the wall. Therefore, the wall does not satisfy the cost effectiveness requirements. In addition, there would have been additional ROW costs to construct a wall along the back of the one benefitted receptor, further increasing the cost of this wall.

3. The viewpoints of the property owners and residents of the benefitted receptors do not need to be considered, because the proposed wall is not reasonable due to not meeting the cost effectiveness requirements.

A noise wall at this location would feasibly provide noise abatement. However, a preliminary determination has been made that noise abatement would <u>not</u> be reasonable due to not meeting the cost effectiveness requirements.

Figure 8. Abatement Area NB05



<u>Abatement Area NB06</u>
Single-family residential along the east side of 168th St, south of Ontario Plz

Receptor EA01 (1 home), shown below in **Figure 9**, is anticipated to have a noise impact in the future year 2035 build situation. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall would have been 300 feet long, varying in height from 8 feet to 10 feet.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front row impacted receptors (1 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

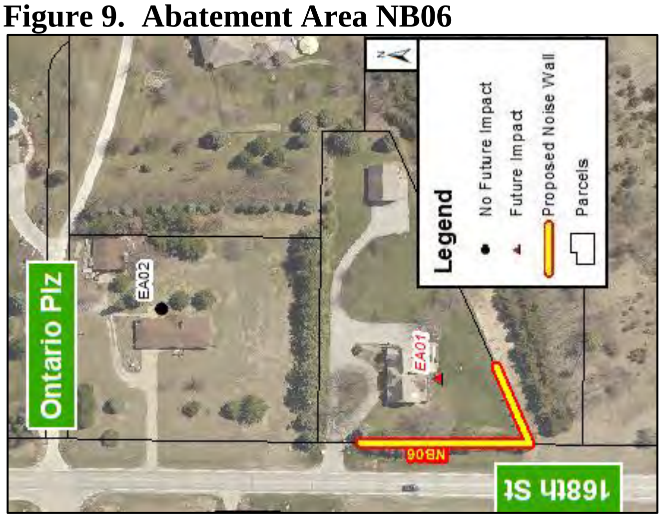
1. The proposed wall would be expected to provide a 7 dBA reduction to the one benefitted front row receptor. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is estimated at $115,442, or $115,442 per benefitted receptor (1 total). With only one potentially benefitted receptor, the cost per benefitted receptor is equal to the cost of the wall. Therefore, the wall does not satisfy the cost effectiveness requirements. In addition, there would have been additional ROW costs to construct a wall along the back of the one benefitted receptor, furthering increasing the cost of this wall.

3. The viewpoints of the property owners and residents of the benefitted receptors do not need to be considered, because the proposed wall is not reasonable due to not meeting the cost effectiveness requirements.

A noise wall at this location would feasibly provide noise abatement. However, a preliminary determination has been made that noise abatement would <u>not</u> be reasonable due to not meeting the cost effectiveness requirements.

Figure 9. Abatement Area NB06



Abatement Area NB06(A)

Single-family residential along the east side of 168th St, north of Oak St

Receptors AA15 and AA16 (2 homes), shown below in **Figure 10**, are anticipated to have a noise impact in the future year 2035 build situation. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall would have been 337 feet long, varying in height from 6 feet to 13 feet.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front row impacted receptors (2 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

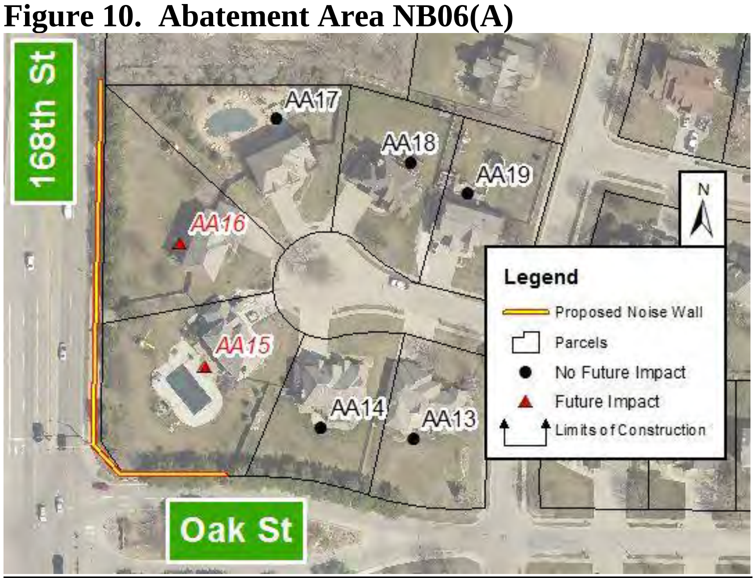
1. The proposed wall would be expected to provide a 7 dBA reduction to the 1 out of the 2 benefitted front row receptors, which corresponds to 50%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is estimated at $156,472, or $78,236 per benefitted receptor (2 total). Therefore, the wall does not satisfy the cost effectiveness requirements.

3. The viewpoints of the property owners and residents of the benefitted receptors do not need to be considered, because the proposed wall is not reasonable due to not meeting the cost effectiveness requirements.

A noise wall at this location would feasibly provide noise abatement. However, a preliminary determination has been made that noise abatement would not be reasonable due to not meeting the cost effectiveness requirements.

Figure 10. Abatement Area NB06(A)



<u>Abatement Area NB07</u>

Single-family residential along the east side of 168th St, south of Gold St

Receptors LW01, LW02 and LW65 to LW69 (7 homes), shown below in **Figure 11**, are anticipated to have a noise impact in the future year 2035 build conditions. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall is 462 feet long and varies in height from 6 feet to 8 feet, as shown in **Exhibit 13**.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front-row impacted receptors (5 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

1. The proposed wall would be expected to provide a 7 dBA reduction to 2 out of the 5 benefitted front-row receptors, which corresponds to 40%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is $146,879 or $29,376 per benefitted receptor (5 total). Therefore, the wall satisfies the cost effectiveness requirements.

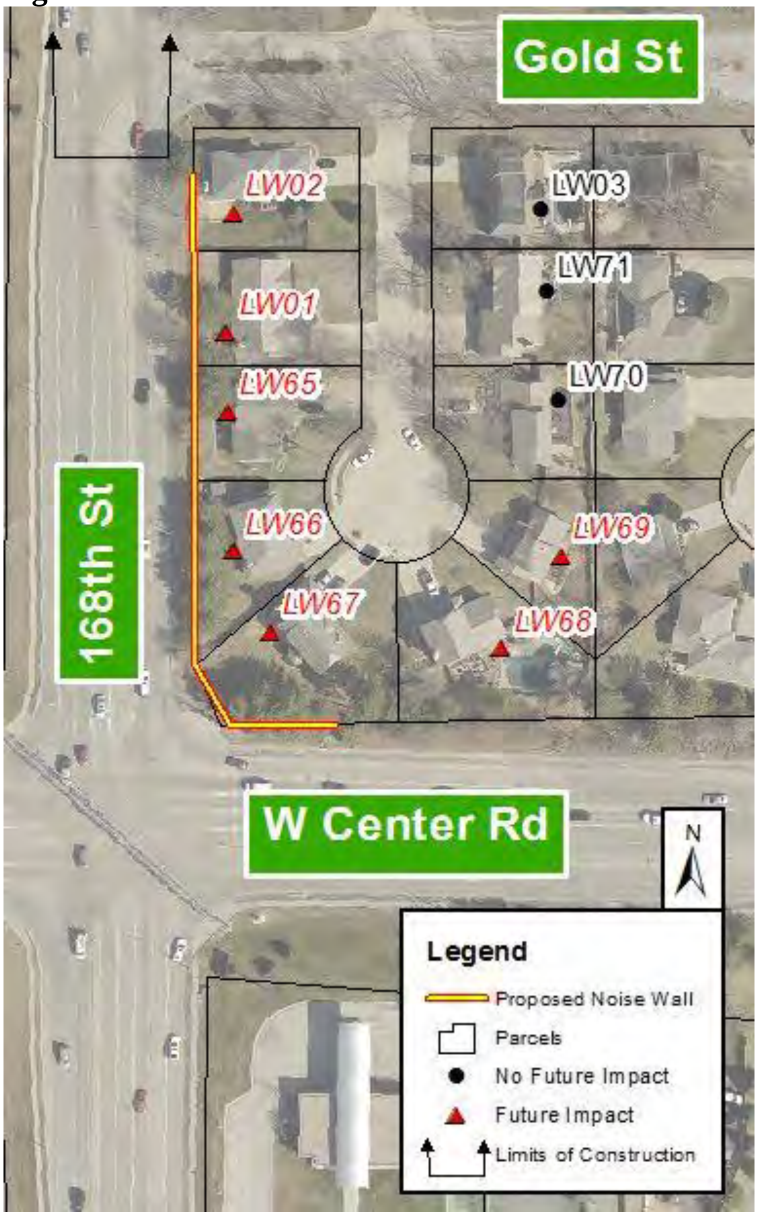
3. The viewpoints of the property owners and residents of the benefitted receptors have been determined. Five out of six voters responded (83%), with 100% of the voters in favor of the noise wall. Therefore, the wall satisfies the viewpoints requirements.

A noise wall at this location would feasibly provide noise abatement. Also, a preliminary determination has been made that noise abatement would be reasonable.

<u>Design Considerations</u>

LW68 and LW69 were determined to be impacted in the future year 2035 build conditions when modeled with both 168th Street and West Center Road traffic (LW68 – 68.9 dBA, LW69 – 67.2 dBA); however, it was determined that the primary sound levels affecting these two receptors, which are not front row along 168th Street, are generated from West Center Road traffic. This was demonstrated by running two different models – one model with only 168th Street traffic and another model with only West Center Road traffic. When only 168th Street traffic is run in the model, these two receptors have lower sound levels than the "West Center Road Only Model," and <u>are not impacted</u> (LW68 – 56.2 dBA, LW69 – 59.5dBA). When only West Center Road traffic is run in the model, these two receptors have higher sound levels than the "168th Street Only Model," and <u>are impacted</u> (LW68 – 68.7 dBA, LW69 – 66.6 dBA). Therefore, because the primary noise affecting these receptors is not generated by 168th Street, noise abatement was not analyzed and is not proposed for LW68 and LW69.

Figure 11. Abatement Area NB07



Abatement Area NB08

Single-family residential along the east side of 168th St, north of Gold St

Receptors LW04 to LW08 (5 homes), shown below in **Figure 12**, are anticipated to have a noise impact in the future year 2035 build conditions. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall is 413 feet long and varies in height from 6 feet to 8 feet, as shown in **Exhibit 14**.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front-row impacted receptors (5 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

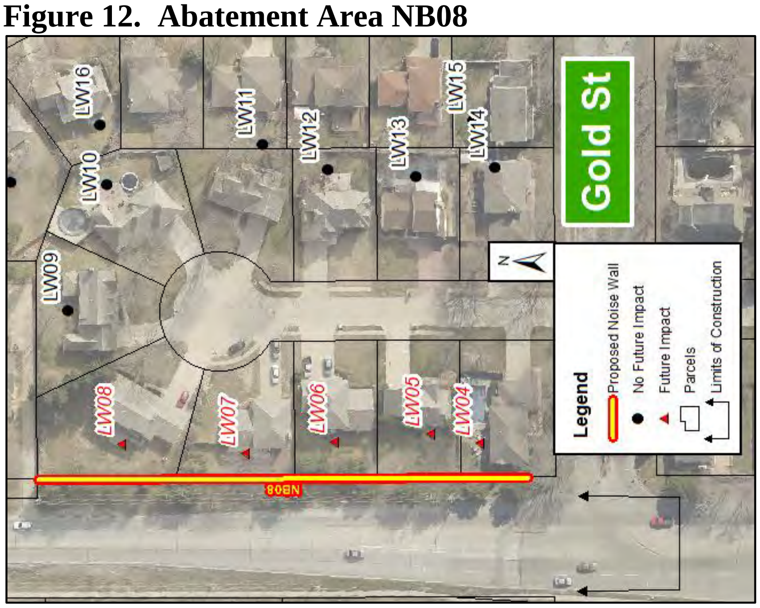
1. The proposed wall would be expected to provide a 7 dBA reduction to 2 out of the 5 benefitted front-row receptors, which corresponds to 40%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is $128,986 or $25,797 per benefitted receptor (5 total). Therefore, the wall satisfies the cost effectiveness requirements.

3. The viewpoints of the property owners and residents of the benefitted receptors have been determined. Four out of six voters responded (67%), with 100% of the voters in favor of the noise wall. Therefore, the wall satisfies the viewpoints requirements.

A noise wall at this location would feasibly provide noise abatement. Also, a preliminary determination has been made that noise abatement would be reasonable.

Figure 12. Abatement Area NB08



Abatement Area NB09

Single-family residential along the east side of 168th St, south of Frances St

Receptors LW26 to LW28, LW36, LW37, and LW46 (6 homes), shown below in **Figure 13**, are anticipated to have a noise impact in the future year 2035 build situation. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall is 740 feet long and 6 feet high, as shown in **Exhibit 15**.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 83% (5 out of 6 total) of the front row impacted receptors, which satisfies acoustic feasibility requirements. Receptor LW26 cannot be benefitted due to its location and orientation to the roadway (i.e. the wall cannot extend far enough south due to the driveway and orientation of the house to the south that faces the road).

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

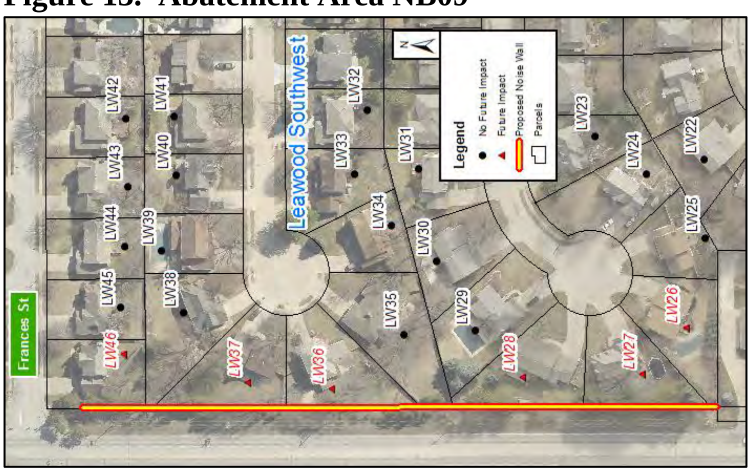
1. The proposed wall would be expected to provide a 7 dBA reduction to 4 out of the 7 benefitted front row receptors, which corresponds to 57%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is estimated at $195,452, or $27,922 per benefitted receptor (7 total). Therefore, the wall satisfies the cost effectiveness requirements.

3. The viewpoints of the property owners and residents of the benefitted receptors have been considered. Eight out of eight voters responded (100%), with 100% of the voters in favor of the noise wall. Therefore, the wall satisfies the viewpoints requirements.

A noise wall at this location would feasibly provide noise abatement. Also, a preliminary determination has been made that noise abatement would be reasonable.

Figure 13. Abatement Area NB09



<u>Abatement Area NB10</u>

Single-family residential along the east side of 168th St, from Frances St to Hickory St

Receptors LW50 to LW54, PH01, PH02, and PH06 to PH09 (11 homes), shown below in **Figure 14**, are anticipated to have a noise impact in the future year 2035 build conditions. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall is 862 feet long and varies in height from 6 feet to 12 feet, as shown in **Exhibit 16**.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front-row impacted receptors (11 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

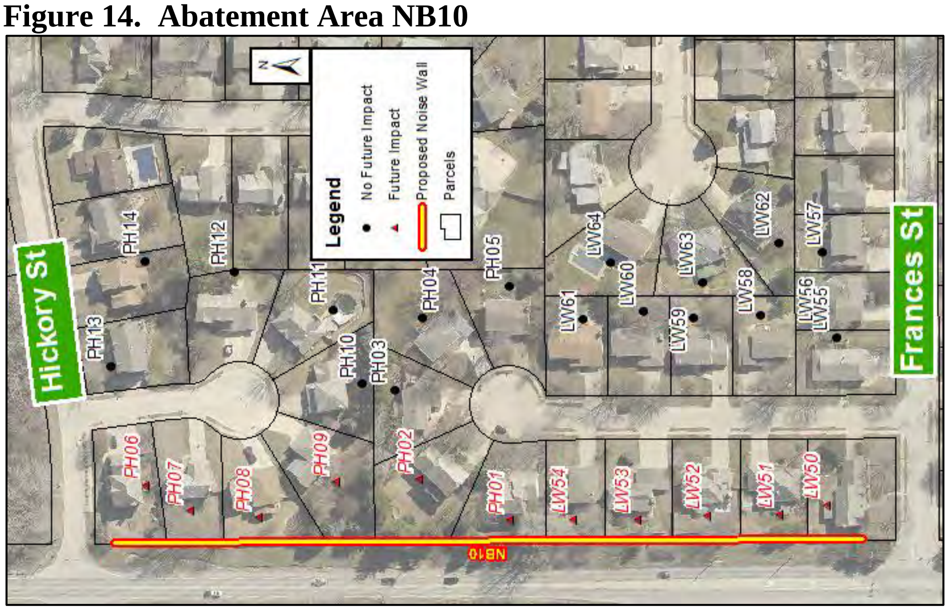
1. The proposed wall would be expected to provide a 7 dBA reduction to 5 out of the 11 benefitted front-row receptors, which corresponds to 45%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is $329,528 or $29,957 per benefitted receptor (11 total). Therefore, the wall satisfies the cost effectiveness requirements.

3. The viewpoints of the property owners and residents of the benefitted receptors have been determined. Ten out of eleven voters responded (90%), with 100% of the voters in favor of the noise wall. Therefore, the wall satisfies the viewpoints requirements.

A noise wall at this location would feasibly provide noise abatement. Also, a preliminary determination has been made that noise abatement would be reasonable.

Figure 14. Abatement Area NB10



Abatement Area NB11

Single-family residential along the east side of 168th St, south of Pine St (east leg)

Receptors PH15 and PH16 (2 homes), shown below in **Figure 15**, are anticipated to have a noise impact in the future year 2035 build situation. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall would have been 253 feet long, varying in height from 12 feet to 18 feet.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front row impacted receptors (1 total), which satisfies acoustic feasibility requirements. Receptor PH16 is considered a second-row receptor.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

1. The proposed wall would be expected to provide a 7 dBA reduction to the one benefitted front row receptor. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is estimated at $169,375, or $84,688 per benefitted receptor (2 total). Therefore, the wall does not satisfy the cost effectiveness requirements. Other options such as not meeting acoustic feasibility requirements for 100% of front row impacted receptors were not possible since there is only one potentially benefitted front-row receptor.

3. The viewpoints of the property owners and residents of the benefitted receptors do not need to be considered, because the proposed wall is not reasonable due to not meeting the cost effectiveness requirements.

A noise wall at this location would feasibly provide noise abatement. However, a preliminary determination has been made that noise abatement would not be reasonable due to not meeting the cost effectiveness requirements.

Figure 15. Abatement Area NB11

Abatement Area NB12

Single-family residential along the east side of 168th St, between Pine St (east leg) and William St

Receptors PH19 to PH26 (8 homes), shown below in **Figure 16**, are anticipated to have a noise impact in the future year 2035 build situation. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall would have been 645 feet long, varying in height from 10 feet to 14 feet.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front row impacted receptors (8 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

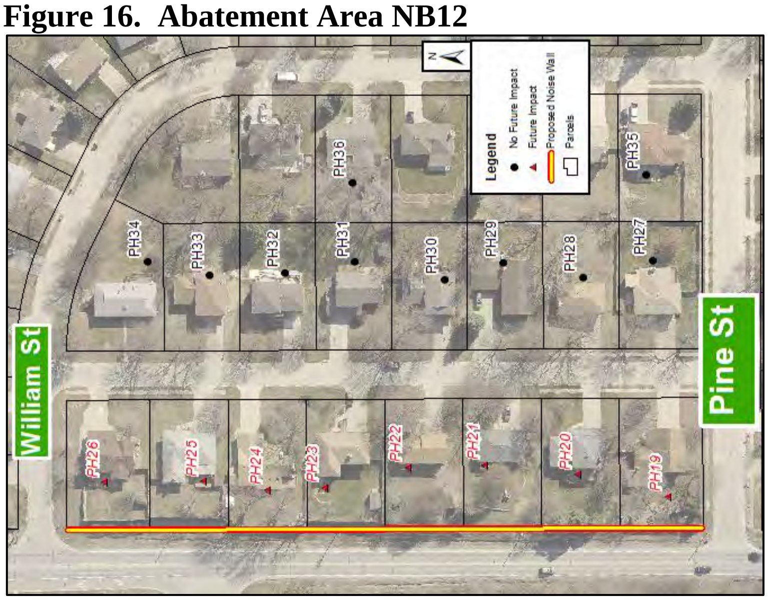
1. The proposed wall would be expected to provide a 7 dBA reduction to 4 out of the 8 benefitted front row receptors, which corresponds to 50%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is estimated at $360,129, or $45,016 per benefitted receptor (8 total). Therefore, the wall does not satisfy the cost effectiveness requirements.

3. The viewpoints of the property owners and residents of the benefitted receptors do not need to be considered, because the proposed wall is not reasonable due to not meeting the cost effectiveness requirements.

A noise wall at this location would feasibly provide noise abatement. However, a preliminary determination has been made that noise abatement would <u>not</u> be reasonable due to not meeting the cost effectiveness requirements.

Figure 16. Abatement Area NB12



Abatement Area NB13

Single-family residential along the east side of 168th St, from Poppleton Ave to William St

Receptors PH37 and PH41 (2 homes), shown below in **Figure 17**, are anticipated to have a noise impact in the future year 2035 build conditions. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall is 173 feet long and 6 feet tall, as shown in **Exhibit 17**.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front-row impacted receptors (2 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

1. The proposed wall would be expected to provide a 7 dBA reduction to 1 out of the 2 benefitted front-row receptors, which corresponds to 50%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is $45,740 or $22,870 per benefitted receptor (2 total). Therefore, the wall satisfies the cost effectiveness requirements.

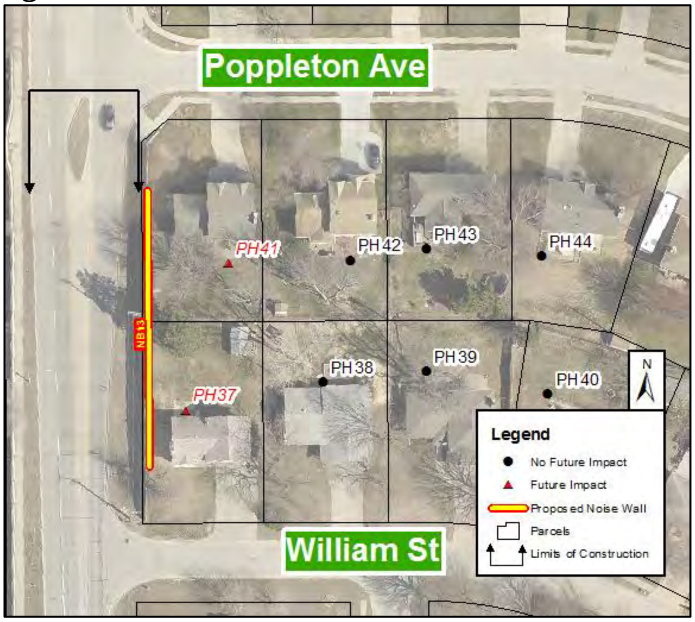
3. The viewpoints of the property owners and residents of the benefitted receptors have been considered. Two out of two voters responded (100%), with 100% of the voters in favor of the noise wall. Therefore, the wall satisfies the viewpoints requirements.

A noise wall at this location would feasibly provide noise abatement. Also, a preliminary determination has been made that noise abatement would be reasonable.

Design Considerations

There is an existing retaining wall along the ROW line for receptors PH37 and PH41. This wall was constructed as part of the previous widening project for Pacific Street that included a portion of 168th Street. This retaining wall is a poured in place concrete wall, and is planned to be removed and replaced with a new gravity (i.e. large interlocking) block wall for the proposed project. If a noise wall is approved by the two benefited receptors, the noise wall would be constructed as a combined noise/retaining wall. Therefore, the costs for the retaining wall were not included in the costs to determine reasonableness.

Figure 17. Abatement Area NB13



Abatement Area SB01

Single-family residential along the west side of 168th St, north of Pine St (west leg)

Receptor RG16 (1 home), shown below in **Figure 18**, is anticipated to have a noise impact in the future year 2035 build situation. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall would have been 197 feet long, varying in height from 16 to 18 feet high.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to the one front row impacted receptor. Therefore, the acoustic feasibility requirements are satisfied.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

1. While a 16 to 18 foot high wall does provide a 5 dBA reduction, a 7 dBA reduction is not achievable at the maximum allowable height (i.e., 30 feet). Therefore, the noise reduction design goal is not satisfied.

2. The cost of the proposed wall was not evaluated because the noise reduction goal is not met.

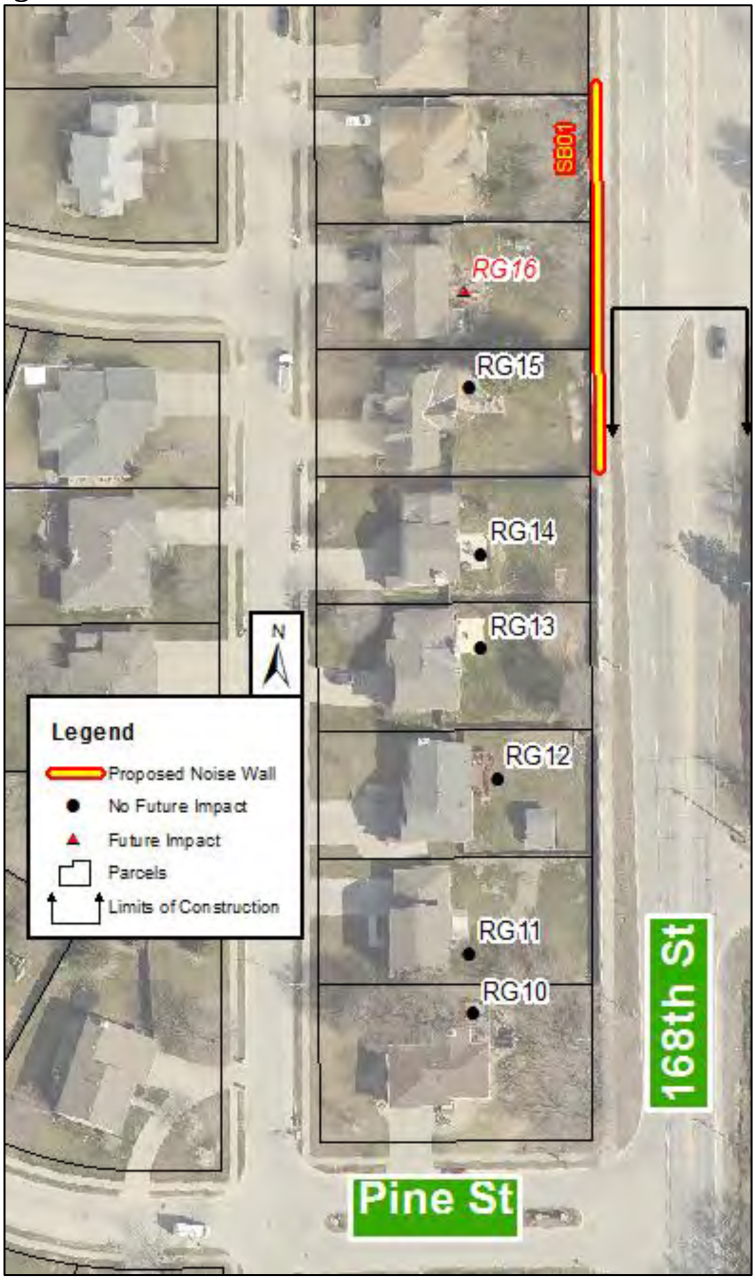
3. The viewpoints of the property owners and residents of the benefitted receptor do not need to be considered, because the proposed wall is not reasonable due to not meeting the noise reduction design goal.

A noise wall at this location would feasibly provide noise abatement. However, a preliminary determination has been made that noise abatement would not be reasonable due to not meeting the noise reduction design goal.

Alternate Wall Designs

An additional noise wall was evaluated which would benefit receptor RG16, as well as the non-impacted receptors to the south (i.e., the receptors between RG16 and Pine Street). This proposed wall would have been 530 feet long and 30 feet tall. This wall could have met the acoustic feasibility requirements, as it would have provided a 5 dBA reduction to the one front row impacted receptor; however, it still would not have benefited the other non-impacted receivers at the maximum allowable height. Additionally, this wall would not have met the reasonableness requirements, since it would not provide a 7 dBA reduction to the 1 benefitted front-row receptor at the maximum allowable height; nor would it satisfy the cost effectiveness requirement ($699,516 per benefitted receiver).

Figure 18. Abatement Area SB01



Abatement Area SB02

Single-family residential along the west side of 168th St, south of Pine St (west leg)

Receptors RG02 to RG06 (5 homes), shown below in **Figure 19**, are anticipated to have a noise impact in the future year 2035 build situation. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall would have been 392 feet long, varying in height from 10 feet to 14 feet.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front row impacted receptors (5 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

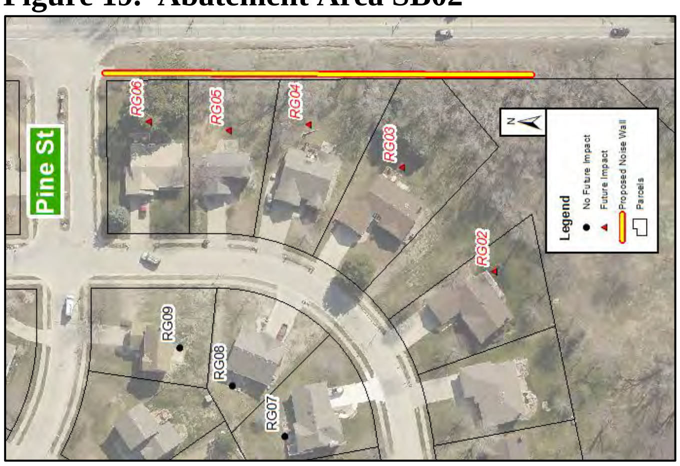
1. The proposed wall would be expected to provide a 7 dBA reduction to 2 out of the 5 benefitted front row receptors, which corresponds to 40%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is estimated at $319,465, or $63,893 per benefitted receptor (5 total). Therefore, the wall does not satisfy the cost effectiveness requirements. Other options were investigated, such as not meeting acoustic feasibility requirements for 100% of front row impacted receptors; however, by decreasing the number of potentially benefitted receptors, the cost per benefitted receptor increases.

3. The viewpoints of the property owners and residents of the benefitted receptors do not need to be considered, because the proposed wall is not reasonable due to not meeting the cost effectiveness requirements.

A noise wall at this location would feasibly provide noise abatement. However, a preliminary determination has been made that noise abatement would <u>not</u> be reasonable due to not meeting the cost effectiveness requirements.

Figure 19. Abatement Area SB02



<u>Abatement Area SB03</u>

Single-family residential along the west side of 168th St, south of Oak Dr

Receptors LV03 to LV10, and LV12 (9 homes), shown below in **Figure 20**, are anticipated to have a noise impact in the future year 2035 build situation. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall would have been 1,100 feet long, varying in height from 8 feet to 24 feet.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front row impacted receptors (9 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

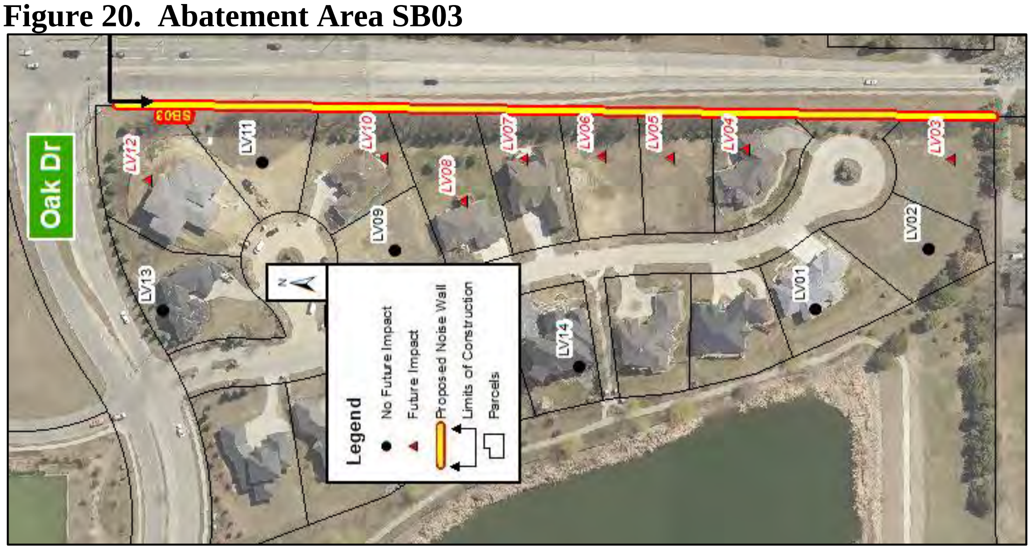
1. The proposed wall would be expected to provide a 7 dBA reduction to 4 out of the 9 benefitted front row receptors, which corresponds to 44%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is estimated at $575,548, or $63,950 per benefitted receptor (9 total). Therefore, the wall does not satisfy the cost effectiveness requirements.

3. The viewpoints of the property owners and residents of the benefitted receptors do not need to be considered, because the proposed wall is not reasonable due to not meeting the cost effectiveness requirements.

A noise wall at this location would feasibly provide noise abatement. However, a preliminary determination has been made that noise abatement would <u>not</u> be reasonable due to not meeting the cost effectiveness requirements.

Figure 20. Abatement Area SB03



Abatement Area SB04

Single-family residential along the west side of 168th St, south of Ontario St

Receptors TR02 and TR03 (2 homes), shown below in **Figure 21**, are anticipated to have a noise impact in the future year 2035 build situation. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall would have been 390 feet long, varying in height from 10 feet to 18 feet.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front row impacted receptors (2 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

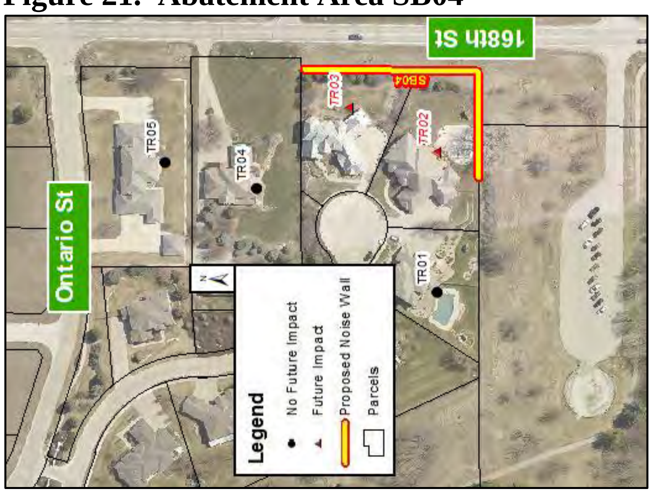
1. The proposed wall would be expected to provide a 7 dBA reduction to 1 out of the 2 benefitted front row receptors, which corresponds to 50%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is estimated at $239,143, or $119,572 per benefitted receptor (2 total). Therefore, the wall does not satisfy the cost effectiveness requirements. In addition, there would have been additional ROW costs to construct a wall along the back side of one benefitted receptor, further increasing the cost of this wall.

3. The viewpoints of the property owners and residents of the benefitted receptors do not need to be considered, because the proposed wall is not reasonable due to not meeting the cost effectiveness requirements.

A noise wall at this location would feasibly provide noise abatement. However, a preliminary determination has been made that noise abatement would not be reasonable due to not meeting the cost effectiveness requirements.

Figure 21. Abatement Area SB04



Abatement Area SB05

Single-family residential along the west side of 168th St, north of H Cir

Receptor TP04 (1 home), shown below in **Figure 22**, is anticipated to have a noise impact in the future year 2035 build situation. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall would have been 209 feet long and 20 feet tall.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front row impacted receptors (1 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

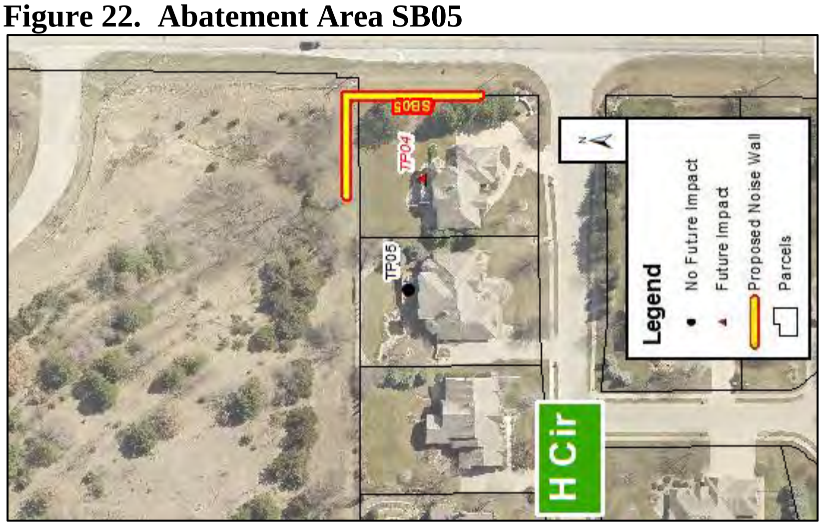
1. The proposed wall would be expected to provide a 7 dBA reduction to the one benefitted front row receptor. Therefore, the noise reduction design goal is satisfied

2. The cost of the proposed wall is estimated at $184,503, or $184,503 per benefitted receptor (1 total). With only one potentially benefitted receptor, the cost per benefitted receptor is equal to the cost of the wall. Therefore, the wall does not satisfy the cost effectiveness requirements. In addition, there would have been additional ROW costs to construct a wall along the back side of the one benefitted receptor, further increasing the cost of this wall.

3. The viewpoints of the property owners and residents of the benefitted receptors do not need to be considered, because the proposed wall is not reasonable due to not meeting the cost effectiveness requirements.

A noise wall at this location would feasibly provide noise abatement. However, a preliminary determination has been made that noise abatement would not be reasonable due to not meeting the cost effectiveness requirements.

Figure 22. Abatement Area SB05



Abatement Area SB06

Single-family residential along the west side of 168th St, between H Cir and Patterson Dr

Receptors LS63, LS64, LS66 to LS68, TP01, and TP02 (7 homes), shown below in **Figure 23**, are anticipated to have a noise impact in the future year 2035 build situation. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall would have been 887 feet long, varying in height from 8 feet to 14 feet.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front row impacted receptors (6 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

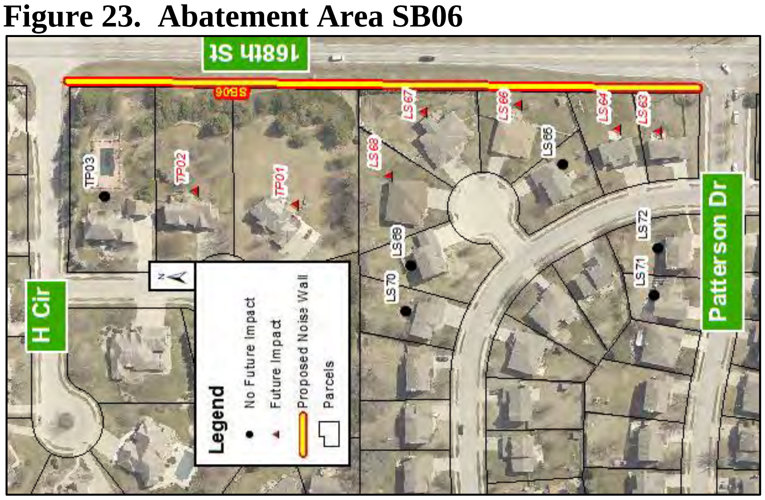
1. The proposed wall would be expected to provide a 7 dBA reduction to 3 out of the 6 benefitted front row receptors, which corresponds to 50%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is estimated at $425,207, or $53,151 per benefitted receptor (8 total, LS65 and LS68 are additional second-row benefitted receptors). Therefore, the wall does not satisfy the cost effectiveness requirements.

3. The viewpoints of the property owners and residents of the benefitted receptors do not need to be considered, because the proposed wall is not reasonable due to not meeting the cost effectiveness requirements.

A noise wall at this location would feasibly provide noise abatement. However, a preliminary determination has been made that noise abatement would not be reasonable due to not meeting the cost effectiveness requirements.

Figure 23. Abatement Area SB06



Abatement Area SB07 and SB08 (Combined)[3]

Single-family residential along the west side of 168th St, between Patterson Dr and Orchard Ave

Receptors LS06, LS13 to LS15, LS23 to LS25, LS LS49 to LS51, and LS53 to LS56 (14 homes), shown below in **Figure 24**, are anticipated to have a noise impact in the future year 2035 build situation. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall is 2,016 feet long and varies in height from 6 feet to 12 feet, as shown in **Exhibit 18**.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front row impacted receptors (14 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

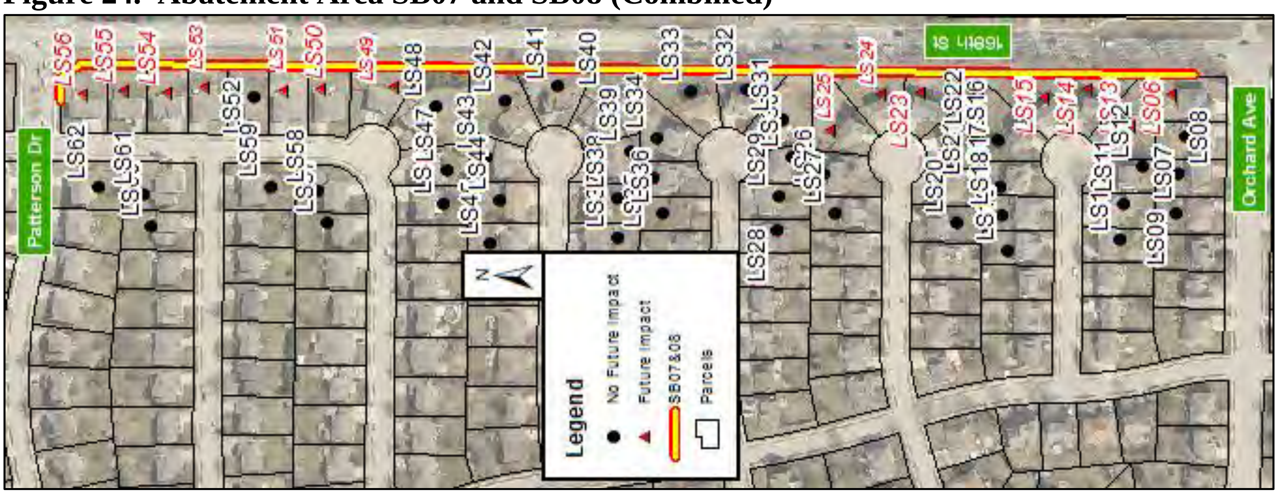
1. The proposed wall would be expected to provide a 7 dBA reduction to 10 out of the 23 benefitted front row receptors, which corresponds to 43%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is estimated at $856,946, or $37,259 per benefitted receptor (23 total). Therefore, the wall satisfies the cost effectiveness requirements.

3. The viewpoints of the property owners and residents of the benefitted receptors have been determined. Twenty-two (22) out of twenty-seven (27) voters responded (81%), with 100% of the voters in favor of the noise wall. Therefore, the wall satisfies the viewpoints requirements.

A noise wall at this location would feasibly provide noise abatement. Also, a preliminary determination has been made that noise abatement would be reasonable.

Figure 24. Abatement Area SB07 and SB08 (Combined)



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[3] Abatement Area SB07 and Abatement Area SB08 were originally evaluated as two separate abatement areas due to the stretch of non-impacted receptors between the two areas (i.e. LS31 to LS33, LS40 to LS42, and LS48); however, the City of Omaha was instructed by NDOR to combine them into one abatement area in order to have a continuous noise wall between Patterson Dr and Orchard Ave.

Abatement Area SB09

Single-family residential along the west side of 168th St, from Orchard Ave to P Street

Receptors AW04 and LS01 (2 homes), shown below in **Figure 25**, are anticipated to have a noise impact in the future year 2035 build conditions. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall is 340 feet long and 6 feet high, as shown in **Exhibit 19**. Additionally, Receptors AR02, AR03, and AR04 (3 homes) are also anticipated to have a noise impact in the future year 2035 build conditions. These receptors are discussed further in the design considerations below.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 100% of the front-row impacted receptors (2 total), which satisfies acoustic feasibility requirements.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

1. The proposed wall would be expected to provide a 7 dBA reduction to 2 out of the 3 benefitted front-row receptors, which corresponds to 67%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is $88,457 or $29,486 per benefitted receptor (3 total, AW05 should be benefitted because it is a front-row receptor). Therefore, the wall satisfies the cost effectiveness requirements.

3. The viewpoints of the property owners and residents of the benefitted receptors have been determined. Two out of four voters responded (50%), with 100% of the voters in favor of the noise wall. Therefore, the wall satisfies the viewpoints requirements.

A noise wall at this location would feasibly provide noise abatement. Also, a preliminary determination has been made that noise abatement would be reasonable.

Design Considerations

There is an existing gravity block retaining wall along the ROW line for receptors AR02, AR03, and AR04. This wall was constructed as part of the previous widening project for Q Street that included a portion of 168th Street. Two options were considered while analyzing noise abatement at these receptors.

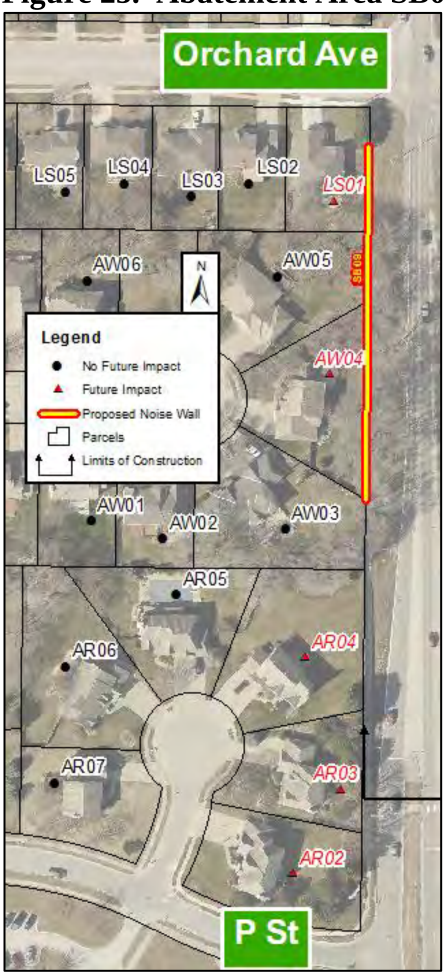
The first option consisted of removing and replacing the existing retaining wall with a combination retaining/noise wall. The total costs associated with removing the wall and replacing it with the pilaster/panel wall that would be required to facilitate the construction of the noise wall above the existing private lot ground elevation is approximately $103,500. The additional costs associated with removing and replacing the existing retaining wall would make the noise wall not reasonable since the total costs would exceed $40,000 per benefitted receptor

The next option consisted of constructing a noise wall behind the existing retaining wall. The City of Omaha determined the minimum setback for constructing a noise wall behind the existing retaining wall is eight feet from the existing retaining wall to the centerline of the noise wall. The NDOR Construction

Division was also consulted to determine the necessary setback that would provide a safe and practical location for potential noise wall construction. The setback of the noise wall would require the acquisition of ROW from the three private lots, as well as an additional five feet of permanent easement behind the wall for maintenance. The total costs associated with permanent and temporary easements and ROW acquisitions, as well as severance damages to the impacted properties is approximately $183,000. The NDOR ROW division has reviewed the costs associated with acquiring the permanent and temporary easements and ROW at this location, and found the costs to be within the normal range of costs for these acquisitions. The additional costs associated with constructing a noise wall behind the existing retaining wall would also make the noise wall not reasonable since the costs would exceed $40,000 per benefitted receptor.

Therefore, due to the costs associated with removing and replacing the existing retaining wall with a noise wall or constructing a noise wall behind the existing retaining wall, a noise wall which would still provide abatement to the impacted receptors north of the retaining wall was analyzed and chosen as the proposed noise abatement at this location. The determination of feasibleness and reasonableness above are based on this shorter wall design. Without a wall for AR02-AR04 extending across the property of AW03, there is no need for benefitting AW03. Furthermore, AW03 is not impact and does not require abatement. However, AW03 could not be benefitted without encroaching upon the existing retaining wall.

Figure 25. Abatement Area SB09



Abatement Area SB11

Multi-family residential along the west side of 168th St, between Oak Dr and Elm Plz

Receptors HL04 to HL33 (30 dwelling units), shown below in **Figure 26**, are anticipated to have a noise impact in the future year 2035 build situation. A noise wall was evaluated at this location to abate the projected impacts. The proposed wall is 432 feet long and varies in height from 11 feet to 17 feet, as shown in **Exhibit 20**.

Feasibility

A. A wall at this location would be expected to provide a 5 dBA reduction to 60% of the front row impacted receptors (18 out of 30 total), which satisfies acoustic feasibility requirements. See the Design Considerations below for more information.

B. A wall at this location would meet the engineering feasibility requirements because it could be designed to fit the existing topography, be less than 30 feet high, and could be located outside of the clear zone.

Reasonableness

1. The proposed wall would be expected to provide a 7 dBA reduction to 8 out of the 18 benefitted front row receptors, which corresponds to 44%. Therefore, the noise reduction design goal is satisfied.

2. The cost of the proposed wall is estimated at $277,487, or $15,416 per benefitted receptor (18 total). Therefore, the wall satisfies the cost effectiveness requirements.

3. The viewpoints of the property owners and residents of the benefitted receptors have been determined. Three out of seven voters responded (43%), with 100% of the voters in favor of the noise wall. Therefore, the wall satisfies the viewpoints requirements.

A noise wall at this location would feasibly provide noise abatement. Also, a preliminary determination has been made that noise abatement would be reasonable.

Design Considerations

- The Heritage at Legacy has an existing landscaping feature located at the corner of 168th Street and Oak Drive. The proposed noise wall ends just north of this feature in order to avoid direct impacts and to avoid blocking it from sight.
- There is an existing sidewalk extending from the Heritage at Legacy to the 168th Street sidewalk. Management from the Heritage at Legacy indicated that the Omaha Fire Department required this sidewalk to be built to provide access in the case of an emergency/be in compliance with fire codes. As such, the proposed noise wall was designed with a “gap” at the sidewalk location in order to maintain access.
- There is an existing Lifetime Fitness brick sign located on the Heritage at Legacy property that would be blocked from view by the proposed noise wall. Management from the Heritage at Legacy indicated that there is an existing easement for this sign. Prior to final design, the City would coordinate with Lifetime Fitness to address this issue.
- Two electrical transformer boxes are generally located along the ROW at the proposed noise wall location, and would need to be relocated.
- With the exception of HL04, all front row receptors located at ground level (lower level) are benefitted. HL04 cannot be benefitted due to the inability to extend the noise wall further south

due to an existing landscaping feature (see the Design Considerations above for more information). In addition, the majority of the receptors on the second story (main level) are also benefitted. Several third story (upper level) are also benefitted; however, the majority of the upper level impacted receptors are not able to be benefitted due to their elevation. The exception to this is at the north end of the noise wall, where four upper level receptors are benefitted.

Figure 26. Abatement Area SB11

Zorinsky Lake

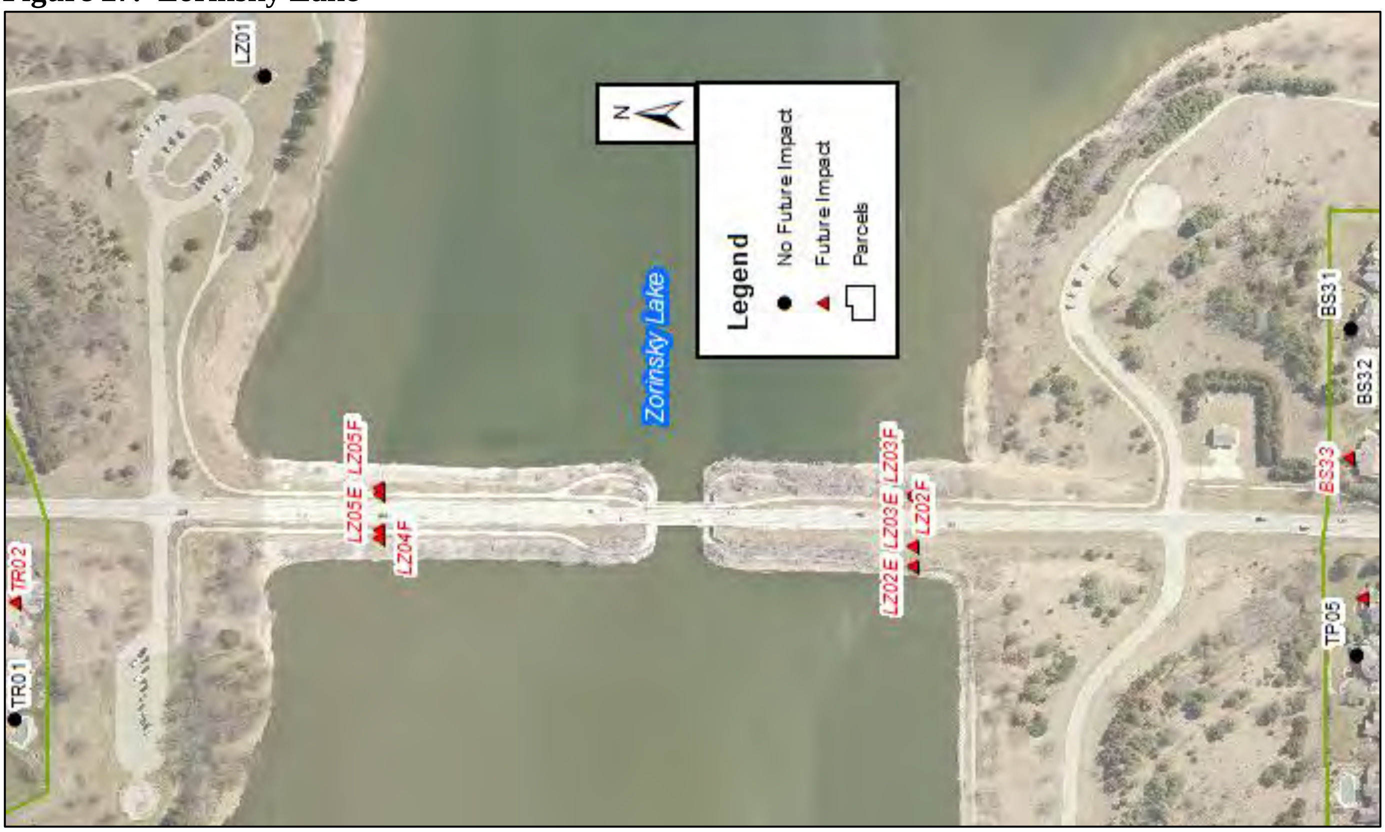
Recreational lands along the east and west sides of 168th Street, between Ontario St and H Cir

Receptors LZ02, LZ03, LZ04, and LZ05 (Zorinsky Trail), shown below in **Figure 27** are anticipated to have a noise impact in the future year 2035 build conditions; however, a noise wall was not evaluated at this location to abate the projected impacts due to the design considerations explained below.

Design Considerations

The U.S. Army Corps of Engineers, owners of Edward Zorinsky Recreation Area and Zorinsky Lake (also known as Dam Site 18), have provided notification that they would not permit a noise wall to be constructed along the trail, as it would interfere with flood control at the dam site and negatively impact recreation and aesthetics. Therefore, a wall at this location was not analyzed because it was predetermined that it would not meet the reasonableness criteria of "viewpoints of the property owners and residents of the benefitted receptors."

Figure 27. Zorinsky Lake



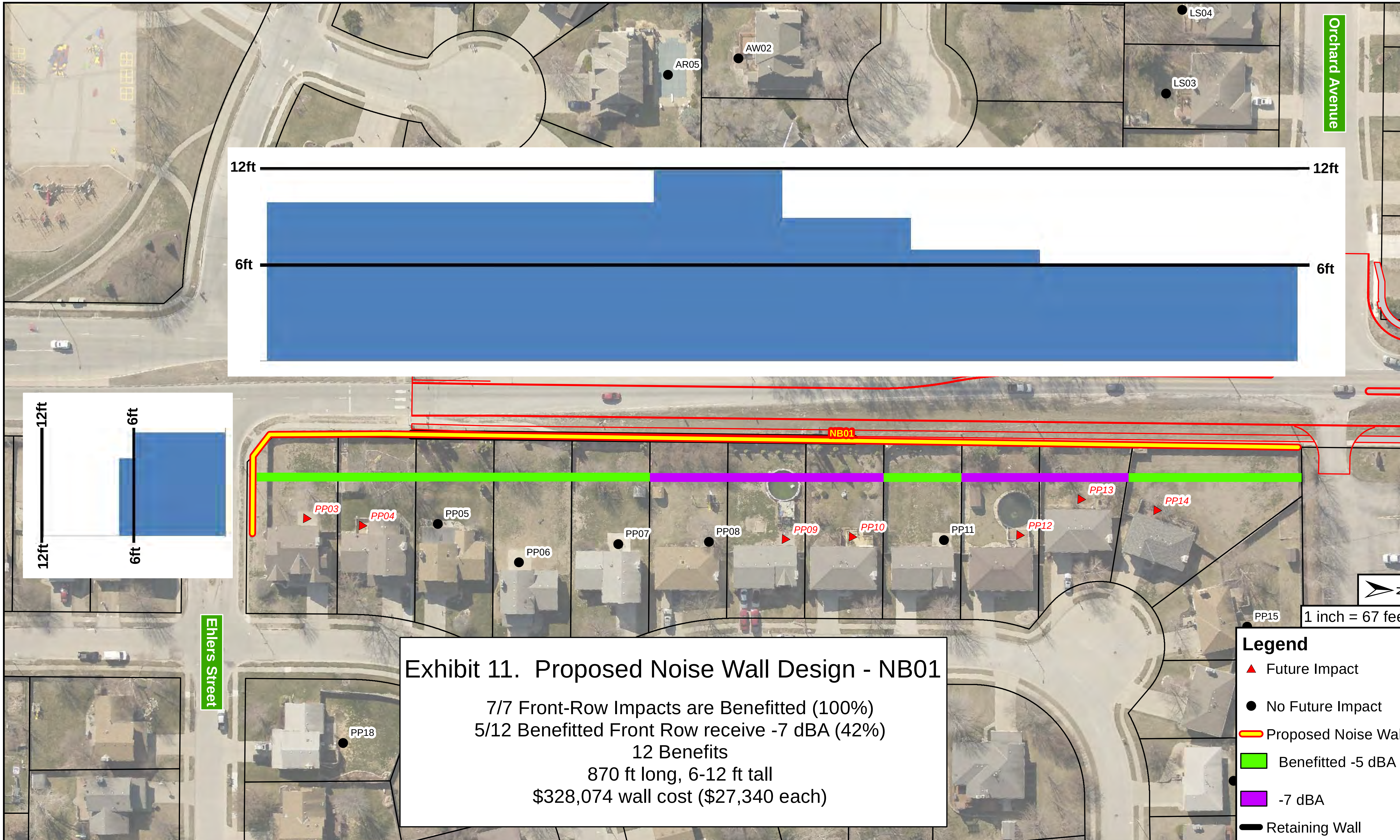


Exhibit 11. Proposed Noise Wall Design - NB01

7/7 Front-Row Impacts are Benefitted (100%)
5/12 Benefitted Front Row receive -7 dBA (42%)
12 Benefits
870 ft long, 6-12 ft tall
$328,074 wall cost ($27,340 each)

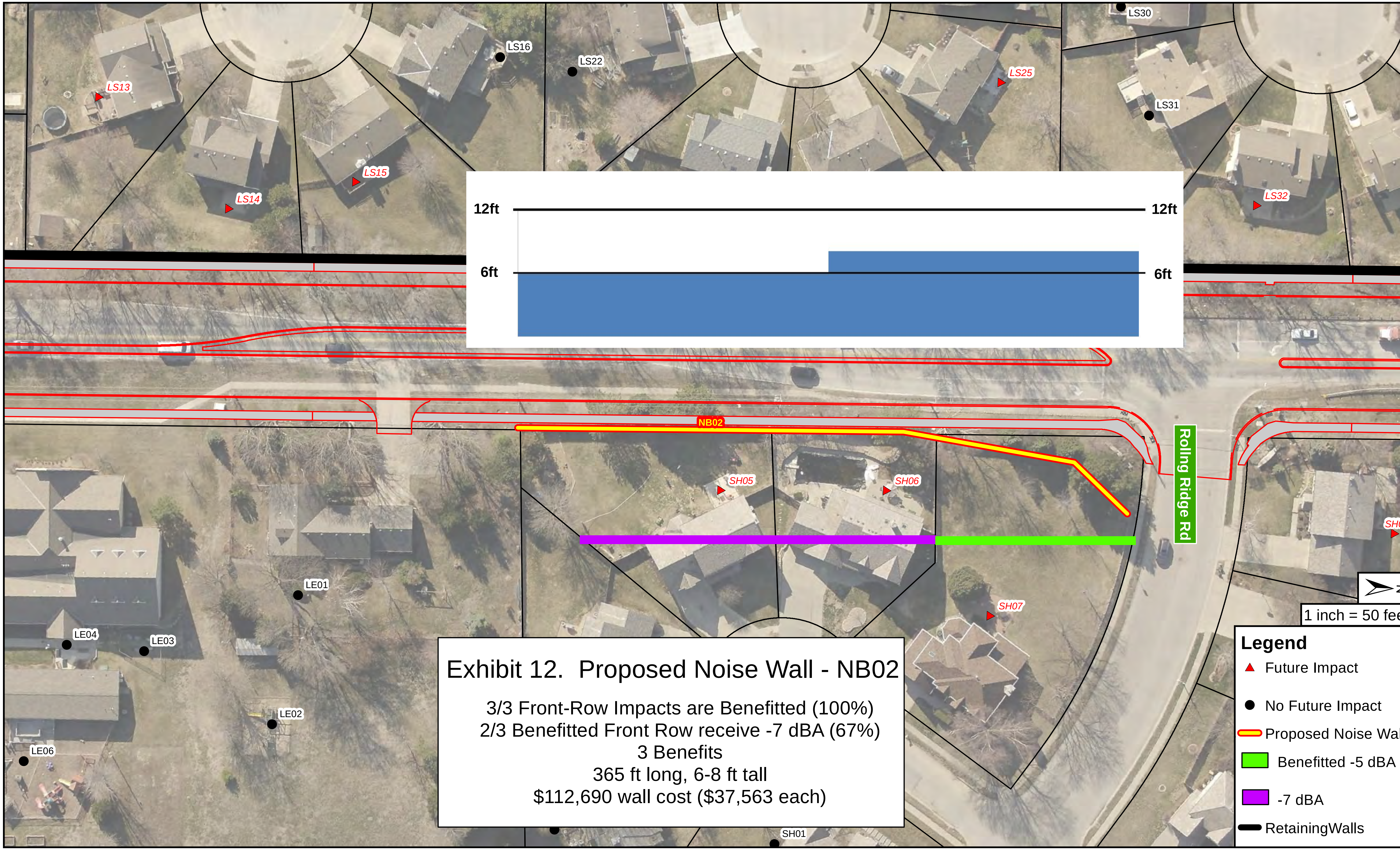


Exhibit 12. Proposed Noise Wall - NB02

3/3 Front-Row Impacts are Benefitted (100%)
2/3 Benefitted Front Row receive -7 dBA (67%)
3 Benefits
365 ft long, 6-8 ft tall
$112,690 wall cost ($37,563 each)

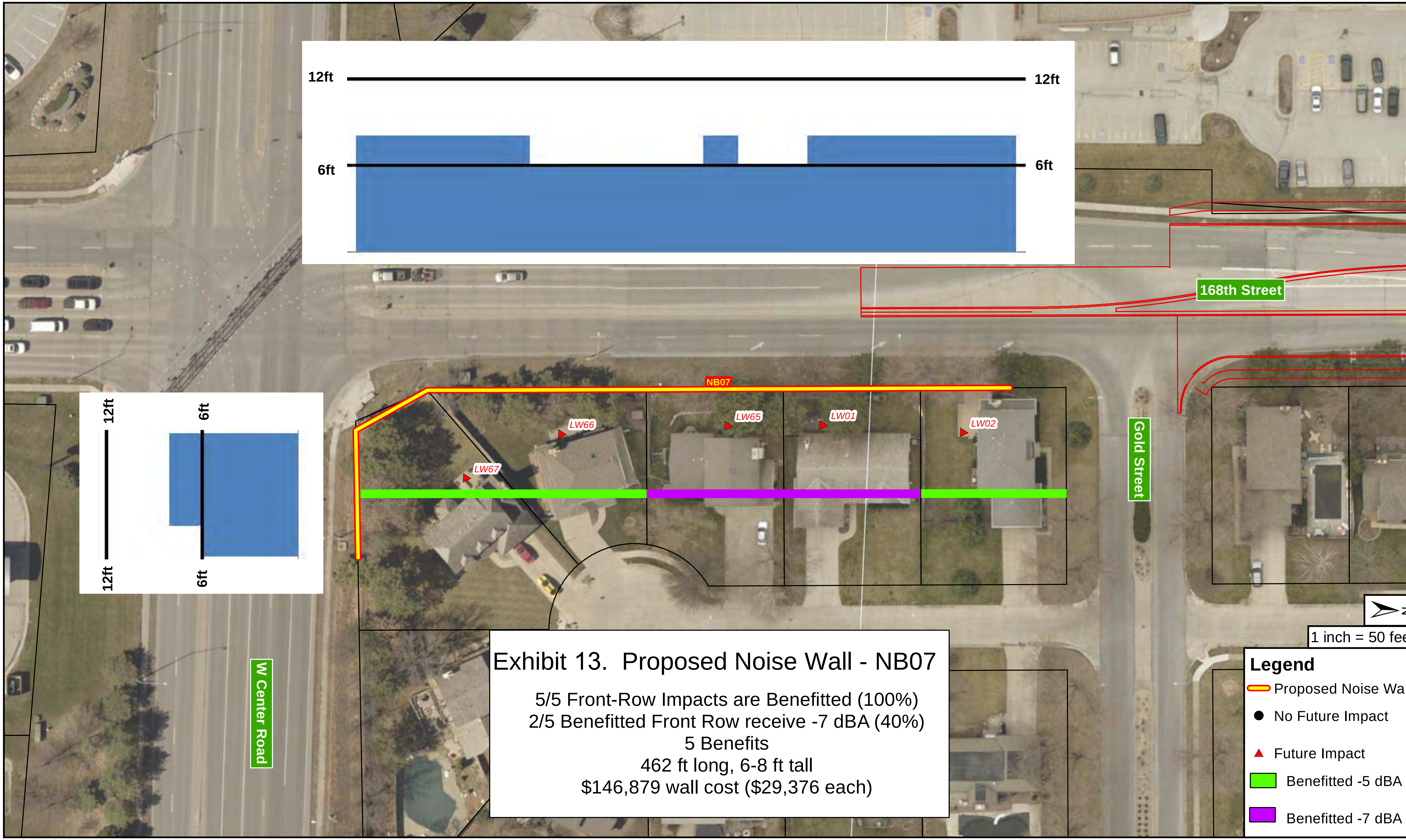
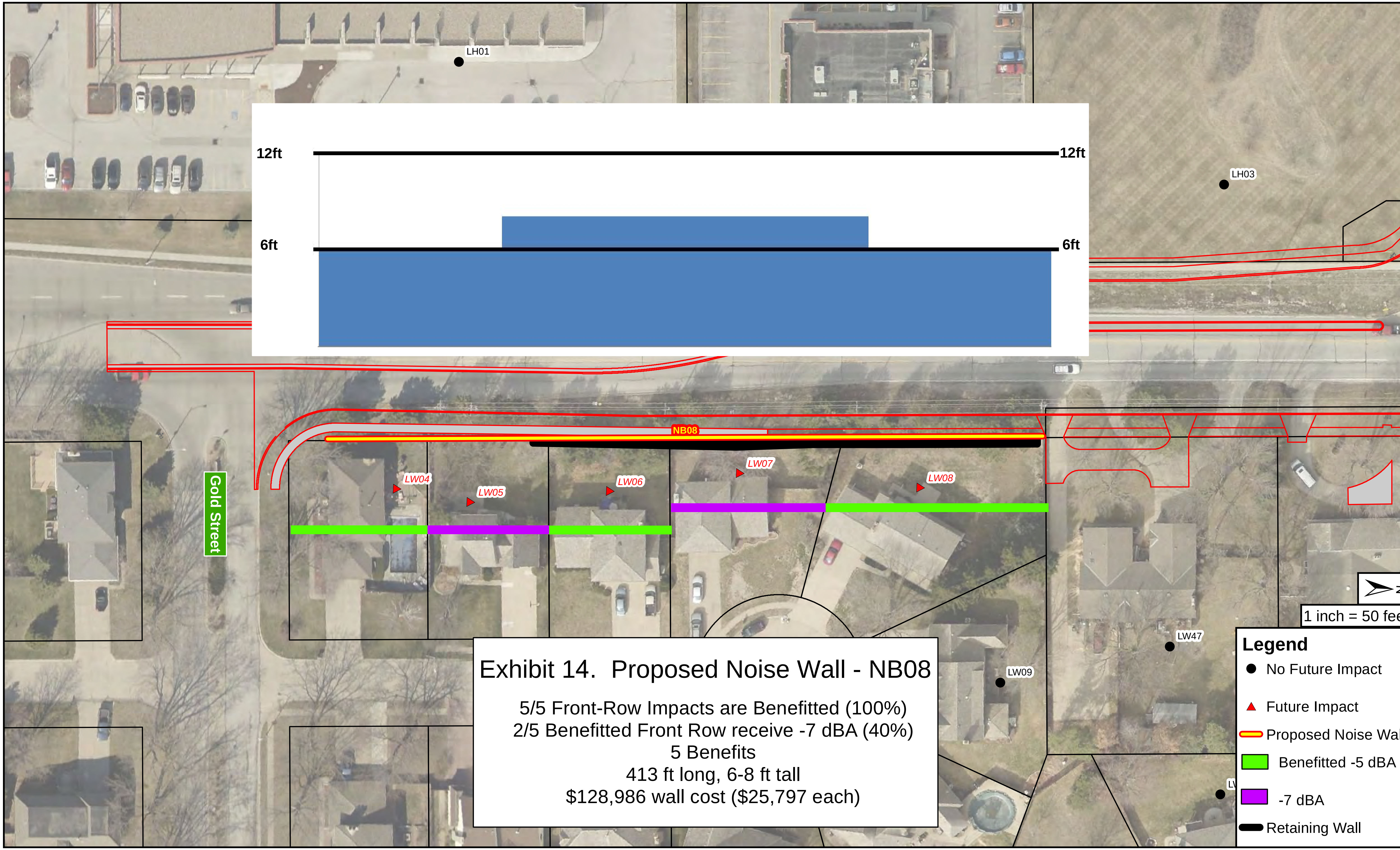


Exhibit 13. Proposed Noise Wall - NB07

5/5 Front-Row Impacts are Benefitted (100%)
2/5 Benefitted Front Row receive -7 dBA (40%)
5 Benefits
462 ft long, 6-8 ft tall
$146,879 wall cost ($29,376 each)

NIROC 2013 Aerial Imagery



LH01
LH03
12ft
12ft
6ft
6ft
NB08
Gold Street
LW04
LW05
LW06
LW07
LW08
LW09
LW47
1 inch = 50 feet
N
Exhibit 14. Proposed Noise Wall - NB08
5/5 Front-Row Impacts are Benefitted (100%)
2/5 Benefitted Front Row receive -7 dBA (40%)
5 Benefits
413 ft long, 6-8 ft tall
$128,986 wall cost ($25,797 each)
Legend
No Future Impact
Future Impact
Proposed Noise Wall
Benefitted -5 dBA
-7 dBA
Retaining Wall

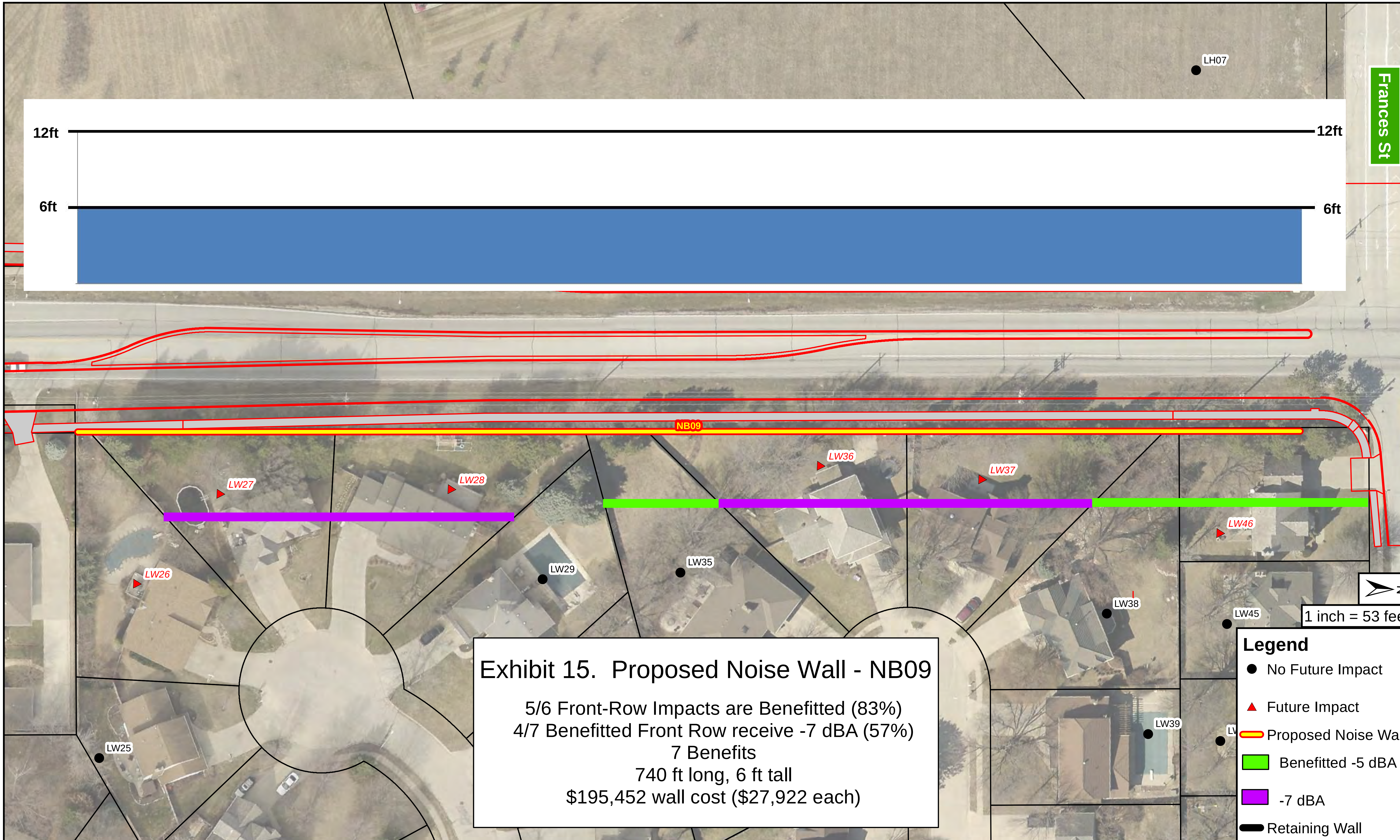


Exhibit 15. Proposed Noise Wall - NB09

5/6 Front-Row Impacts are Benefitted (83%)
4/7 Benefitted Front Row receive -7 dBA (57%)
7 Benefits
740 ft long, 6 ft tall
$195,452 wall cost ($27,922 each)

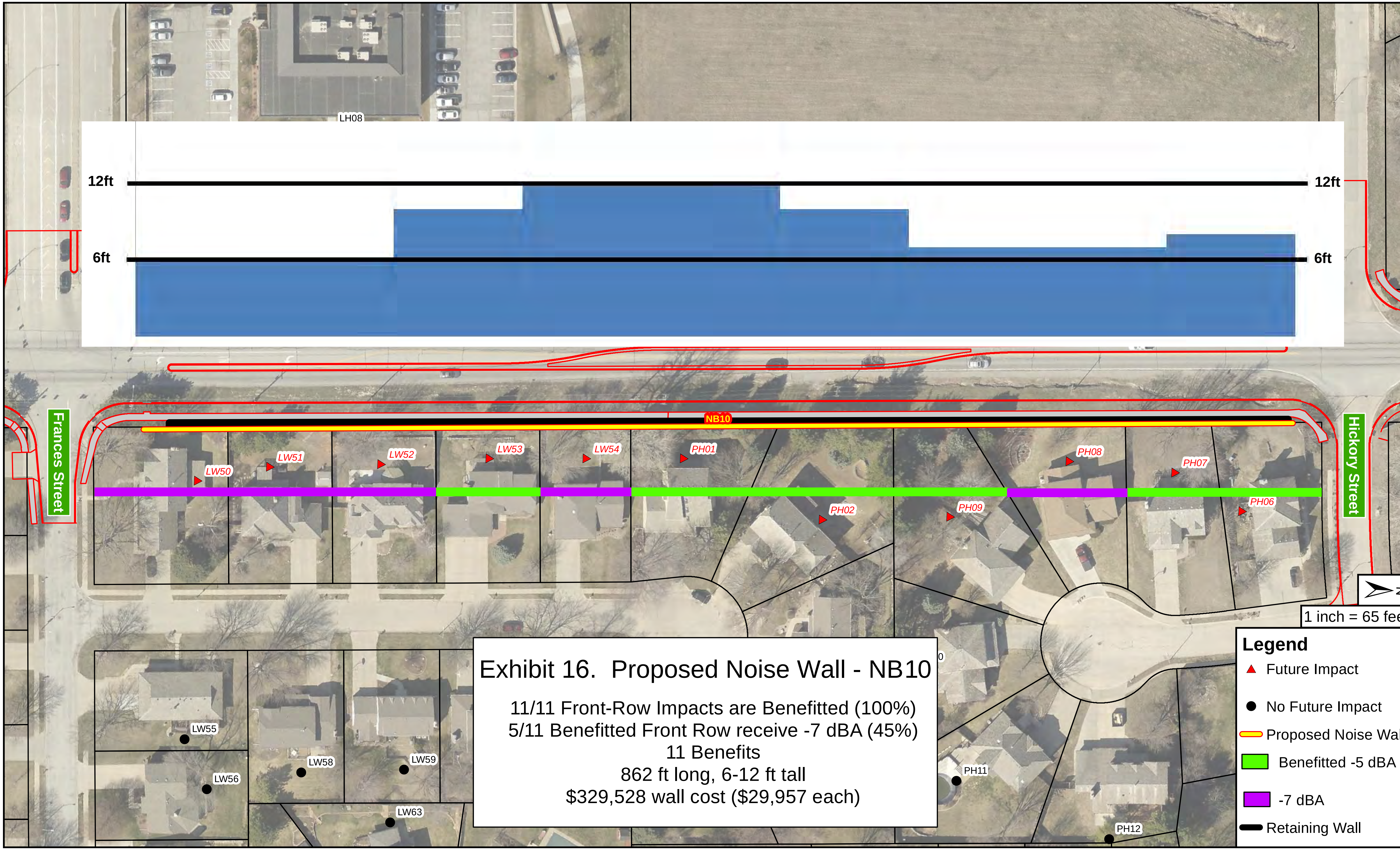


Exhibit 16. Proposed Noise Wall - NB10

11/11 Front-Row Impacts are Benefitted (100%)
5/11 Benefitted Front Row receive -7 dBA (45%)
11 Benefits
862 ft long, 6-12 ft tall
$329,528 wall cost ($29,957 each)

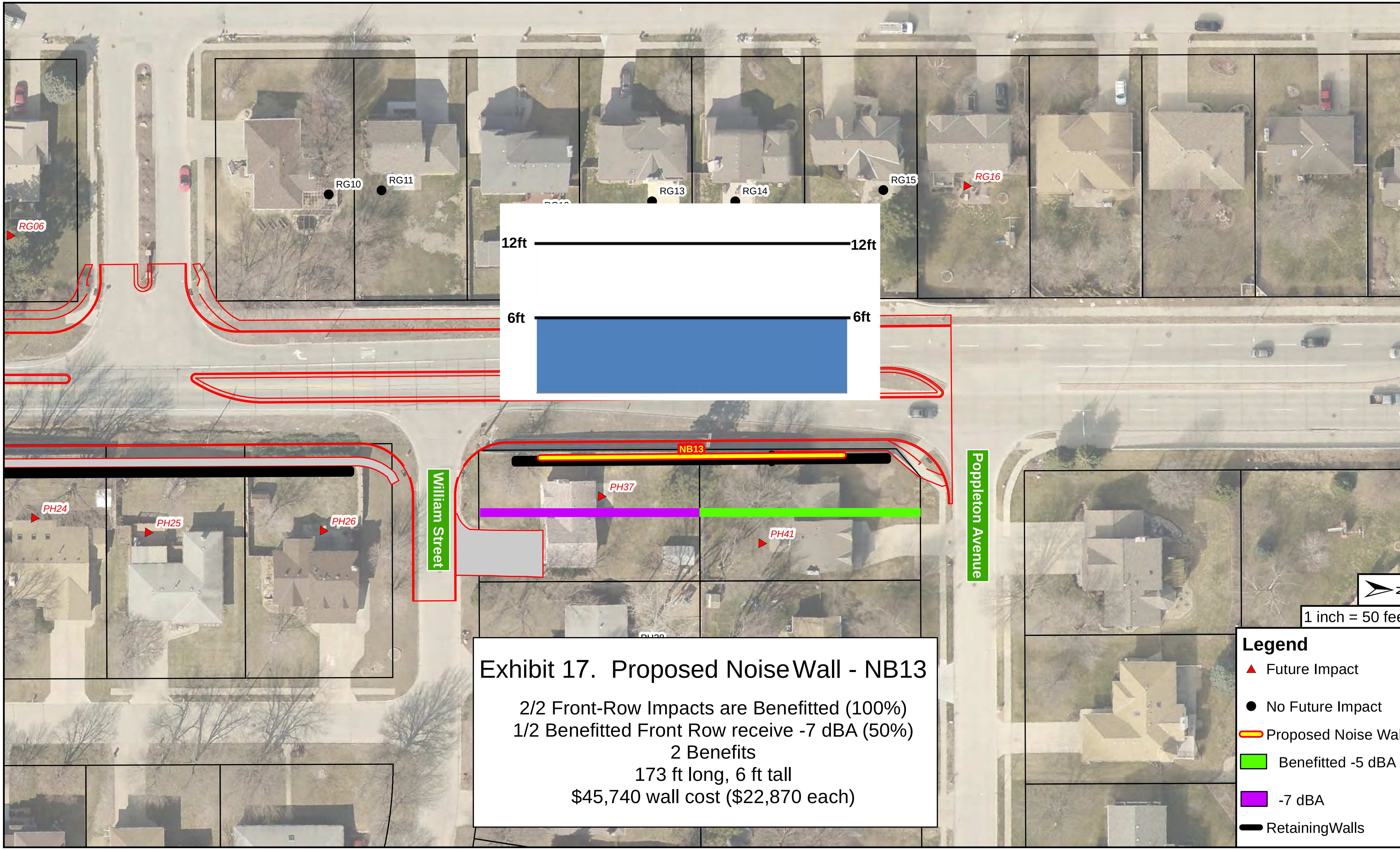


Exhibit 17. Proposed Noise Wall - NB13
2/2 Front-Row Impacts are Benefitted (100%)
1/2 Benefitted Front Row receive -7 dBA (50%)
2 Benefits
173 ft long, 6 ft tall
$45,740 wall cost ($22,870 each)
12ft
12ft
6ft
6ft
NB13
RG06
RG10
RG11
RG13
RG14
RG15
RG16
PH24
PH25
PH26
PH37
PH41
William Street
Poppleton Avenue
N
1 inch = 50 feet
Legend
Future Impact
No Future Impact
Proposed Noise Wall
Benefitted -5 dBA
-7 dBA
RetainingWalls

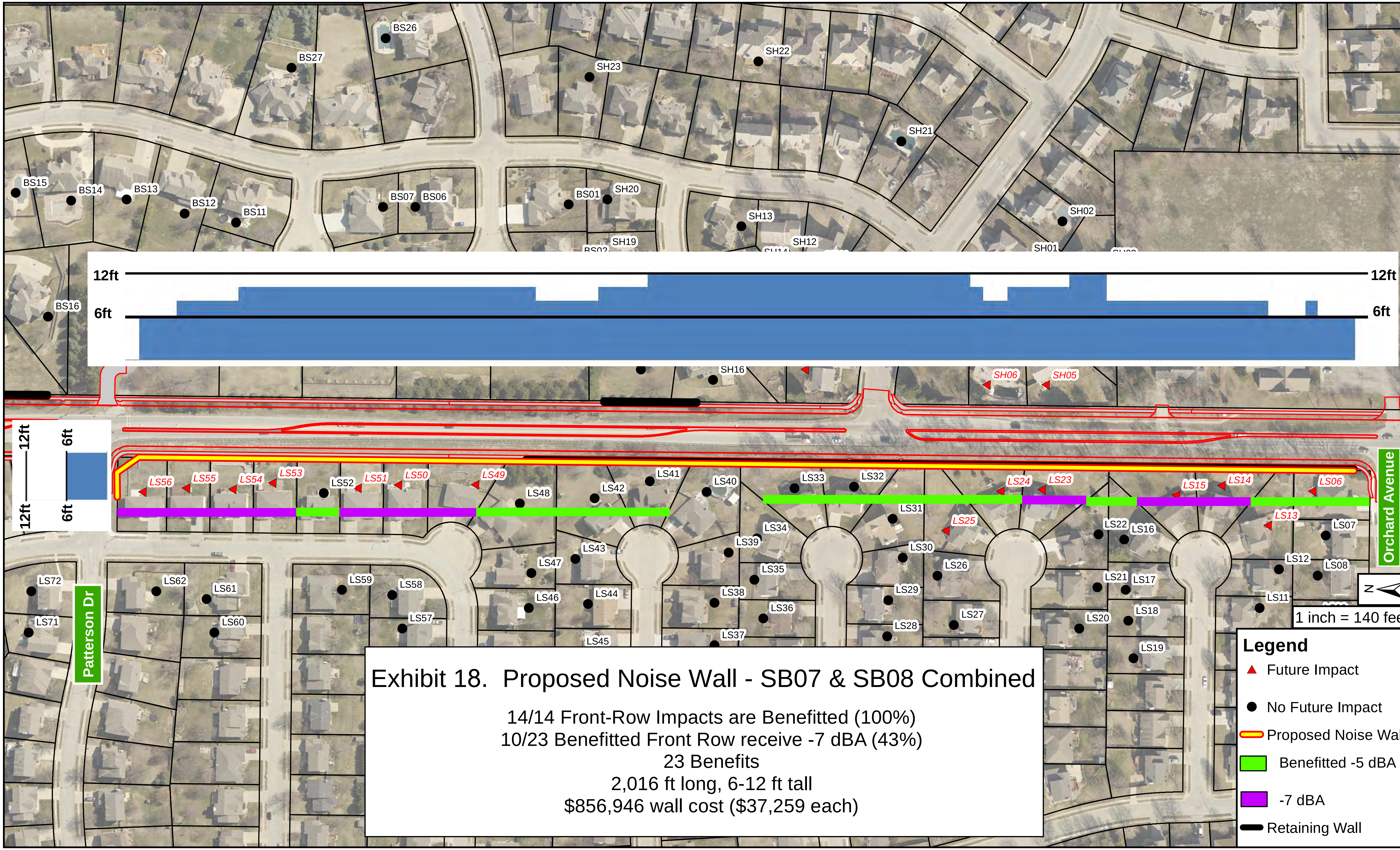


Exhibit 18. Proposed Noise Wall - SB07 & SB08 Combined
14/14 Front-Row Impacts are Benefitted (100%)
10/23 Benefitted Front Row receive -7 dBA (43%)
23 Benefits
2,016 ft long, 6-12 ft tall
$856,946 wall cost ($37,259 each)
Legend
Future Impact
No Future Impact
Proposed Noise Wall
Benefitted -5 dBA
-7 dBA
Retaining Wall
1 inch = 140 feet
12ft
6ft
Orchard Avenue
Patterson Dr

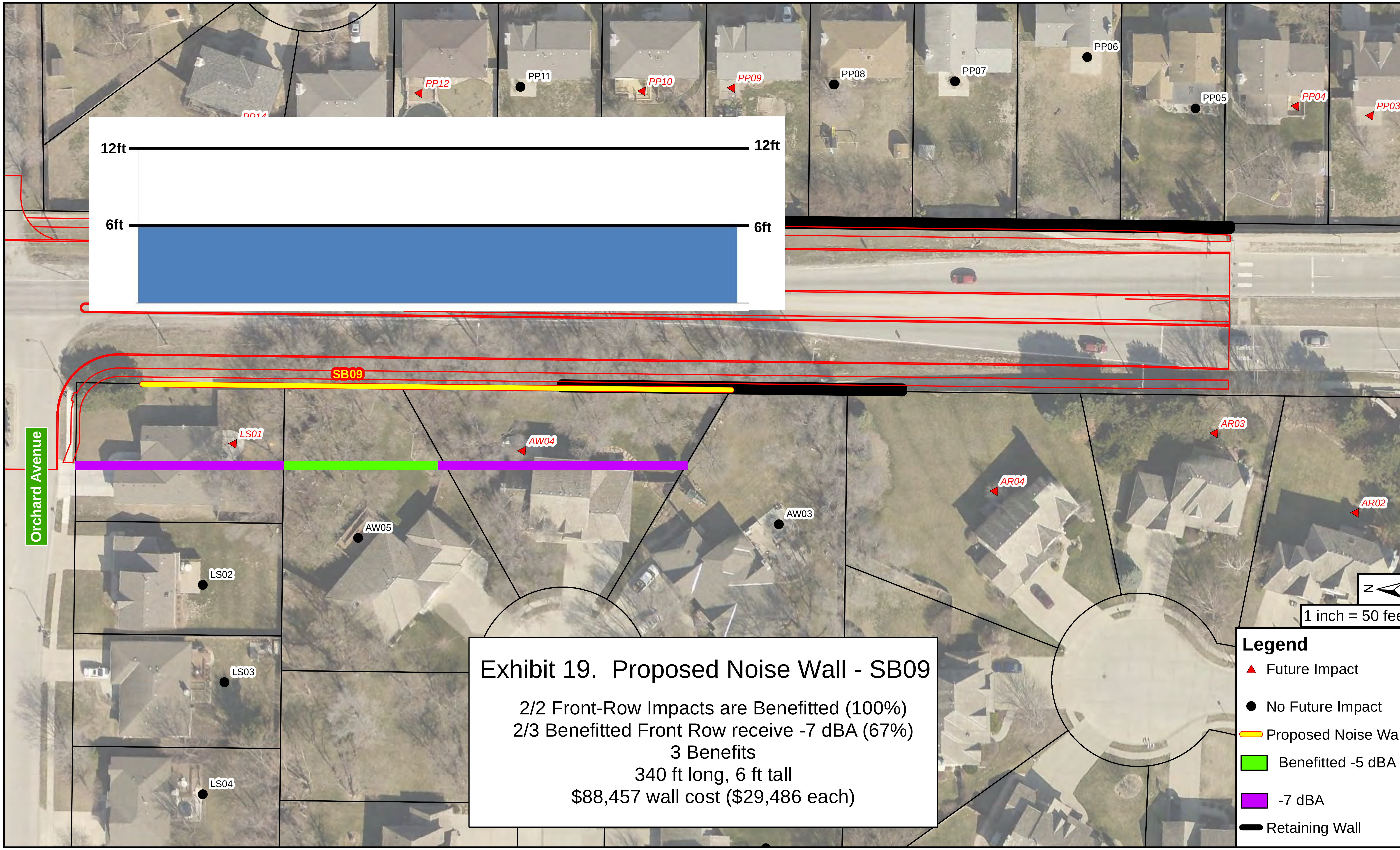


Exhibit 19. Proposed Noise Wall - SB09

2/2 Front-Row Impacts are Benefitted (100%)
2/3 Benefitted Front Row receive -7 dBA (67%)
3 Benefits
340 ft long, 6 ft tall
$88,457 wall cost ($29,486 each)

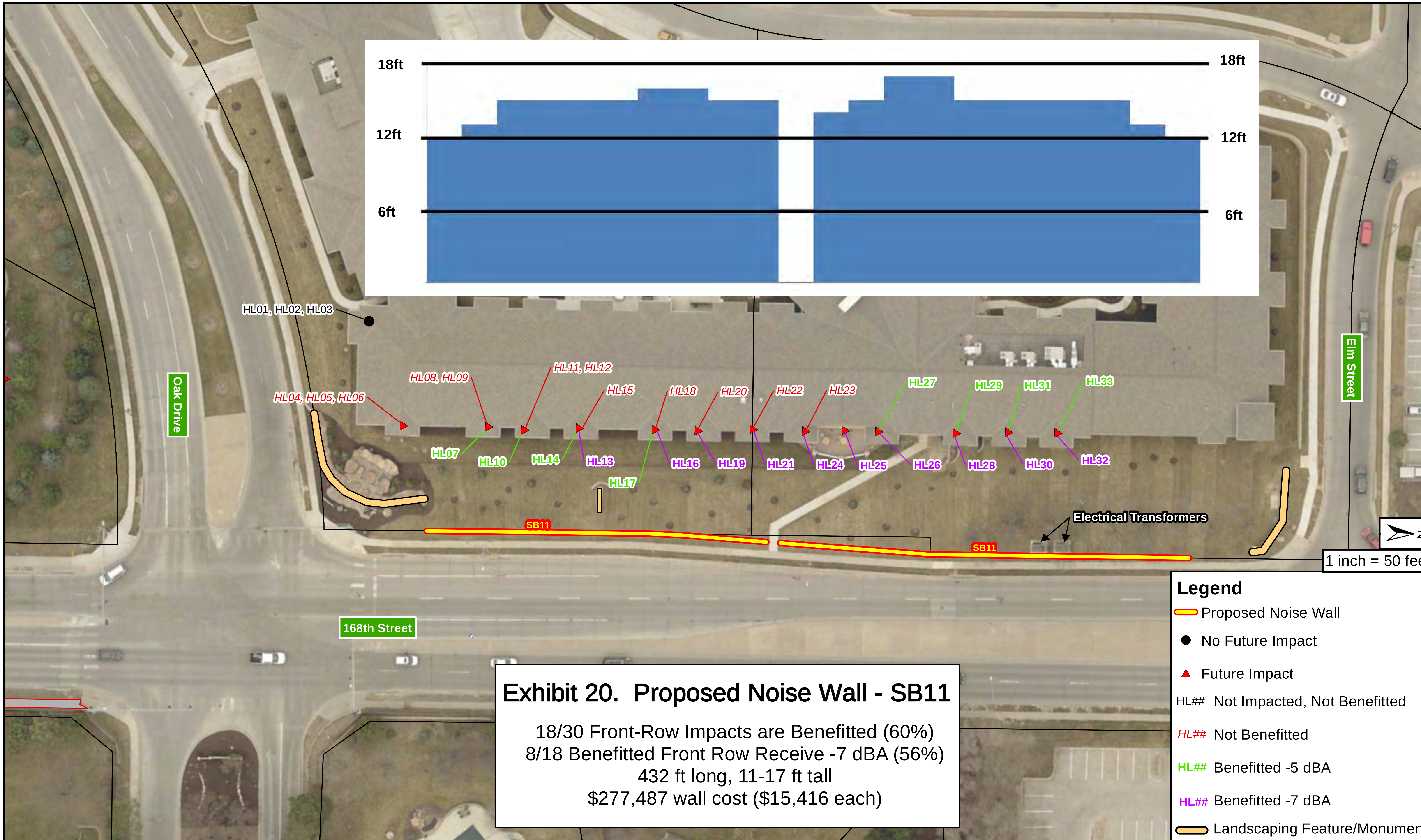


Exhibit 20. Proposed Noise Wall - SB11

18/30 Front-Row Impacts are Benefitted (60%)
8/18 Benefitted Front Row Receive -7 dBA (56%)
432 ft long, 11-17 ft tall
$277,487 wall cost ($15,416 each)

5.0 Construction Noise

The evaluation and control of construction noise must be considered as well as the traffic noise. The following sections discuss mitigation measures for construction noise.

5.1 Design Considerations

This includes measures in the plans and specifications to minimize or eliminate adverse impacts. Because the existing noise sensitive receptors are located on both sides of the roadway, nothing can be done to minimize or eliminate construction noise through changes in design.

5.2 Community Awareness

It is important for people to be made aware of the possible inconvenience and to know its approximate duration so they can plan their activities accordingly.

5.3 Source Control

This involves reducing noise impacts from construction by controlling the noise emissions at their source. This can be accomplished by specifying proper muffler systems, either as a requirement in the plans and specifications on this project or through an established local noise ordinance requiring mufflers. Contractors generally maintain proper muffler systems on their equipment to ensure efficient operation and to minimize noise for the benefit of their own personnel as well as the adjacent receptors.

5.4 Site Control

Site control involves the specification of certain areas where extra precautions should be taken to minimize construction noise. One way to reduce construction noise impact at sensitive receptors is to operate stationary equipment, such as air compressors or generators, as far away from the sensitive receptors as possible. Another method might be placing a temporary noise barrier in front of the equipment. As a general rule, good coordination between the project engineer, the contractor, and the affected receptors is less confusing, less likely to increase the cost of the project, and is a more personal approach to work out ways to minimize construction noise impacts in the more noise-sensitive areas. No specific construction-noise, site-control specifications will be included in the plans.

5.5 Time and Activity Constraints

Limiting work hours on a construction site can be beneficial during the hours of sleep or on Sundays and holidays. However, most construction activities do not occur at night and usually not on Sundays. Exceptions due to weather, schedule, and a time-related phase of construction work could occur. No specific constraints will be incorporated in the plans of this improvement. Enforcement of these constraints could be handled through a general city or county ordinance, either listing the exceptions or granting them on a case-by-case basis.

5.6 Detour Noise

A detour route is anticipated for this project. A full closure of 168th Street is planned for approximately three months between Frances Street and the east leg of Pine Street. Alternate routes would be available during this closure, as well as throughout the duration of the project for those wishing to avoid 168th Street during construction. Alternate routes would use 156th Street, 180th Street, Q Street, West Center Road, and Pacific Street. For the remainder of the project, traffic will be shifted between lanes, according to what is being constructed at the time. During construction, there will be two lanes of traffic open on 168th Street: one lane open in each direction. This study does not address alternate route noise impacts since such noise is considered short-term.

6.0 Conclusion

Four-hundred one (401) receptors were modeled in the study area representing recreational land uses, commercial land uses, a church, a daycare, and residential homes. As a result of the noise analysis of the existing roadway conditions, ninety-three (93) receptors are currently impacted by the existing road noise. As a result of the proposed widening of 168th Street (i.e. build alternative), one-hundred thirty-six (136) receptors are anticipated to have noise impacts.

Noise walls were evaluated at twenty-three (23) abatement areas to mitigate the expected noise impacts; ten (10) were found to be feasible and reasonable, for a total estimated cost of $2.9M. Detailed displays of the feasible and reasonable wall designs are shown in **Exhibit 11** through **Exhibit 20**. Of the thirteen (13) walls not found feasible and reasonable, all thirteen did not meet the reasonableness criterion: one wall (SB01) did not meet the noise reduction design goal, and the remaining twelve (12) walls did not meet the cost-effectiveness criterion. Noise walls were not analyzed through Dam Site 18 because the USACE indicated that noise walls would adversely impact the floodplain and flood protection benefits of Zorinsky Lake.

A summary of the twenty-three (23) noise walls that were evaluated are displayed in **Table 10**. If it subsequently develops during final design that the proposed conditions have substantially changed, the corresponding noise walls might need to be re-evaluated. The 10 noise walls determined to be feasible and reasonable would be constructed; however, slight wall design modifications could be necessary during the project's final design.

Table 10. Proposed Noise Wall Evaluation Summary

Area	Location		Feasibility		Reasonableness			Feasible and Reasonable
	Side of Road	Between	Acoustic[1]	Engineering[2]	Cost-effectiveness[3]	Noise Reduction Design Goal[4]	Viewpoints[5]	
NB01	**East**	**Ehlers and Orchard**	**100%**	**Yes**	**$27,340**	**42%**	**Yes**	**Yes**
NB02	**East**	**Ehlers and Rolling Ridge**	**100%**	**Yes**	**$31,753**	**100%**	**Yes**	**Yes**
NB03	East	Rolling Ridge and 167th Ave	100%	Yes	$173,466	100%	N/A	No
NB04	East	Rolling Ridge and 167th Ave	100%	Yes	$52,824	40%	N/A	No
NB05	East	167th Ave and Zorinsky Lake South Access Drive	100%	Yes	$107,242	100%	N/A	No
NB06	East	Zorinsky Lake North Access Drive and Ontario	100%	Yes	$115,442	100%	N/A	No
NB06 (A)	East	Oak and West Center	100%	Yes	$78,236	50%	N/A	No
NB07	**East**	**Gold and West Center**	**100%**	**Yes**	**$29,376**	**40%**	**Yes**	**Yes**
NB08	**East**	**Gold and Frances**	**100%**	**Yes**	**$25,797**	**40%**	**Yes**	**Yes**
NB09	**East**	**Lakeside Hills and Frances**	**83%**	**Yes**	**$27,922**	**57%**	**Yes**	**Yes**
NB10	**East**	**Frances and Hickory**	**100%**	**Yes**	**$29,957**	**45%**	**Yes**	**Yes**
NB11	East	Hickory and Pine	100%	Yes	$84,688	100%	N/A	No
NB12	East	Pine and William	100%	Yes	$45,016	50%	N/A	No
NB13	**East**	**William and Poppleton**	**100%**	**Yes**	**$22,870**	**50%**	**Yes**	**Yes**
SB01	West	Pacific and Pine	100%	Yes	N/A	0%	N/A	No
SB02	West	Pine and Shirley	100%	Yes	$63,893	40%	N/A	No
SB03	West	Oak and Ontario	100%	Yes	$63,950	44%	N/A	No
SB04	West	Ontario and Zorinsky Lake North Access Drive	100%	Yes	$119,572	50%	N/A	No
SB05	West	Zorinsky Lake South Access Drive and H Cir	100%	Yes	$184,503	100%	N/A	No
SB06	West	H Cir and Patterson	100%	Yes	$53,151	50%	N/A	No
SB07 and SB08	**West**	**Patterson and Orchard**	**100%**	**Yes**	**$37,259**	**40%**	**Yes**	**Yes**
SB09	**West**	**Orchard and P**	**100%**	**Yes**	**$29,486**	**67%**	**Yes**	**Yes**
SB11	**West**	**Elm and Oak**	**60%**	**Yes**	**$15,416**	**44%**	**Yes**	**Yes**

1 – 60% minimum for acoustic feasibility
2 – "Engineering feasibility" encompasses topographic limitations and potential impacts to drainage, utilities, and safety (e.g., intersection sight distance)
3 – $40,000 maximum for cost effectiveness
4 – 40% minimum for noise reduction design goal
5 – "Viewpoints" consists of the voting outcomes by benefitted property owners and residents. Noise abatement is provided if at least 75% of the points from returned ballots are in favor of a proposed noise barrier.

7.0 References

- American Association of State Highway and Transportation Officials, *Guide on Evaluation and Attenuation of Traffic Noise.*

- FHWA, *Living with Noise* by Chris Corbisier. Printed in *Public Roads* Magazine, July/August 2003, Vol. 67, No. 1. http://www.fhwa.dot.gov/publications/research/.../pavements/.../publicroads/03jul/06alttext.cfm.

- FHWA, *Noise Barrier Inventory Summary*. http://www.fhwa.dot.gov/environment/noise/noise_barriers/inventory/summary/sstates7.cfm.

- FHWA, *Special Report – Highway Construction Noise: Measurement, Prediction and Mitigation*. http://www.fhwa.dot.gov/environment/noise/construction_noise/special_report/.

- FHWA, *FHWA-PD-96-010 FHWA Highway Traffic Noise Model (FHWA TNM®) Technical Manual.*

- Nebraska Department of Roads, *Noise Analysis and Abatement Policy*. July 13, 2011, as amended.

- Title 23, Article 772, U.S. Code of Federal Regulations (23 CFR Part 772).

STATE OF NEBRASKA
DEPT. OF ROADS
APPROVED: Will [signature]

DATE: 8/29/14

Technical Memorandum

TO:	Jon Meyer (City of Omaha)
FROM:	Benesch
SUBJECT:	Traffic Volume Update for 168th Street – Poppleton to Ehlers
	STPC-3811(1), CN 22209 and STPC-3811(2), CN 22210
DATE:	August 13, 2014

This memo details the update of the traffic volumes on 168th Street and the comparison to the previous volumes used for the noise analysis.

1.0 Traffic Counts

The City conducted intersection turning movement counts (TMC) at the study intersections on various typical weekdays in February, March, and April 2014. The City did not complete new traffic counts at the intersections with no proposed improvements as part of this project (Pacific, Poppleton, P Street/Ehlers, and Q Street). The 5:00 PM hour was used for analysis, as it was in the noise analysis.

Using a 12% K-factor, the 2011 and 2014 average daily traffic volumes (ADT) are estimated as shown in **Table 1**. Compared to the 2011 turning movement volumes (in the Noise Report as Table 3), the 2014 volumes are slightly higher.

Table 1. Existing ADT Comparison (calculated from TMC)

Location	2011	2014
168th St, north of Pine St	18,600	20,400
168th St, north of W. Center Rd	17,800	22,200
168th St, south of W. Center Rd	18,200	22,900
168th St, south of Orchard St	15,300	15,400

2.0 Traffic Projections

MAPA provided the previous 2035 traffic volume projections that were used in the noise analysis. In spring 2014, MAPA released the latest update to its travel demand model (TDM) that includes the 2040 traffic forecast. The 2040 projections are generally lower than the 2035 projections, which are shown in **Table 2**, along with the 2010 ADT that was used in MAPA's base model.

The differences between the 2035 and 2040 traffic projections may arise from several factors. One of these factors is MAPA's use of a new software package (CommunityViz) for the land planning aspect of the TDM inputs, which relies on more accurate land use data than MAPA's previous land use model, and therefore produces more accurate traffic projections. It should be noted however, that the actual travel demand modelling software itself remains the same (TransCAD). Additionally, the roadway network in the 2040 TDM was updated to reflect the current MAPA Transportation Plan, which (among many other improvements) reflects several improvements to 180th Street in Sarpy County; these improvements include a new interchange with Interstate 80, paving 180th Street from Harrison Street to Buffalo Road, located south of the interstate, The improvements also include constructing a new bridge over the South Papillion Creek and BNSF railroad tracks north of Giles Road. The new connectivity in the 2040 model appears to shift some commuter traffic from 168th Street to 180th Street.

Table 2. MAPA TDM ADT Projection Comparison (post-processed volumes)

Location	2010 (base model)	2035 (projection)	2040 (projection)
168th St, north of Pine St	24,500	36,000	33,000
168th St, north of W. Center Rd	20,000	38,000	27,000
168th St, south of W. Center Rd	18,500	30,000	26,000
168th St, south of Orchard St	18,500	27,000	26,000

3.0 Future Traffic Volumes

Based on MAPA's 2010 and 2035 volumes, the noise analysis used a growth rate of 2.0% per year, compounded annually. This growth rate was applied to the 2011 TMCs to calculate the 2035 future turning movement volumes for the noise analysis. Converting the 2035 future turning movement volumes to ADT using a 12% K-factor gives the 2035 ADT shown in **Table 3**, along with the 2011 ADT calculated from the TMCs.

Table 3. Year 2011 and 2035 ADT Comparison (calculated from peak hour volume)

Location	2011	2035	Annual Growth
168th St, north of Pine St	18,600	30,000	2.0%
168th St, north of W. Center Rd	17,800	28,700	2.0%
168th St, south of W. Center Rd	18,200	29,300	2.0%
168th St, south of Orchard St	15,300	24,600	2.0%

However, when comparing MAPA's 2010 volumes to the newly-modelled 2040 volumes, the growth rate is closer to 1.0% per year, compounded annually. As a result, a growth rate of 1.0% per year was applied to the 2014 TMCs to calculate the 2040 future turning movement volumes. Converting the 2040 future turning movement volumes to ADT using a 12% K-factor gives the 2040 ADT shown in **Table 4**, along with the 2014 ADT calculated from the TMCs.

Table 4. Year 2014 and 2040 ADT Comparison (calculated from peak hour volume)

Location	2014	2040	Annual Growth
168th St, north of Pine St	20,400	26,400	1.0%
168th St, north of W. Center Rd	22,200	28,700	1.0%
168th St, south of W. Center Rd	22,900	29,700	1.0%
168th St, south of Orchard St	15,400	20,000	1.0%

4.0 Conclusions

The 2035 ADT projections were compared to the 2040 ADT projections, and are shown in **Table 5**.

Table 5. Year 2035 and 2040 ADT Comparison (calculated from peak hour volume)

Location	2035	2040	Difference[1]	Percent Change[2]
168th St, north of Pine St	30,000	26,400	-3,600	-12.0%
168th St, north of W. Center Rd	28,700	28,700	0	0.0%
168th St, south of W. Center Rd	29,300	29,700	+400	+1.4%
168th St, south of Orchard St	24,600	20,000	-4,600	-18.7%

1 – Difference = 2040-2035
2 – Percent Change = (2040-2035)/2035

When considering the effects on traffic noise resulting from an increase or decrease in traffic volumes, a doubling (+100% change) or halving (-50% change) is required to produce a ±3 dBA difference, which is the minimum perceptible difference to human ears. Comparing the 2035 ADT projections to the 2040 ADT projections, the maximum percent change is approximately 19%. This amount of change is less than the 25% change stipulated by NDOR for a re-evaluation of noise impacts, and would therefore, not significantly change the findings of the noise analysis. As a result, the current findings of the noise analysis should be considered valid.

APPENDIX H

HAZARDOUS MATERIALS TECHNICAL REVIEW

168th Street Improvements
Hazardous Materials Technical Review

168th Street from Poppleton Avenue to Ehlers Street
Omaha, Douglas County, Nebraska
NDOR Project Numbers: STPC-3811(1) CN 22209
& STPC-3811(2) CN 22210

Benesch Project No. 72470186.01

STATE OF NEBRASKA
DEPT. OF ROADS
APPROVED:

DATE: 8/16/13

PREPARED FOR:
City of Omaha

August 2013

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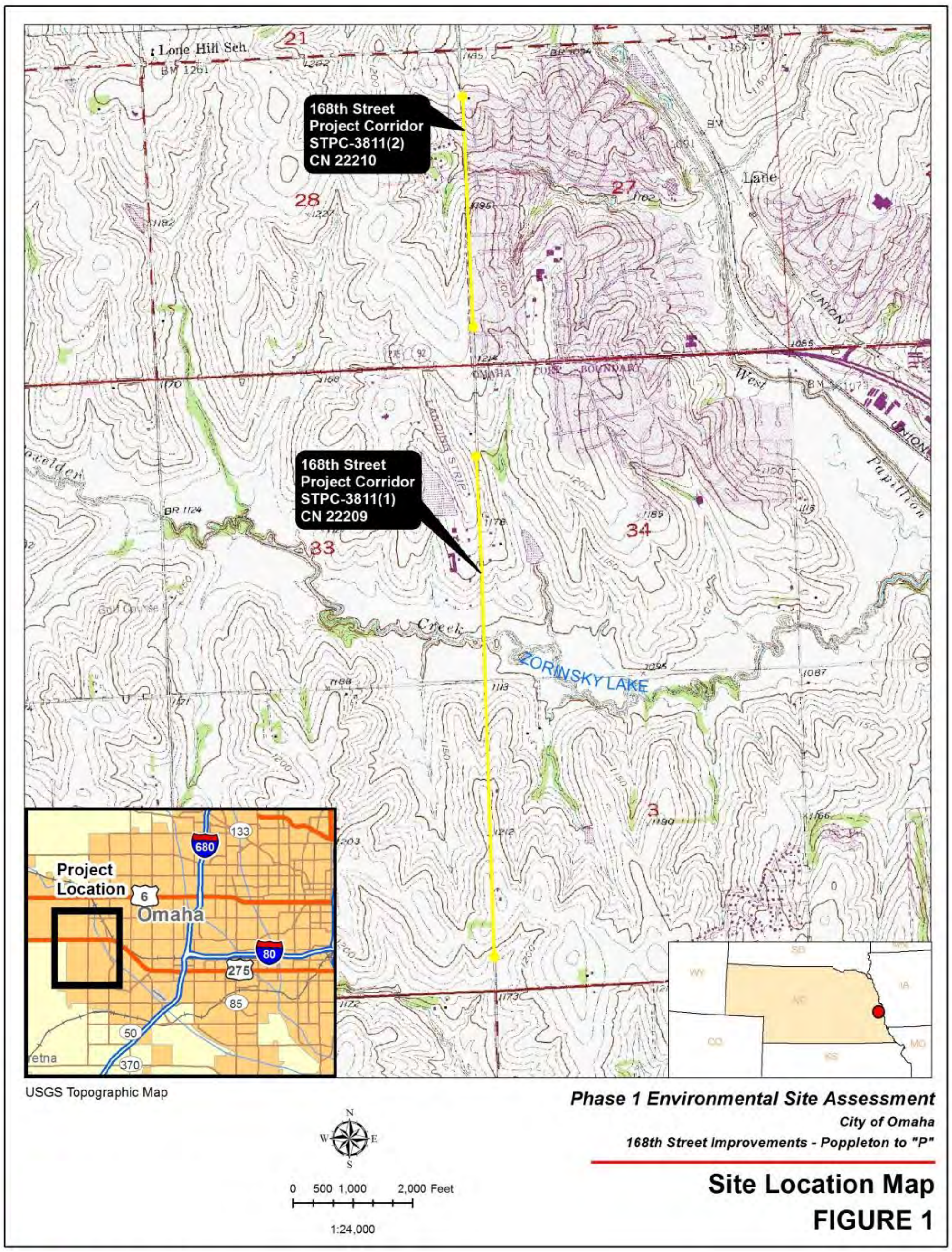
1.0 Project Location

The 168th Street Improvements Project generally extends from the intersection of 168th Street and Poppleton Avenue, to the intersection of 168th and Ehlers Streets in Omaha, NE (project corridor). The project corridor is approximately 2.7 miles long, and is located in portions of Sections 3 and 4, Township 14 North, Range 11 East and Sections 27, 28, 33, and 34, Township 15 North, Range 11 East, Douglas County, Nebraska. The project corridor is depicted on **Figure 1 – Site Location Map** provided below.



1.1 Project Description

The 168th Street Improvements Project consists of widening 168th Street from a two lane roadway to a four-lane divided roadway with auxiliary lanes and sidewalks where appropriate, and widening or replacing the existing bridge spanning Lake Zorinsky. The roadway improvements to 168th Street will occur from Poppleton Avenue to Gold Street (STPC-3811(2) CN 22210) and from Oak Street to Ehlers Street (STPC-3811(1) CN 22209). The segment of 168th Street from Gold Street to Oak Street (approximately 0.4 miles) was previously widened, and there are no plans to improve this segment as part of the proposed project.

1.2 Hazardous Materials Technical Review Scope

Due to federal funding being provided for the 168th Street Improvement Project, the Nebraska Department of Roads (NDOR) requires a review of potential hazardous materials to address worker safety, reduce liability, and to address various federal regulations covered by the National Environmental Policy Act (NEPA). Therefore, Alfred Benesch & Company (Benesch) has prepared this Hazardous Materials Technical Review (HMTR) following guidelines provided by NDOR and standard industry practices. Furthermore, a Phase I Environmental Site Assessment (ESA) was prepared for the project corridor in 2011, in compliance with guidelines from the American Society of Testing and Materials (ASTM) Standard Practice E 1527-05 (Standard Practice for Environmental Site Assessments), which included the following:

- Retaining a commercial database service to obtain information regarding reported releases of hazardous substances and petroleum products on or near the project corridor.
- Searching the Nebraska Department of Environmental Quality (NDEQ) hazardous substances and petroleum products databases, Surface Spill List, Leaking Underground Storage Tank (LUST) list, and other NDEQ environmental records for identified sites of concern located on or near the 168th Street project corridor.
- Conducting site reconnaissance of parcels located along the project corridor for indications of environmental risk.
- Conducting historical research for the area of the project corridor including obtaining and reviewing historic aerial photographs, USGS topographic maps, city directories, and fire insurance maps.
- Inquiring about the location of historic landfills, if any, in the area of the project corridor.
- Contacting the Douglas County Health Department for information regarding septic systems and drinking water wells along the project corridor.
- Obtaining environmental records from the Nebraska State Fire Marshal regarding the project corridor and adjacent properties.

The results of the database and regulatory records review, site reconnaissance, and historical research information from the Phase I ESA prepared by Benesch in 2011 are provided in this HMTR. The complete Phase I ESA for the 168th Street Improvements Project is available in the project file, and is attached to this HMTR by reference.

In addition, due to the widening or removal of the bridge over Lake Zorinsky, a lead and asbestos review was conducted by Cardno/ATC in 2013, the results of which are available in the project file. The review found that there was no suspected lead or asbestos containing material, and that no further testing was required.

1.3 Environmental Risk Overview

Environmental risk sites are those facilities and locations where hazardous substances and petroleum products are currently or were historically stored, used, or transported. In such areas hazardous substances and petroleum products could be released into the environment and contaminate media (i.e. surface soils, subsurface soils, groundwater, and/or surface water) which are located within the 168th Street project corridor. Potential contaminated media within the project corridor could then adversely impact workplace health and safety during construction activities and raise liability issues regarding right-of-way acquisition.

In general accordance with ASTM Standard Practice E 1527-05, the purpose of assessing potential environmental risk along the 168th Street project corridor is to identify, to the extent feasible, *recognized environmental conditions* in connection with the proposed roadway project corridor. The term *recognized environmental condition* shall mean the presence or likely presence of any hazardous substances or petroleum products on the 168th Street project corridor under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures in the immediate area of the project corridor; or into the ground, groundwater, or surface water in the immediate area of the project corridor. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally would not be subject to an enforcement action if brought to the attention of the appropriate governmental agencies.

This HMTR addresses certain physical characteristics of the 168th Street project corridor with regard to the release or presence of petroleum products or hazardous substances. It is not intended to warrant or otherwise imply that the project corridor is or is not free from conditions, materials, or substances, which could adversely impact the environment or pose a threat to public health and safety. In the course of this assessment, Benesch has relied on information from outside parties, such as regulatory agencies and interview sources. Benesch has made no independent investigation as to the validity, completeness or accuracy of such information provided by third parties. Benesch does not expressly provide or imply any warranty regarding information that was provided by third party sources. Performance of this environmental risk assessment is intended to reduce, but not eliminate, uncertainty regarding the potential for *recognized environmental conditions* in connection with the 168th Street project corridor. The findings in this HMTR reflect Benesch employees' best judgment in light of information that was readily available at the time of report preparation.

1.4 Summary of Phase I Environmental Site Assessment

Site Reconnaissance

The 168th Street project corridor extends approximately 2.7 miles from Poppleton Avenue (two blocks south of Pacific Street) south to 'P' Street (one block north of 'Q' Street) in Omaha, Douglas County, Nebraska. The project corridor is characterized by residential, recreational and commercial use. Site reconnaissance conducted for the Phase I ESA in 2011 revealed no evidence of *recognized environmental conditions* in connection with the 168th Street Improvements Project. Subsequent site reconnaissance in 2013 indicates that the land uses along the project corridor have not changed since the completion of the Phase I ESA.

Regulatory Records Review

Based on distance, topography, estimated groundwater gradient, and/or current regulatory status, none of the sites listed in the federal or state agency databases appear to represent *recognized environmental conditions* for the 168th Street Improvements project at this time.

Benesch obtained Nebraska Department of Environmental Quality (NDEQ) and Nebraska State Fire Marshal (SFM) file and database information for review in preparation of the ESA report (see **Phase I ESA**). The review of NDEQ and SFM file and database information revealed no evidence of *recognized environmental conditions* in connection with the 168th Street Improvements Project.

Interviews

Relevant interview information has been incorporated into the appropriate sections of the Phase I ESA report and copies of the User Questionnaires are provided in the report (see **Phase I ESA**).

Historical Summary

The 168th Street project corridor has been characterized by residential, recreational, and commercial use since circa 1990. Prior to the 1980s, the project corridor was the location of undeveloped cropland and some farmsteads. The historic uses of the project corridor do not represent any *recognized environmental conditions*.

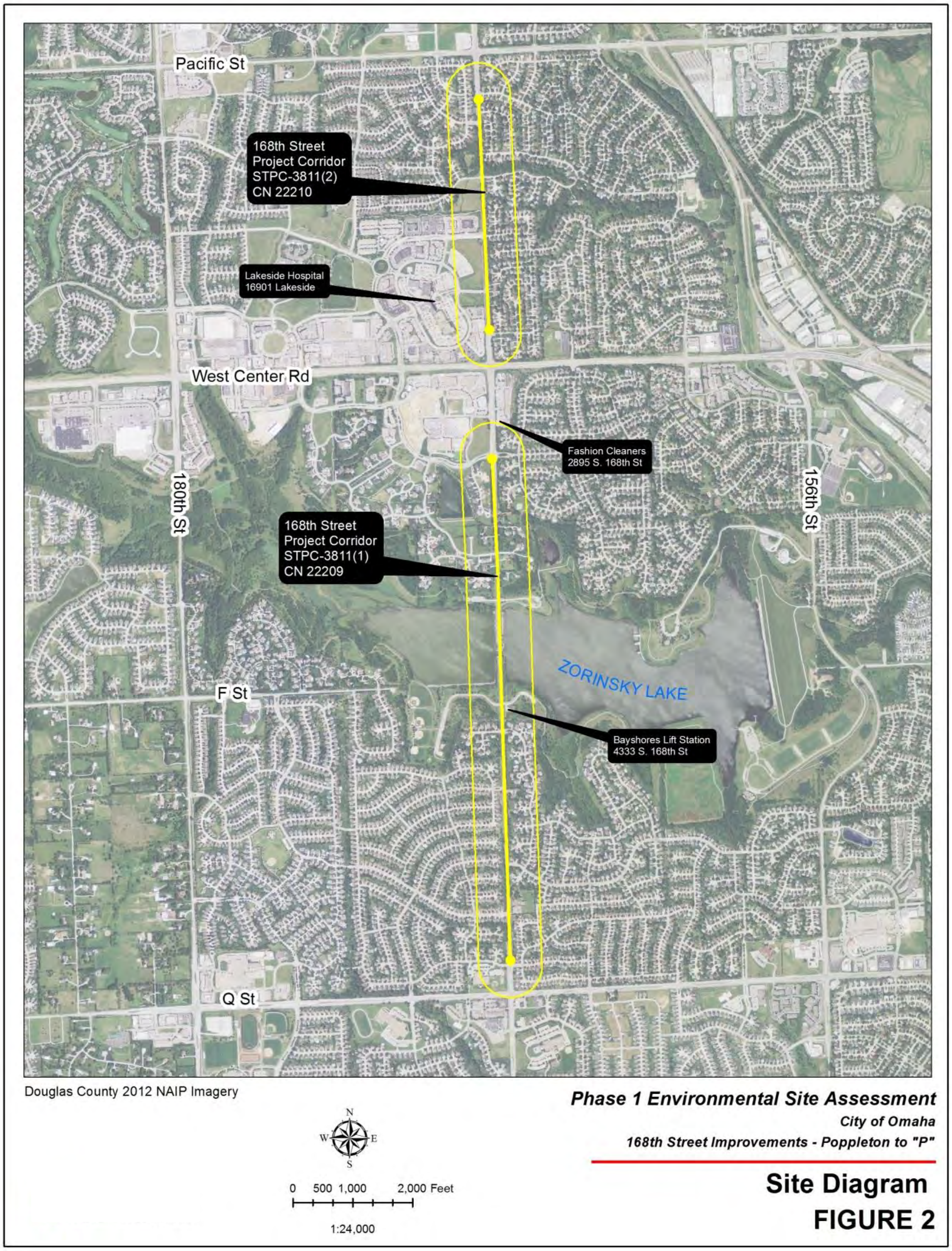
Data Gap Analysis

A data gap is a lack of or inability to obtain information by the environmental professional that could affect the ability of the environmental professional to identify conditions indicative of releases or threatened releases. The ASTM standard specifies that all obvious uses of the property shall be identified back to first developed use or 1940, whichever is earlier; and that review of standard historical sources at intervals of less than five years is not required. Further, if the use of the property appears unchanged over a period longer than five years, then it is not required to research the use during that period.

The history of the 168th Street project corridor has been researched to 1896 (topographic map), 1941 (aerial photograph), and 1971 (city directory). Data gaps spanning more than five years do exist; however, the use of the 168th Street project corridor appears primarily unchanged during these data gaps. Therefore, in the opinion of the environmental professionals, these data gaps are not considered significant and do not affect our ability to identify *recognized environmental conditions* in connection with the 168th Street Improvements Project.

Identified Sites within 1/10 Mile of project corridor

Three sites identified in the Phase I ESA are within 1/10 mile of the project corridor: MUD Bayshores Lift Station, Fashion Cleaners, and Lakeside Hospital (see **Figure 2 – Site Diagram**). Based on the information in the Phase I ESA, either due to their regulatory status, the nature of their activities, or current uses, none of these sites represent a *recognized environmental condition* for the 168th Street Improvements Project.



Phase 1 Environmental Site Assessment

City of Omaha

168th Street Improvements - Poppleton to "P"

Site Diagram

FIGURE 2

1.5 Conclusions

Alfred Benesch & Company (Benesch) performed a Phase I ESA for the 168th Street Improvements Project along a corridor extending from Poppleton Avenue to 'P' Street in Omaha, Douglas County, Nebraska (see **Phase I ESA**). The project corridor generally consists of an existing two lane road in an area of Omaha characterized by residential, recreational and commercial use. The ESA was conducted on behalf of the City of Omaha, Nebraska - Department of Public Works in conformance with the scope and limitations of ASTM Standard Practice E 1527-05. The results of the Phase I ESA, and subsequent site reconnaissance of the project corridor, have been presented in this HMTR to comply with NDOR requirements.

The project corridor has been characterized by residential, recreational, and commercial use since circa 1990. Prior to the 1980s, the project corridor was the location of undeveloped cropland and some farmsteads. The historic and current land uses of the corridor do not represent any *recognized environmental conditions*.

Based on site reconnaissance observations, interviews, and a review of historical sources and regulatory records, the Phase I ESA and this HMTR have revealed no evidence of any *recognized environmental conditions* for the 168^{th} Street Improvements project at this time.

1.6 Commitments

Although the risk for regulated materials impact is considered low for the 168^{th} Street project, if contaminated soils and/or water or hazardous materials are encountered, all work within the immediate area should stop and NDOR should be notified. Upon notification, NDOR should implement its standard unexpected waste protocols, including NDEQ consultation as necessary. The project contractor should be required by NDOR's Standard Specification Section 107 (legal relations and responsibilities to the public) to handle and dispose of contaminated material in accordance with applicable laws and regulations. Disposal of construction waste and debris should be handled as per Standard Specifications Sections 201, 202.02(4), 203.01, 203.02 and NDOR's Special Provision addressing unexpected discoveries of hazardous waste during construction.

The demolition or widening of the bridge over Lake Zorinsky requires the contractor to submit a written Notification of Demolition and Renovation in compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP). On August 14, 2013 Cardno/ATC conducted an asbestos inspection (see attached letter) of the bridge and found no suspect asbestos containing material (ACM). Because no ACM was present, the NESHAP notification should only be sent to the Nebraska Department of Environmental Quality (NDEQ). The contractor should submit the NESHAP Notification of Demolition and Renovation to NDEQ at least 10 working days prior to commencement of any demolition activities or disturbance of any ACM. The ten day clock would start with the day the Notification is postmarked, hand delivered (includes submittals by email notification), or picked up by a commercial delivery service, such as UPS, FedEx, etc. Faxing documents is prohibited. The NDOR State Representative shall be provided copies of said notifications and their submittal date, which should also be recorded in the NDOR Site Manager software.

Attachments are available in the summary file

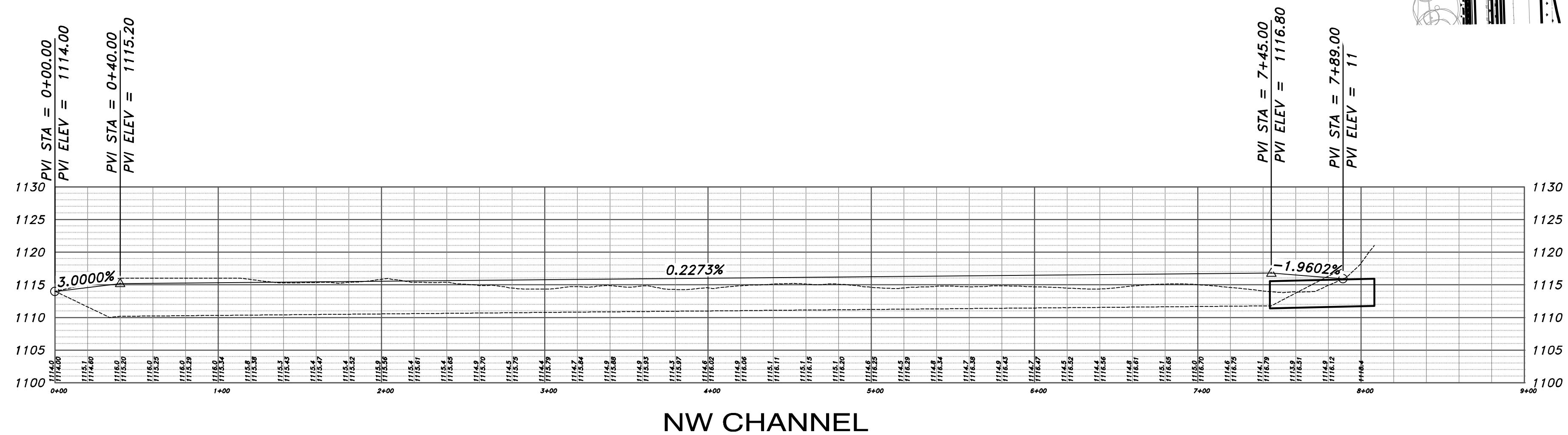
APPENDIX J

RE-VEGETATION PLAN

PRELIMINARY PLAN
NOT FINAL - SUBJECT TO CHANGE

PROJECT NO.	SHEET NO.
STPC 3811 (2)	1

C.N. 22210
OPW51016



THE PRELIMINARY APPROXIMATION FOR EMBANKMENT REQUIRED FOR CONSTRUCTION IN FLOOD POOL AREA IS 11,000 CU. YDS

LOCATIONS SHOWN FOR TREE PLANTINGS ARE SUBJECT TO CHANGE BASED ON SITE REVIEW BY THE CITY OF OMAHA PARKS DEPARTMENT DURING CONSTRUCTION ACTIVITIES

SEEDING MIX FOR REVEGETATION WITHIN CONSTRUCTION LIMITS WILL CONSIST OF LOW-GROWING PERENNIALS AND GRASSES. SPECIFIC SEED MIXTURE AND LOCATIONS OF SEEDING APPLICATION ARE SUBJECT TO CHANGE BASED ON THE CITY OF OMAHA PARKS DEPARTMENT RECOMMENDATIONS DURING FINAL DESIGN

X TREE REMOVAL

TREE SIZES	NUMBER
0"–9"	13
9"–18"	35
18"–27"	29
27"–36"	10
36"+	5

N

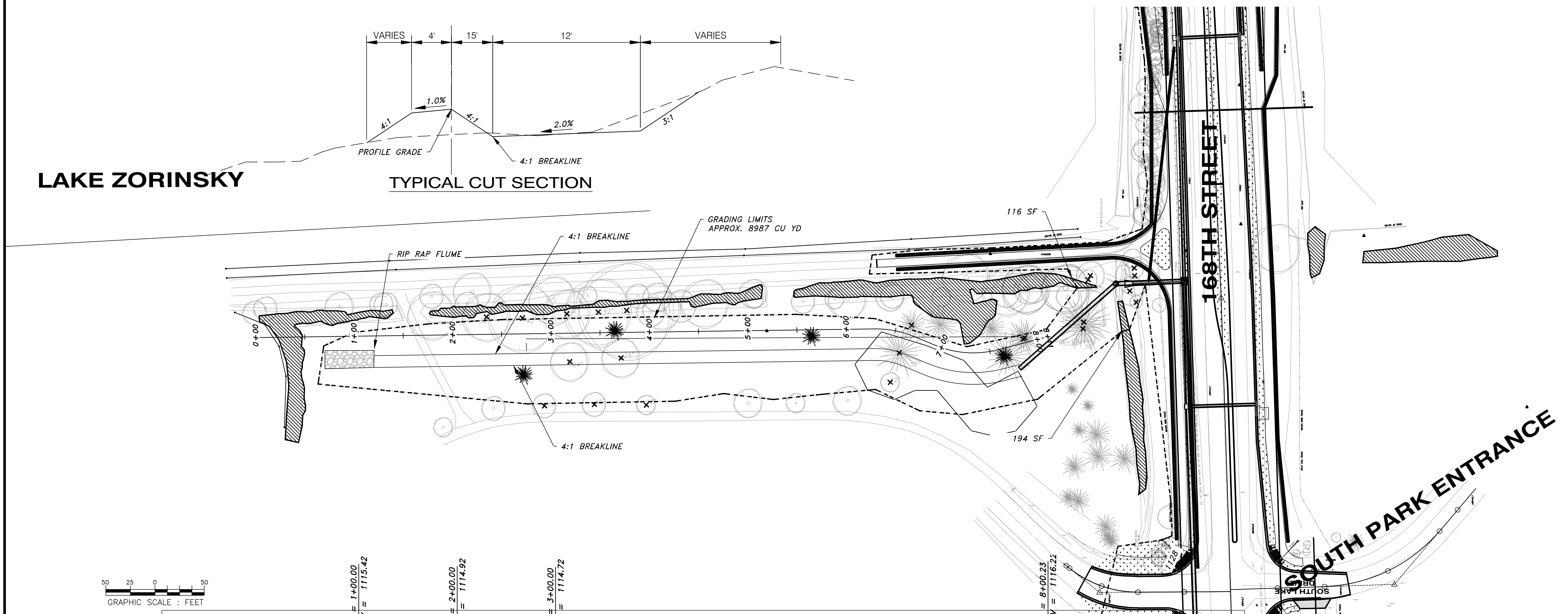
NORTH WATER QUALITY BASIN TREE REMOVAL PLAN

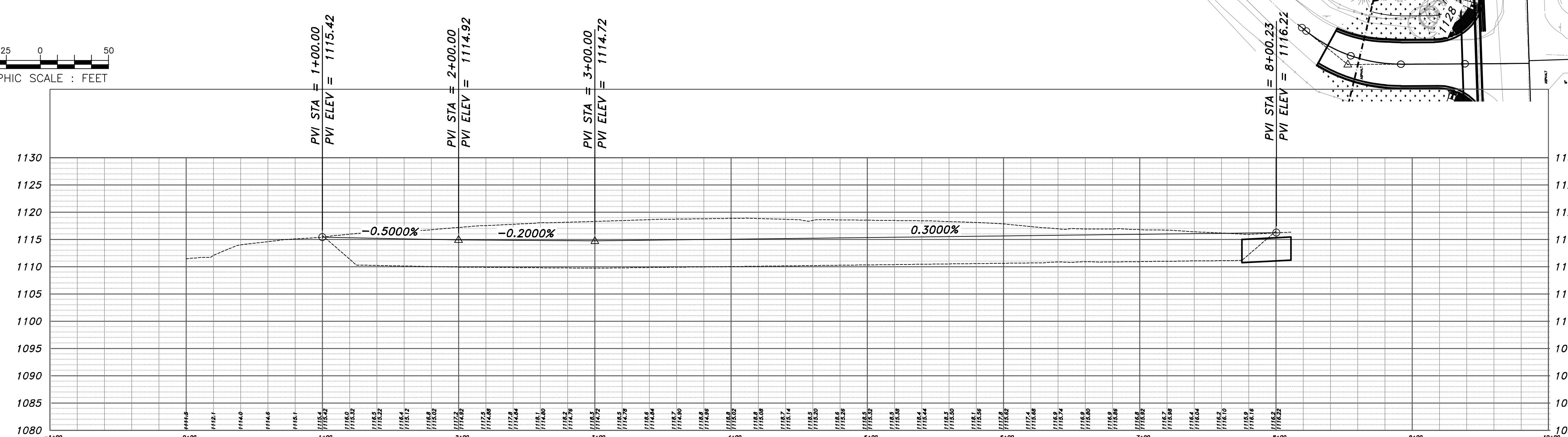
FILENAME: X:_C3D Vault Projects\OPW 51016_168th-COMBINED\CAD\Source Drawings\OPW50417_Drainage Tree Removal and Planting.dwg
DATE PLOTTED: 11/18/2016 9:20 AM DRAWN BY: LIEKHUS PLOT SCALE: 1:2

PRELIMINARY PLAN
NOT FINAL - SUBJECT TO CHANGE

PROJECT NO.	SHEET NO.
STPC 3811 (2)	2

C.N. 22210
OPW51016





SW CHANNEL

THE PRELIMINARY APPROXIMATION FOR EMBANKMENT REQUIRED FOR CONSTRUCTION IN FLOOD POOL AREA IS 11,000 CU. YDS

LOCATIONS SHOWN FOR TREE PLANTINGS ARE SUBJECT TO CHANGE BASED ON SITE REVIEW BY THE CITY OF OMAHA PARKS DEPARTMENT DURING CONSTRUCTION ACTIVITIES

SEEDING MIX FOR REVEGETATION WITHIN CONSTRUCTION LIMITS WILL CONSIST OF LOW-GROWING PERENNIALS AND GRASSES. SPECIFIC SEED MIXTURE AND LOCATIONS OF SEEDING APPLICATION ARE SUBJECT TO CHANGE BASED ON THE CITY OF OMAHA PARKS DEPARTMENT RECOMMENDATIONS DURING FINAL DESIGN

X TREE REMOVAL

TREE SIZES	NUMBER
0"–9"	1
9"–18"	10
18"–27"	5
27"–36"	5
36"+	4

N

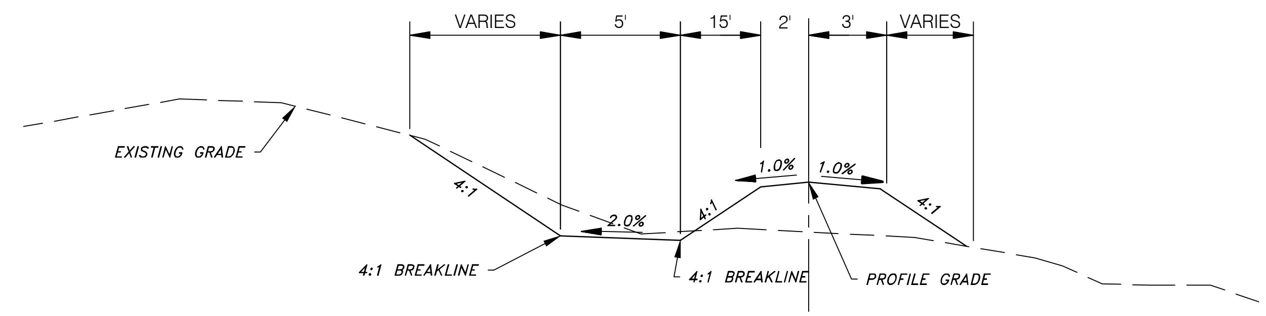
SOUTH WATER QUALITY BASIN TREE REMOVAL PLAN

FILENAME: X:_C3D Vault Projects\OPW 51016_168th-COMBINED\CAD\Source Drawings\OPW50417_Drainage Tree Removal and Planting.dwg
DATE PLOTTED: 11/18/2016 9:18 AM DRAWN BY: LIEKHUS PLOT SCALE: 1:2

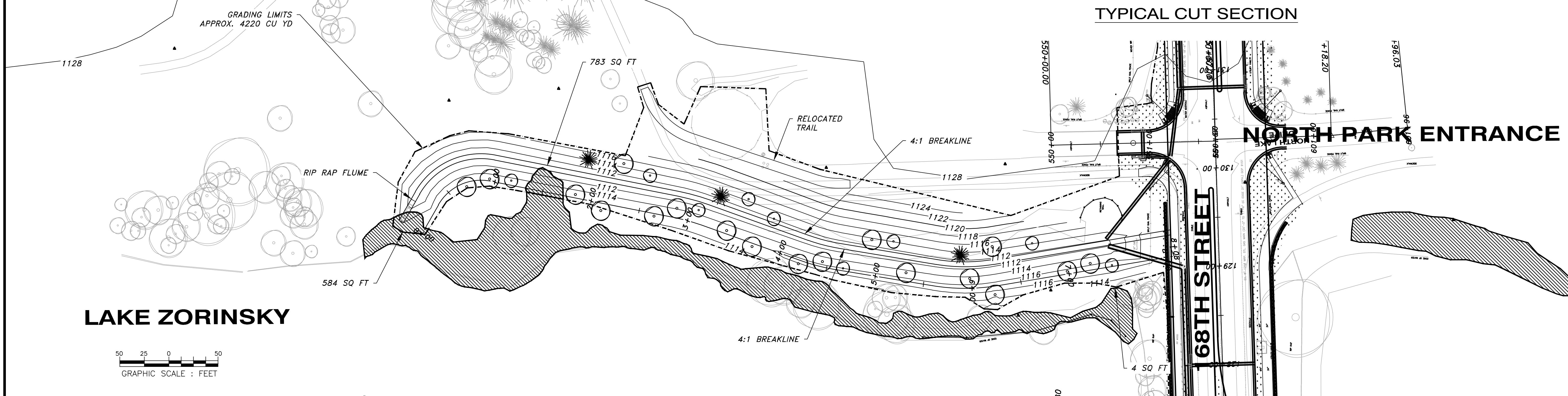
PRELIMINARY PLAN
NOT FINAL - SUBJECT TO CHANGE

PROJECT NO.	SHEET NO.
STPC 3811 (2)	3

C.N. 22210
OPW51016



TYPICAL CUT SECTION



THE PRELIMINARY APPROXIMATION FOR EMBANKMENT REQUIRED FOR CONSTRUCTION IN FLOOD POOL AREA IS 11,000 CU. YDS

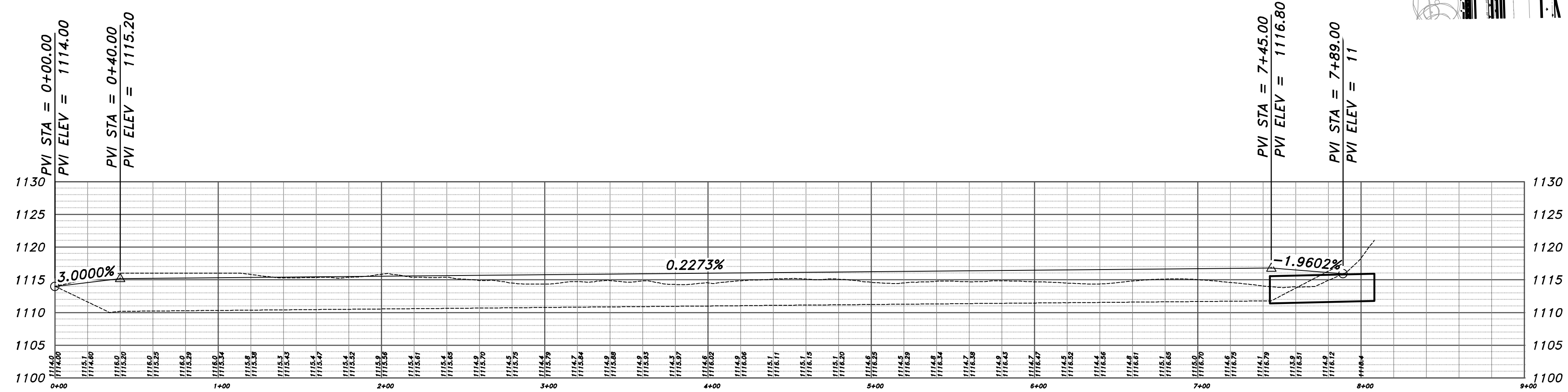
LOCATIONS SHOWN FOR TREE PLANTINGS ARE SUBJECT TO CHANGE BASED ON SITE REVIEW BY THE CITY OF OMAHA PARKS DEPARTMENT DURING CONSTRUCTION ACTIVITIES

SEEDING MIX FOR REVEGETATION WITHIN CONSTRUCTION LIMITS WILL CONSIST OF LOW-GROWING PERENNIALS AND GRASSES. SPECIFIC SEED MIXTURE AND LOCATIONS OF SEEDING APPLICATION ARE SUBJECT TO CHANGE BASED ON THE CITY OF OMAHA PARKS DEPARTMENT RECOMMENDATIONS DURING FINAL DESIGN

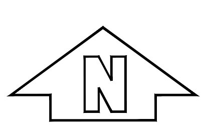
LEGEND

CONIFER TREE

DECIDUOUS TREE



NW CHANNEL



NORTH WATER QUALITY BASIN TREE PLANTING PLAN

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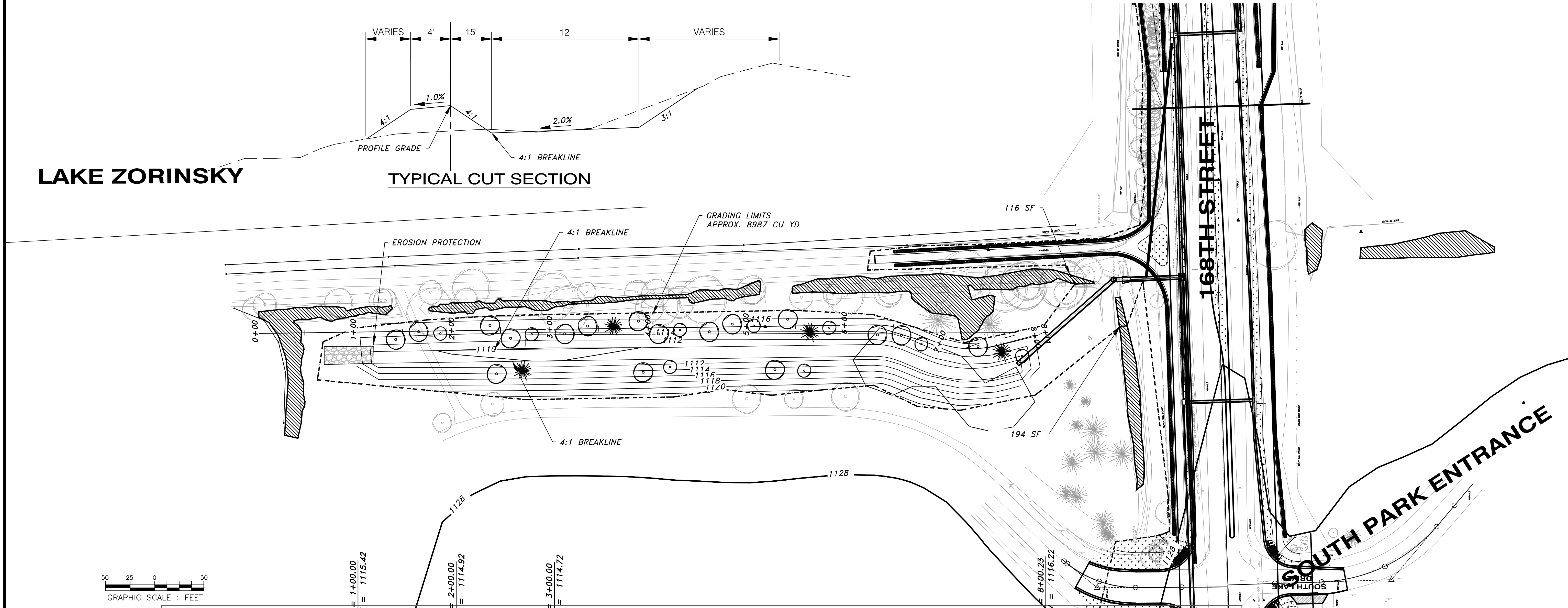
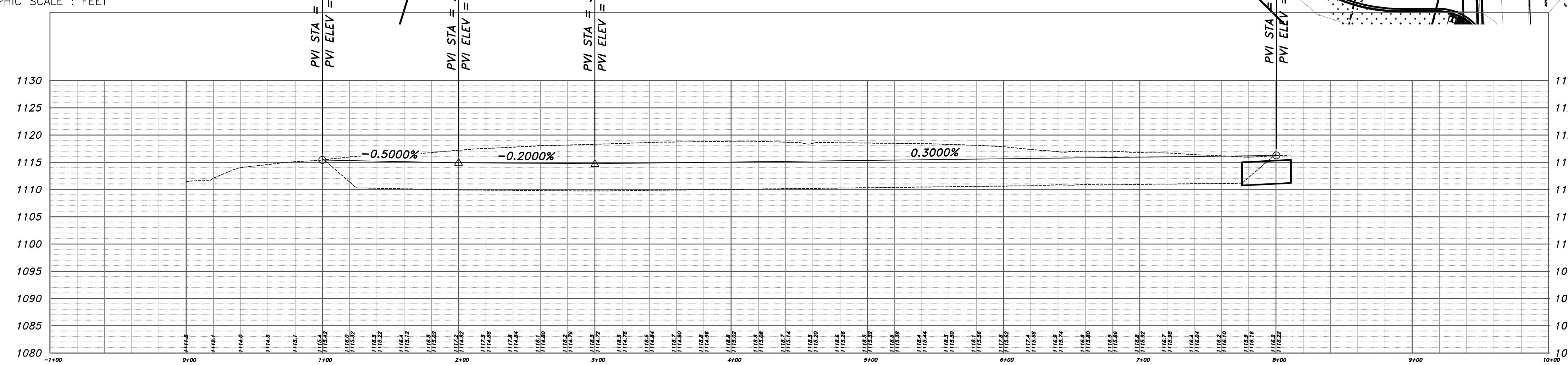
DATE PLOTTED: 11/18/2016 9:17 AM DRAWN BY: LIEKHUS PLOT SCALE: 1:2

PRELIMINARY PLAN
NOT FINAL - SUBJECT TO CHANGE

PROJECT NO.	SHEET NO.
STPC 3811 (2)	4

C.N. 22210
OPW51016





SW CHANNEL

THE PRELIMINARY APPROXIMATION FOR EMBANKMENT REQUIRED FOR CONSTRUCTION IN FLOOD POOL AREA IS 11,000 CU. YDS

LOCATIONS SHOWN FOR TREE PLANTINGS ARE SUBJECT TO CHANGE BASED ON SITE REVIEW BY THE CITY OF OMAHA PARKS DEPARTMENT DURING CONSTRUCTION ACTIVITIES

SEEDING MIX FOR REVEGETATION WITHIN CONSTRUCTION LIMITS WILL CONSIST OF LOW-GROWING PERENNIALS AND GRASSES. SPECIFIC SEED MIXTURE AND LOCATIONS OF SEEDING APPLICATION ARE SUBJECT TO CHANGE BASED ON THE CITY OF OMAHA PARKS DEPARTMENT RECOMMENDATIONS DURING FINAL DESIGN

LEGEND

CONIFER TREE

DECIDUOUS TREE

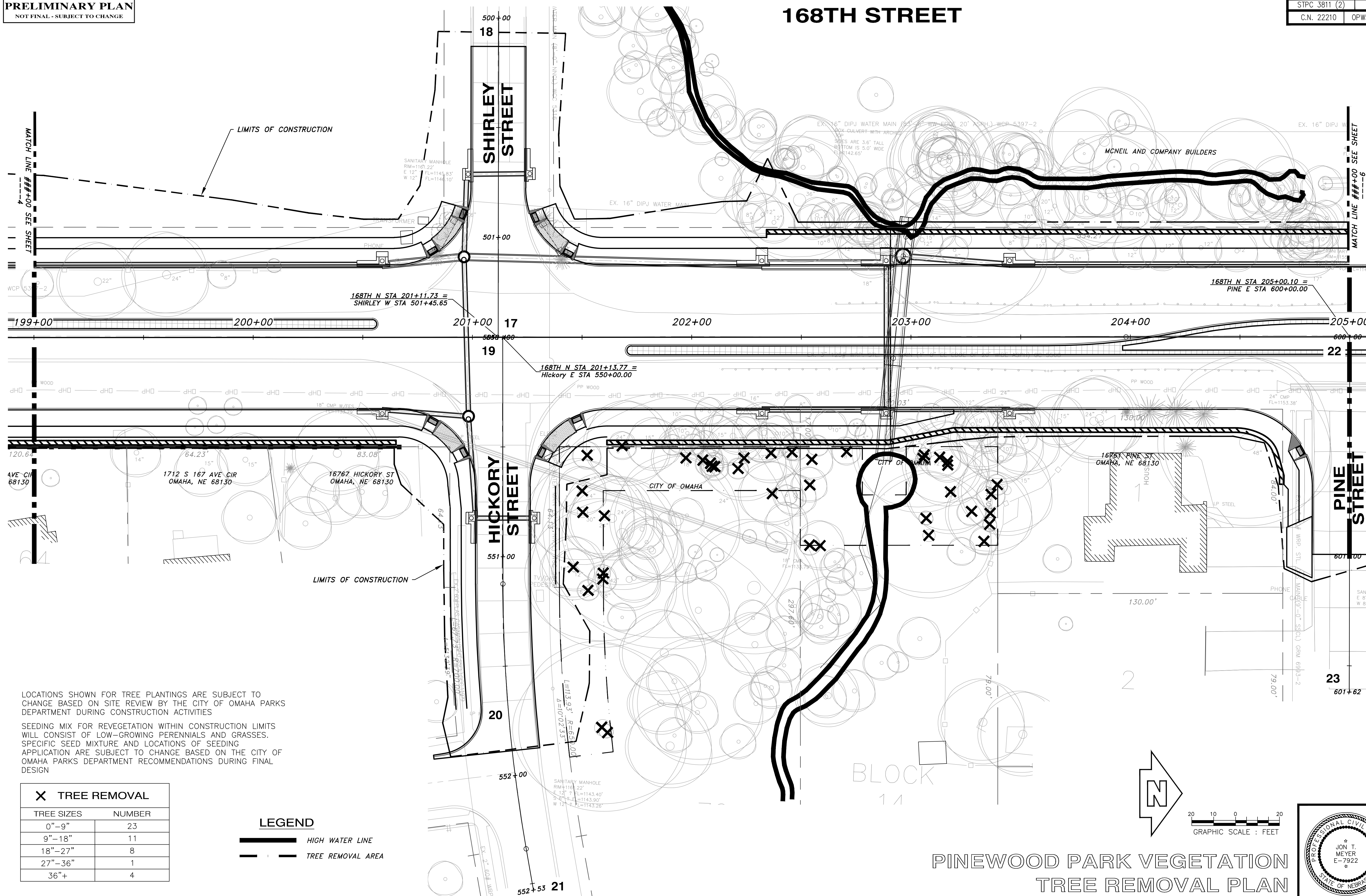
SOUTH WATER QUALITY BASIN TREE PLANTING PLAN

FILENAME: X:_C3D Vault Projects\OPW 51016_168th-COMBINED\CAD\Source Drawings\OPW50417_Drainage Tree Removal and Planting.dwg
DATE PLOTTED: 11/18/2016 9:15 AM DRAWN BY: LIEKHUS PLOT SCALE: 1:2

PRELIMINARY PLAN
NOT FINAL - SUBJECT TO CHANGE

PROJECT NO.	SHEET NO.
STPC 3811 (2)	5
C.N. 22210	OPW51016

168TH STREET



LOCATIONS SHOWN FOR TREE PLANTINGS ARE SUBJECT TO CHANGE BASED ON SITE REVIEW BY THE CITY OF OMAHA PARKS DEPARTMENT DURING CONSTRUCTION ACTIVITIES

SEEDING MIX FOR REVEGETATION WITHIN CONSTRUCTION LIMITS WILL CONSIST OF LOW-GROWING PERENNIALS AND GRASSES. SPECIFIC SEED MIXTURE AND LOCATIONS OF SEEDING APPLICATION ARE SUBJECT TO CHANGE BASED ON THE CITY OF OMAHA PARKS DEPARTMENT RECOMMENDATIONS DURING FINAL DESIGN

X TREE REMOVAL

TREE SIZES	NUMBER
0"–9"	23
9"–18"	11
18"–27"	8
27"–36"	1
36"+	4

LEGEND

HIGH WATER LINE
TREE REMOVAL AREA

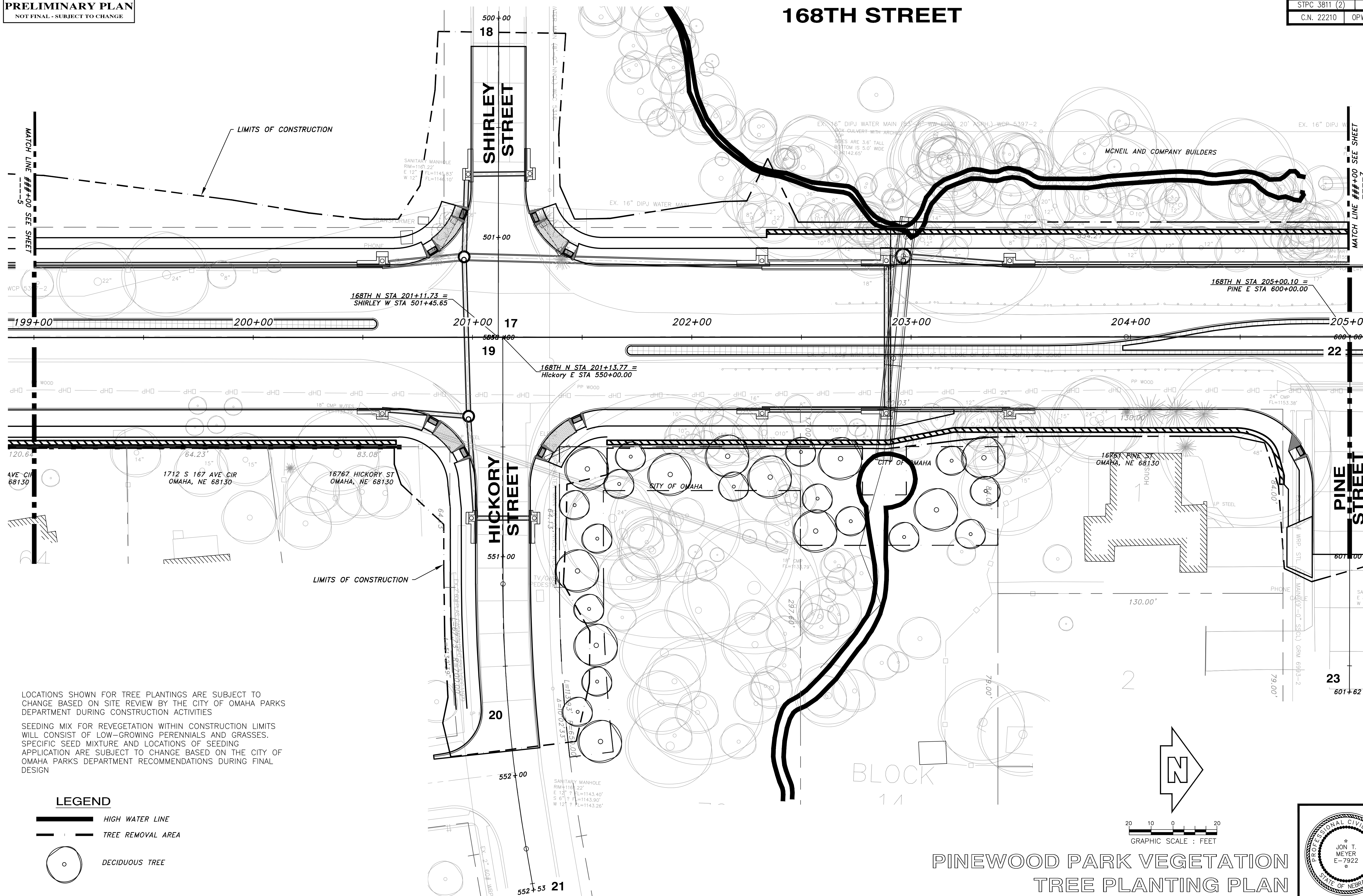
PINEWOOD PARK VEGETATION TREE REMOVAL PLAN

PROFESSIONAL CIVIL ENGINEER JON T. MEYER E-7922 STATE OF NEBRASKA

FILENAME: X:_C3D Vault Projects\OPW 51016_168th-COMBINED\CAD\Production Drawings\OPW51016- WETLANDS.dwg
DATE PLOTTED: 11/18/2016 9:13 AM DRAWN BY: LIEKHUS PLOT SCALE: 1:2

PRELIMINARY PLAN
NOT FINAL - SUBJECT TO CHANGE

PROJECT NO.	SHEET NO.
STPC 3811 (2)	6
C.N. 22210	OPW51016



LOCATIONS SHOWN FOR TREE PLANTINGS ARE SUBJECT TO CHANGE BASED ON SITE REVIEW BY THE CITY OF OMAHA PARKS DEPARTMENT DURING CONSTRUCTION ACTIVITIES

SEEDING MIX FOR REVEGETATION WITHIN CONSTRUCTION LIMITS WILL CONSIST OF LOW-GROWING PERENNIALS AND GRASSES. SPECIFIC SEED MIXTURE AND LOCATIONS OF SEEDING APPLICATION ARE SUBJECT TO CHANGE BASED ON THE CITY OF OMAHA PARKS DEPARTMENT RECOMMENDATIONS DURING FINAL DESIGN

LEGEND

- HIGH WATER LINE
- TREE REMOVAL AREA
- DECIDUOUS TREE

PINEWOOD PARK VEGETATION
TREE PLANTING PLAN

PROFESSIONAL CIVIL ENGINEER
JON T. MEYER
E-7922
STATE OF NEBRASKA

FILENAME: X:_C3D Vault Projects\OPW 51016_168th-COMBINED\CAD\Production Drawings\OPW51016- WETLANDS.dwg
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