NORANN SUBDIVISION AREA
Road Reconstruction

FINAL DESIGN STUDY MEMORANDUM

DECEMBER 2023

MOA PM&E Project No. 20-14

Prepared for:
Municipality of Anchorage
Project Management &
Engineering Department
4700 Elmore Road, Anchorage, AK 99507

Prepared by:

CRW Engineering Group, Inc.
3940 Arctic Blvd. Suite 300 Anchorage, AK 99503

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NORANN SUBDIVISION AREA ROAD RECONSTRUCTION

Prepared by:

Justin Keene, P.E.
Design Project Manager
CRW Engineering Group, Inc.

05/08/2024
Date

Recommended:

Nichole Rehm, P.E.
Project Manager
PTS, Inc.

05/08/2024
Date

Approved:

Brandon Telford, P.E.
Acting Municipal Engineer
Project Management & Engineering Department

05/15/2024
Date

Brad Coy, P.E.
Municipal Traffic Engineer
Traffic Engineering Department

5/15/2024
Date

Executive Summary

Introduction

The Municipality of Anchorage Project Management and Engineering Department (MOA PM&E) has contracted with CRW Engineering Group, Inc. (CRW) to provide professional services to develop and evaluate alternatives to reconstruct the Norann Subdivision Area (Norann) project roadways including West 57th Avenue (57th Avenue) and West 58th Avenue (58th Avenue) from Cope Street to Arctic Boulevard and Cope Street from 57th Avenue to 58th Avenue (see FIGURE 1 in the main body for project location/limits including parcel numbers referenced in this document).

Improvements are expected to include:

- Roadway structural section
- Asphalt pavement and curbs and gutters
- Storm drain system infrastructure
- Pedestrian facilities
- Street lighting
- Signage

The project is currently funded through Design. Additional funding will be necessary to complete construction of the project.

Stakeholder comments were solicited using the Context Sensitive Solutions (CSS) process through the following venues. The residents engaged to-date have been very supportive of the project.

- Project Website and Interactive Project Map
- Direct Mailings (4) and Electronic Newsletters (5)
- Project Questionnaire (1)
- Taku-Campbell Community Council Meeting Presentation (1)
- Community Open House Meeting (1)
- Agency Coordination Meeting (1)

The DSM evaluates existing conditions and conceptual design alternatives. Existing conditions and recommended improvements are summarized below.

Existing Conditions

The existing roadways are classified as secondary (local) urban residential in the MOA Design Criteria Manual (DCM). Type 2 (rolled) curb and gutter is present on 57th and 58th Avenues while Cope Street has no curb and gutter. There are no sidewalks within most of the project area. There is a short section of attached 3-foot wide sidewalk north of Parcel 11 and an attached 4-foot wide sidewalk along the west side of Arctic Boulevard within the project area. The existing roadway width along 57th & 58th Avenues is approximately 32 feet wide measured from back of curb (BOC). Cope Street is approximately 21 to 25

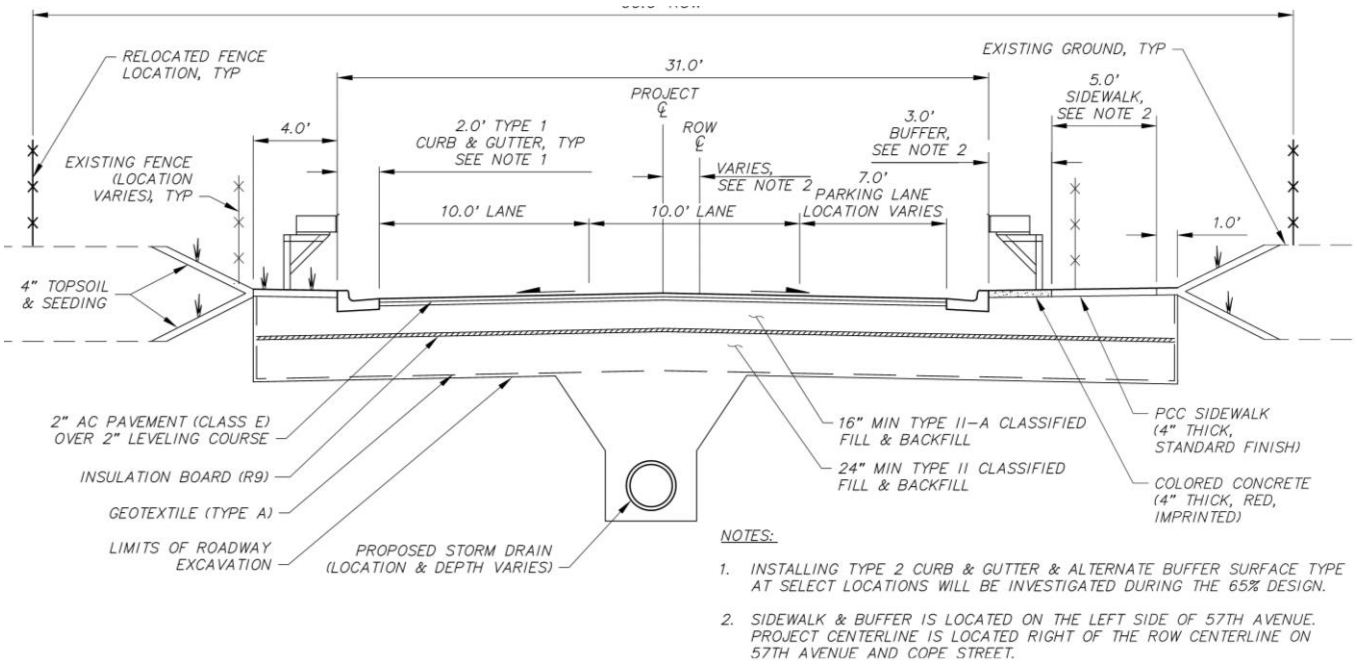
feet wide measured from the edge of pavement. The existing roadways are in very poor condition with cracked pavement surfacing and heaved irregular curbs. MOA Street Maintenance crews are frequently called out to address drainage and roadway problems.

Design Recommendations

To achieve the project goals, meet some of the requirements of the DCM and Anchorage Municipal Code (AMC) Title 21, and based on comments received from public, agency, and stakeholders the recommended improvements for the project are as follows:

Roadway Cross Section

The preferred roadway cross section is Alternative 2 (see figure below) and includes two 10-foot wide travel lanes with one 7-foot wide parking lane (31 feet total width from BOC), Type 1 (barrier) curb and gutter and a single 5-foot wide sidewalk with a 3-foot wide concrete buffer. Installing Type 2 curb and gutter at select locations will be investigated during the 65% design to eliminate the on-property storm drain catch basin along Cope Street. The use of a grass buffer instead of a concrete buffer will also be investigated. No roadway traffic markings are proposed, effectively allowing parking along either side of the roadway. Installing only one sidewalk is preferred to installing two sidewalks due to minimizing adverse impacts to several existing driveways.



Alternative 2 Preferred Roadway Cross Section

Roadway Horizontal and Vertical Alignment

The proposed overall roadway cross section (measured from back of curb to back of sidewalk) will be typically centered within the ROW to balance adjacent impacts. Along Cope Street the proposed roadway will be shifted to the west of the ROW centerline to allow for an equivalent proposed driveway grade to the Parcel 20 (west) garage. The northern horizontal curve radius at the transition from Cope

Street to 58th Avenue is proposed to be 100 feet while the southern curve radius is proposed to be 125 feet. The vertical profile design forces high/low spots and has a minimum grade of 0.65%.

Posted Speed

It is proposed that the posted speed limit for Norann project roadways remain at 25 mph. A design speed of 25 mph is proposed to match the requirements of the DCM.

Drainage

The preferred drainage design is Alternative 2 and includes two new storm drain systems, one on 57th Avenue and one on 58th Avenue/Cope Street. Both systems include new catch basins at low points to alleviate ponding issues and connections to the existing Arctic Boulevard storm drain system. Water quality treatment for storm runoff will be provided by installation of OGS's with bypass systems prior to the tie-in to the Arctic Boulevard system. Heat trace will be installed in storm drain pipes that have less than 3 feet of cover. Several water and sewer services will need to be reconstructed due to the proposed storm drain systems.

Lighting

A continuous LED lighting system, consistent with current MOA standards will be installed along the Norann project roadways. The power for the lighting system will come from a new Type 1A load center. The load center location will need to be coordinated and approved by CEA during the detailed design, but the initial proposed location is on 57th Avenue near the intersection with Arctic Boulevard.

Total Project Costs

Following is a summary of estimated project costs for the entire project for the Alternative 2 preferred alternative:

Category	Alternative 2 (Preferred)
Design & Management Total (estimated)	$845,000
ROW Acquisition Total	$66,000
Utility Relocation (with 15% Contingency) Total	$115,000
A. Design, ROW Acquisition, Utility Relocation	***$1,026,000***
Construction	
Roadway Improvements	$2,470,000
Drainage Improvements	$1,026,000
Illumination Improvements	$268,000
Construction Subtotal	*$3,764,000*
Construction Contingency (15%)	$565,000
Construction Management / Inspection / Testing	$388,000
B. Total Estimated Construction Cost (rounded)	***$4,717,000***
C. Overhead / Grant Accounting	***$1,013,000***
Total Estimated Project Cost (A + B + C)	***$6,756,000***

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1.0 Introduction and Background

The Municipality of Anchorage Project Management and Engineering Department (MOA PM&E) has contracted with CRW Engineering Group, Inc. (CRW) to provide professional services to develop and evaluate alternatives to reconstruct the Norann Subdivision Area (Norann) project roadways including West 57th Avenue (57th Avenue) and West 58th Avenue (58th Avenue) from Cope Street to Arctic Boulevard and Cope Street from 57th to 58th Avenue (see FIGURE 1 for project location/limits including parcel numbers referenced in this document).

The project team met with MOA PM&E, Traffic Engineering and Street Maintenance Department to discuss this project and subsequently a Draft Technical Memorandum (TM) was developed in June 2021 (see APPENDIX I for Draft TM). The Draft TM presented roadway cross section alternatives to bring the project roadways in conformance with the MOA PM&E Design Criteria Manual (DCM) for a local roadway. During the review of the Draft TM, PM&E initially determined that this project would reconstruct the existing roadways in kind instead of improving them to current criteria, so the Draft TM was not finalized. Upon subsequent review by PM&E it was determined that the design should include roadway cross section alternatives that are in conformance with current DCM requirements.

The scope of this Design Study Memorandum (DSM) is to review the existing conditions along the project area, evaluate alternatives to upgrade the roadways to meet current criteria for local roadways, evaluate storm drain improvement alternatives, and recommend a preferred alternative. This project is funded by Anchorage Road and Drainage Service Area (ARDSA) bonds and is currently funded through Design. Construction funding is anticipated to be provided in 2025 depending on the approval of the ARDSA bond.

2.0 Existing Conditions

2.1 Purpose and Need

Curb heaving and significant pavement failure on 58th Avenue

The existing roadways are in very poor condition with cracked pavement surfacing and heaved irregular curbs. The conditions lead to potholes, puddles, and a bumpy ride for vehicles. These roads are more costly to maintain, and MOA Street Maintenance crews are frequently called out to address drainage problems and fill the potholes. Significant ponding appears on both 57th and 58th Avenue during spring break up each year. The purpose of this project is to reconstruct the roadways, improve drainage, alleviate maintenance issues, upgrade the roadway lighting, add pedestrian facilities, and provide a stable base to extend the life of the roadways.

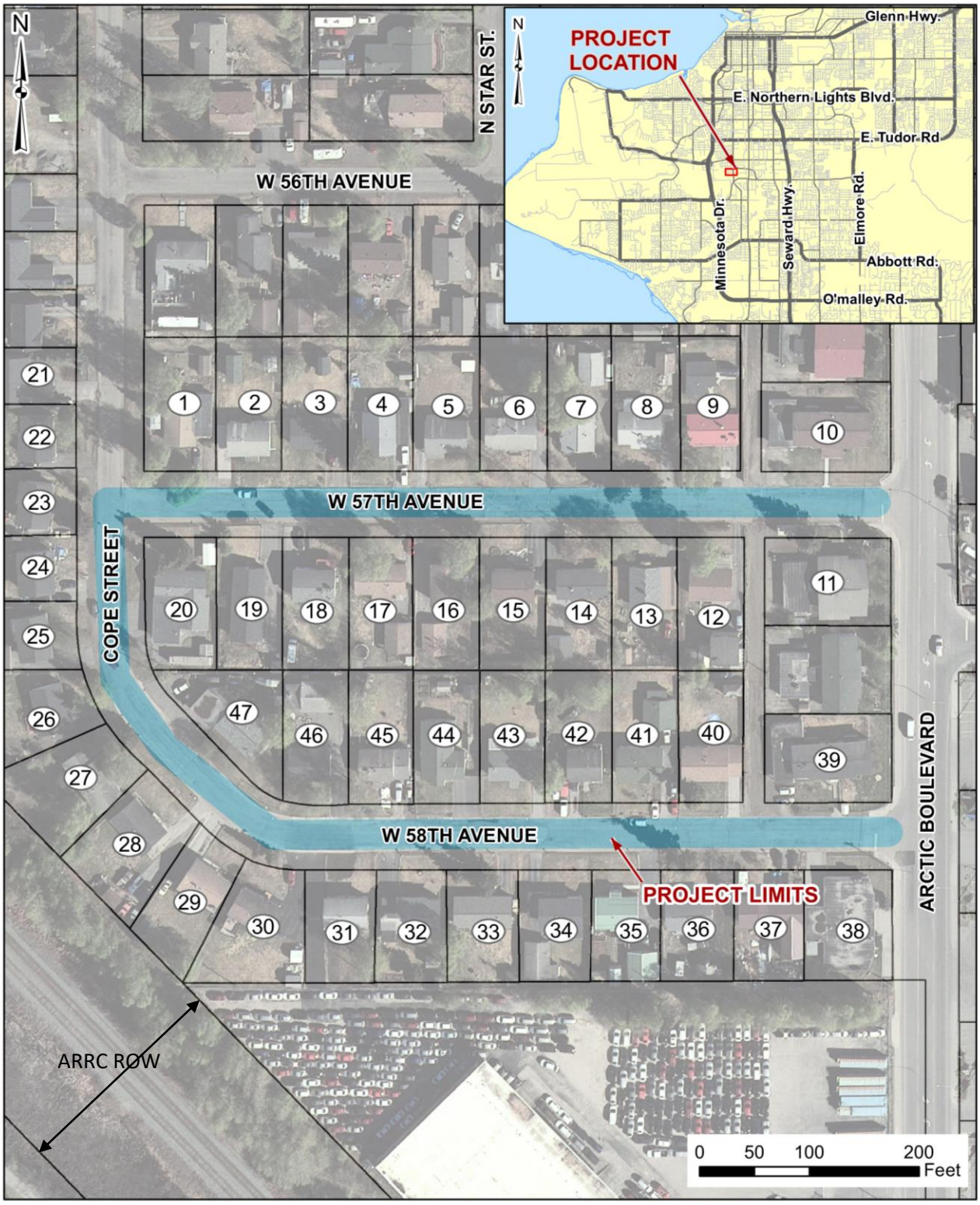


Figure 1 - Project Location and Vicinity Map

2.2 Area Context and Zoning

The Norann Subdivision area is a local neighborhood situated west of Arctic Boulevard, south of W. International Airport Road and north of W. Dowling Road. Alaska Railroad Corporation (ARRC) right-of-way (ROW) and an active railroad track is located west of the neighborhood. The main access into the neighborhood is from Arctic Boulevard east of the project limits, an alternate access is available from Cope Street north of the project limits. Most homes were built in the 1960s prior to the establishment of many MOA building and driveway codes.

The neighborhood is zoned as Class A R-1 "single family residential" and R-3 "mixed residential." An alley located west of Arctic Boulevard separates the single-family residential area from the mixed residential area. The parcels directly adjacent to the project roadways to be reconstructed consist of 41 single family homes, three 4-plexes, and one duplex, totaling 45 parcels. A portion of Parcel 22 is adjacent to the Cope Street reconstruction limits and Parcel 21 is just north of the reconstruction limits.

2.3 Roadway Characteristics and Conditions

The existing roadways are classified as secondary (local) urban residential in the DCM and have a posted speed limit of 25 miles per hour (mph). The existing roadway grades in the project area are generally very flat, between approximately 0% and 1.3%. There are low spots along the roadways where drainage can't effectively drain to a catch basin, and during spring break-up or large rain events these areas form large ponds in the roadway. The existing roadway pavement conditions are very poor with cracking, settling, and heaving conditions throughout many sections of the roadway. Type 2 (rolled) curb and gutter is present on 57th and 58th Avenue; however, some sections of curb are missing, broken, or are undulating. Cope Street has no curb and gutter. There are no sidewalks within most of the project area. There is a short section of attached 3-foot wide sidewalk north of Parcel 11 and an attached 4-foot wide sidewalk along the west side of Arctic Boulevard within the project area.

The existing roadway width along 57th and 58th Avenue is approximately 32 feet wide measured from the back of curb (BOC). Cope Street is approximately 21 to 25 feet wide measured from the edge of pavement. There is a gravel alley that connects 57th Avenue to 58th Avenue and a gravel alley between 57th Avenue and West 56th Avenue. These alleys provide access to the car ports and parking spaces for the 4-plexes located west of Arctic Boulevard.

Parcel 47 full frontage driveway with parking extending into ROW

On-street parking is allowed along the roadway. Some driveways are wider than allowable based on current MOA Design Criteria for maximum width requirements and Parcels 20 (west) and 47 have full frontage driveways. Parcel 20 has one driveway off 57th Avenue that accesses an on-property car port and another west side driveway from Cope Street that accesses 3 separate garages and an additional parking space south of the home. Due to the location of the existing homes, the Parcel 20 (west) driveway and Parcel 47 driveway require parking to extend in the right-of-way (ROW). The driveway for Parcel 17 is shared with Parcel 16 and primarily located on Parcel 16 but no access easement is shared between the parcels. Most of the homes are higher than the adjacent roadway with positive drainage away from the garages. Existing driveways generally do not have a landing at the bottom of the driveway near the curb and some driveways are steep.

2.4 Right-of-Way and Easements

The existing ROW width is 60 feet along all the project roadways. The existing roadway is approximately centered in the ROW on 57th & 58th Avenue and is skewed to the west side of the ROW on Cope Street. The alleys within the project limits are 20 feet wide. Existing easements within the project area include 10-foot wide utility easements on the back sides of the parcels north and south of 57th & 58th Avenue. A 10-foot wide power and telephone easement extends along the west side of Arctic Boulevard and between Parcels 8/9 and 12/13. A 12-foot wide sanitary sewer easement extends along the east side of Parcel 30 and an 18-foot wide sanitary sewer easement extends along the west side of Parcel 31. A 5-foot wide drainage easement extends on and between Parcels 26 and 27. A 10-foot wide utility and planting easement extends along the back side of the parcels along Cope Street.

2.5 Environmental

There are no wetlands, creeks, or flood plains within the project limits. According to the Alaska Department of Environmental Conservation (ADEC) Contaminated Sites Program Database, there are no active sites in or within 1,000 feet of the project area.

2.6 Drainage & Soils

Existing drainage conditions and storm drain are discussed in SECTION 3.3 below. Existing soil conditions are discussed in SECTION 5.0 below.

2.7 Lighting

Street lighting is infrequent along the project corridor and does not meet current MOA design criteria for roadway illumination. There is one streetlight west of the alley on 58th Avenue and another one approximately mid-block on 57th Avenue. There are two streetlights along the curve as 58th Avenue transitions to Cope Street and one additional streetlight near the Cope Street/57th Avenue intersection. Streetlights in the project area are all owned by Chugach Electric Association, Inc. (CEA) and consist of light-emitting diode (LED) light fixtures mounted on wooden utility poles. The fixtures are served by overhead conductors that generally extend along the back side of the parcels. There are existing MOA owned streetlights that extend along the east side of Arctic

Boulevard that illuminate some of the intersections at 57th & 58th Avenue. The poles are mounted on pile foundations and have LED fixtures.

2.8 Utilities

Existing utilities within the project area are summarized below. The location of the utilities are based on field locates/survey/utility potholes and utility company facility maps. All utility companies listed below were contacted during development of the DSM to ensure utility facility upgrades can be coordinated with the Norann reconstruction project. No utility companies have indicated any future improvement plans within the project area.

2.8.1 Water

Anchorage Water and Wastewater Utility (AWWU) owns and operates water mains, fire hydrants, and water services in the project area. All adjacent parcels are served by AWWU's public water system. An existing 8-inch asbestos cement (AC) water main extends along the length of the north side of 57th Avenue, the south side of 58th Avenue and the west side of Cope Street. The AC water main was installed in 1963 and is located approximately 6-7 feet from the ROW lines except for along the north section of Cope Street where it's located approximately 4 feet from the ROW line. The water mains typically have between 8 and 11 feet of cover based upon record drawing information, in addition to field information identifying the elevation of the top of nut of multiple water valves with respect to the existing grade surface elevation. There are three fire hydrants within the project limits, each is within 2 feet of the ROW line, and no fire hydrant easements exist on adjacent private property. Several water service keyboxes were not found during the field survey and are likely buried beneath grass or pavement. The missing keyboxes were approximated into the drawings based upon water connect cards and GIS information provided by AWWU.

2.8.2 Sanitary Sewer

The project area is also entirely served by an AWWU owned and operated piped sewer system consisting of gravity sewer mains, manholes, and sewer services. An existing 8-inch AC sewer main extends along the south side of 57th Avenue from the alley to Cope Street, along the north side of 58th Avenue east of the alley to Cope Street and along the east side of Cope Street. An 8-inch AC sewer main also crosses 57th Avenue at the alley & continues north and south to serve adjacent parcels east of the alley. The AC sewer main was installed in 1963 and is located approximately 5-7 feet from the ROW lines. An 8-inch polyvinylchloride (PVC) gravity sewer main installed in 2014 crosses 58th Avenue in between Parcels 30/31 to serve a private commercial property south of the project limits. The existing sewer manhole (MH39 on AWWU sewer grid map SW1929) on the north side of 58th Avenue south of Parcel 42 was not found during the field survey, it's assumed it has been buried beneath the grass adjacent to a private retaining wall. Existing sewer service locations are approximated in the drawings based upon connect cards provided by AWWU, CCTV data of the sewer main provided by AWWU and utility potholes of select sewer services. Parcel 27 is served from a bootleg sewer service from Parcel

26 but no additional information was provided from AWWU on how the Parcel 27 sewer service is connected to the Parcel 26 sewer service.

2.8.3 Electric

CEA owns and operates overhead electric lines, utility poles and roadway lights in the project area. The overhead lines run along the backside of the parcels and cross 57th Avenue west of the alley. Overhead electric lines also run along the west side of Arctic Boulevard.

2.8.4 Telephone & Fiber Optic

Alaska Communications (ACS) owns and operates overhead telephone and underground telephone/fiber optic lines in the project area. The overhead telephone lines are located on the CEA owned utility poles and run along the backside of the parcels and cross 57th Avenue west of the alley. Underground telephone and fiber optic lines are installed within a duct and run on the west side of Arctic Boulevard.

2.8.5 Cable & Fiber Optic

General Communications, Inc. (GCI) owns and operates overhead cable and fiber optic lines in the project area. The overhead cable lines are located on the CEA owned utility poles and run along the backside of the parcels and cross 57th Avenue west of the alley. Overhead cable/fiber optic lines also run on the CEA utility poles on the west side of Arctic Boulevard.

2.8.6 Natural Gas

ENSTAR Natural Gas Company (ENSTAR) owns and operates natural gas facilities within the project area. A 4-inch gas main extends along the west side of Arctic Boulevard and continues along the south side of 57th Avenue until the alley where it crosses the roadway to the north. A 2-inch steel gas main runs south along the alley and extends along the back side of parcels between 57th and 58th Avenue to serve adjacent parcels. This gas main crosses Cope Street and continues to the north on the west side of the roadway. A 1-1/4" steel gas main extends south along Cope Street to the east side of Parcel 28 where it terminates. An additional 2-inch steel gas main runs along the back side of the 58th Avenue parcels to serve adjacent parcels.

2.9 Private Improvements and Mailboxes

Existing fences and retaining wall along 57th Avenue

Like many established neighborhoods, private improvements including fences, retaining walls, landscaping, and mature trees/bushes are in the ROW behind the curb. These items hinder MOA Street Maintenance Department activities, especially snow removal and storage. TABLE 1 below summarizes the existing private improvements within the ROW.

Individual mailboxes for single-family residences are present on both sides of the road. For multi-family residences, mail is delivered to boxes on or within the buildings.

Table 1 – Private Improvements in the ROW

Parcel No.	Private Improvement in ROW
1	Fence, tree, & bush
2	Fence & landscaping with edging
3	Bush
4	Fence
6	Fence, bushes, & tree
7	Fence & bushes
8	Trees
9	Fence & hedge
10	Tree
11	Fence, trees, & landscaping
12	Fence & hedge
13	Fence, trees & landscaping
14	Fence
15	Fence & bush
16	Retaining wall & trees
17	Fence, trees & concrete steps
18	Fence & retaining wall
19	Fence, retaining wall & tree
20	Fence & bush
21	Boulder
22	Fence & bushes
23	Tree
24	Bush
26	Landscape edging
27	Tree
29	Fence

Parcel No.	Private Improvement in ROW
31	Fence
34	Boulder
35	Boulders, trees & bushes
36	Fence, trees & bushes
37	Bush
38	Fence
39	Fence & bushes
40	Fence
41	Fence, retaining wall, & bushes
42	Retaining wall
43	Fence
44	Fence
45	Bush
47	Fence & bushes

2.10 Nonconformities

MOA Code of Ordinances Title 21.13 defines "nonconformities" as legal uses, structures, lots, or signs established prior to the effective date of the current title, or future amendments to the current title, that don't conform to the requirements of the current title. The acknowledgement and relief granted to existing property, land uses, and structures are intended to minimize negative economic effects on development that was lawfully established prior to effective date of the current title and subsequent amendments.

The MOA Planning Department completed a review of existing parcels within the projects limits to determine if any legally established nonconformities existing on parcels that could impact the roadway design. Three parcels (23, 37, & 46) had existing established nonconforming rights established but none will affect the proposed roadway design as they all relate to building offsets and building/private improvement encroachments.

3.0 Traffic and Parking Analysis

3.1 Traffic Volumes and Speeds

Existing daily traffic volumes and speeds were collected for this project in late May and early June 2021. The traffic data collected was adjusted for day and month, based on the nearest permanent Alaska Department of Transportation and Public Facilities (ADOT&PF) traffic recorder. The adjusted annual average daily traffic (AADT) volumes and 85th percentile speeds are shown below in TABLE 2.

Table 2 – Existing Traffic Data

Roadway	Location	AADT	85th Percentile Speed (mph)
W. 57th Ave.	west of alley	140	17
W. 58th Ave.	west of alley	170	19

3.2 Parking

A parking study was conducted to document the current use of on-street parking for consideration in the design of the proposed improvements. The parking study was based on observations from four separate site visits. Site visits were organized to include one weekday afternoon/evening and one weekend afternoon/evening and took place on Saturday, May 15, 2021 and Wednesday, May 19, 2021 (see APPENDIX E for the parking study memorandum). Parking demand is summarized below in TABLE 3. Based upon the study results there does not appear to be a need for a wider roadway to accommodate more on-street parking than currently exists.

Table 3 – On-Street Parking Demand Summary

Roadway	Maximum On-Street Parking Demand Observed (Vehicle Count)
W. 57th Ave.	5
W. 58th Ave.	5
Cope Street	2

3.3 Stopping Sight Distance Along Horizontal Curves

A driver's ability to see ahead is required for efficient and safe operation of a vehicle along a roadway. Sight distance of sufficient length should be provided along roadways to allow drivers to control their vehicle and avoid striking an unexpected object in the traveled way. The available sight distance on a roadway should be sufficiently long enough to enable a vehicle at or near the design speed to stop before hitting an object in the roadway. Although lengths of greater visible roadway are desirable, the sight distance at every point along a roadway should be at least that needed for a below-average driver or vehicle to stop.

Stopping sight distance lines of sight along the worst-case locations of the horizontal curves within the project limits for Alternative 2 were drawn in per the guidelines of the MOA DCM, see APPENDIX M for the stopping sight distance drawing. As noted on the drawing, there are existing fences in the ROW that conflict with the stopping sight lines and should be removed or reset out of the sight lines as part of this project.

4.0 Existing Drainage Conditions & Analysis

4.1 Existing Conditions

The condition of the existing pavement and curb and gutter is very poor along the project roadways with widespread cracking, potholes, settling, and heaving. These issues are a result of flat grades and inadequate storm drain infrastructure to properly convey stormwater runoff off the roadway surface. MOA Street Maintenance crews are frequently called upon to address the drainage issues in this neighborhood during the spring breakup to make these roadways passable.

Poor roadway condition along 57th Avenue

This section of the report will summarize the existing storm drain systems in and around the project area, the drainage areas contributing runoff to these systems (or lack thereof), and other drainage related items and concerns. Additionally, an assessment was completed to evaluate the condition of the existing drainage infrastructure on

Arctic Boulevard, a likely connection point for future systems. A hydrologic and hydraulic analysis was also developed to analyze peak flows, pipe sizing, and problem areas.

Design alternatives to improve overall drainage along the project corridor and alleviate maintenance issues are discussed in SECTION 9.0.

4.1.1 Contributing Drainage Areas

The drainage basins (catchments) that contribute stormwater runoff to the project area were delineated using several methods, including topographical mapping, aerial photography, parcel boundaries, and MOA Watershed Management's hydrography geodatabase (HGDB). Based on HGDB data, the project corridor bisects two major watersheds in the Anchorage Bowl: Fish Creek watershed (to the west) and Campbell Creek watershed (to the east). HGDB mapping further divides the primary watersheds into subwatersheds and subbasins. For this project, portions of MOA Subbasin #1178 (Fire Creek) and Subbasin #830 (Lower Campbell Creek) contribute runoff directly to the project corridor.

The MOA Subbasins identified above were refined into smaller, individual drainage catchments to represent the surface drainage and hydraulic properties contributing directly to the project area. Five catchments (E-1 through E-5) were delineated for the existing condition based on topography, land cover, and routing of runoff. The drainage area consists of a fully developed neighborhood with single family homes (zoned R-1) and some multi-family homes (zoned R-3), municipal roadways constructed with Type 2 (rolled) curb and gutter (Cope Street is strip paved), and asphalt surfacing. As such, land cover generally consists of pervious areas such as lawns and forested areas, and impervious surfaces such as roadways, driveways, and roofs.

Both 57th and 58th Avenues generally slope to the west toward Cope Street. The eastern ends of these streets slope to the east towards Arctic Boulevard. Cope Street slopes from north to south to a low point between Parcel 26 & 27. The majority of stormwater runoff from the contributing area flows overland to the low point on Cope Street. The remaining runoff is directed east towards Arctic Boulevard.

The watersheds and subbasins described above, as well as the contributing drainage area and delineated catchments are illustrated in APPENDIX D.

4.1.2 Conveyance Systems

The following provides a description of the existing storm drain conveyance systems within the project area and adjacent systems that influence drainage. The systems described below are all owned and maintained by MOA Street Maintenance. See FIGURE 2 below that depicts these systems.

No record drawings were available for the storm drain systems discussed below. Therefore, the age of these pipes and structures is unknown.

Cope Street/ARRC System

The majority of stormwater runoff from the project area flows overland toward two curb inlets located at a low point near the south end of Cope Street before it turns into 58th Avenue. Stormwater collected at these inlets flows southwest through a 10-inch corrugated metal pipe (CMP) that is routed between two homes (Parcels 26 & 27) through a 10-foot wide (5-foot wide on each parcel) drainage easement and outfalls to the adjacent Alaska Railroad Corporation (ARRC) ROW. The 10-inch CMP pipe was installed with less than 2-feet of cover in some locations without heat trace or other freeze protection. Based on surveyed inverts, the pipe segment between the two curb inlets (MOA ID 34663) is reverse grade. This system has several other deficiencies that were identified after MOA Street Maintenance inspected this system using a closed-circuit television (CCTV) camera. These issues are summarized in more depth in SECTION 4.1.4 below.

MOA Street Maintenance has indicated that they'd like to remove or abandon this system entirely, if possible. The outfall on ARRC ROW is difficult to access and maintain due to improvements on private property (fencing, sheds, etc.) and mandatory coordination with ARRC to get into their ROW. ARRC has also indicated that they'd prefer for this system to be removed and redirect runoff away from their ROW, if feasible.

57th Avenue System

There are currently no storm drainage systems installed on 57th Avenue. A single curb inlet (MOA ID 1929-009) is located at the northwest quadrant of the 57th Avenue and Arctic Boulevard intersection. This inlet collects a small amount of runoff from the eastern most portion of 57th Avenue. The remaining runoff from the eastern end of 57th flows south along the west side of Arctic Boulevard to an intermediate curb inlet located halfway between 57th Avenue and 58th Avenue. Both inlets connect to the existing system located along Arctic Boulevard via 10-inch CMP leads into manholes located in the center of the turn lane.

58th Avenue System

Like the 57th Avenue system, there is no drainage infrastructure extended along 58th Avenue. Two curb inlets (MOA ID 1929-011 & 043) are located at the northwest and southwest quadrants of the 58th Avenue and Arctic Boulevard intersection. These inlets collect runoff from the eastern most portion of 58th Avenue and direct flow to the existing system located in Arctic Boulevard via 10-inch CMP leads. There is also a 6" CMP pipe connected to the north side curb inlet entering from north of the structure, and a 6" CMP pipe connected to the south side curb inlet entering from south of the structure. There are no record drawings of these pipes so it's unclear what the purpose of these pipes are and whether the pipes are connected to an upstream storm drain structure or a home. Further investigation of these pipes will be completed during the 65% design.

Arctic Boulevard & Downstream Systems

The Arctic Boulevard system adjacent to the project corridor flows north to south, with manholes located in the center of the turn lane. The two manholes (MOA ID 1930-034 & 039) located at the intersections of 57th and 58th Avenues are standard Type I storm drain manholes (4-foot inner diameter). The inlet and outlet storm drain pipe are 24-inch CMP at the 57th Avenue manhole. The inlet and outlet pipe increases in size to 30-inch CMP at the 58th Avenue manhole.

The Arctic Boulevard system is located at the upstream end of a much larger, extensive storm drain system that extends from C Street to the east, Minnesota Drive to the west, and as far south as Dimond Boulevard. This system discharges into a sedimentation basin situated just north of Dimond Boulevard, eventually discharging into Campbell Creek.

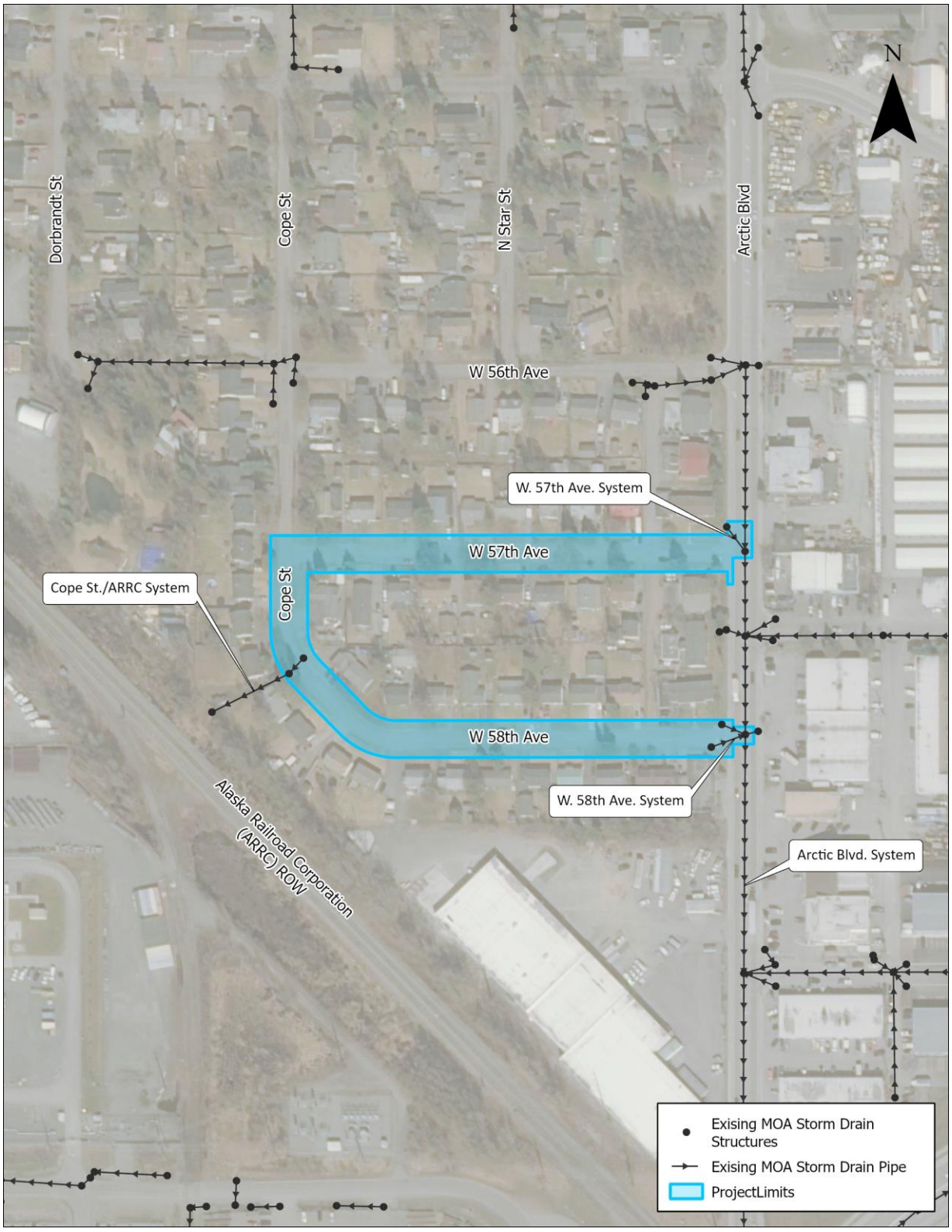


Figure 2 - Existing Storm Drain System Map

4.1.3 Water Quality Treatment

Currently, water quality treatment is not being provided for stormwater runoff generated within the project area. However, as noted above, stormwater conveyed to the Arctic Boulevard system is eventually directed to a sedimentation basin before it discharges into Campbell Creek. Sedimentation basins are designed to retain sediment-laden runoff, allowing sediment to settle out before the runoff exits the facility.

4.1.4 Storm Drain Condition Assessment

Debris in pipe invert (MOA ID 32996)

MOA Street Maintenance inspected the two storm drain pipe segments (MOA ID 32996 & 34663) that make up the Cope Street/ARRC system using a closed-circuit television (CCTV) camera in October and November 2021 (see APPENDIX C). The pipe within Cope Street (34663) appeared to be in fair condition. However, the downstream/outfall pipe (32996) had significant debris/deposits located within the last 10 feet of the pipe segment. This pipe was designed to daylight and outfall into ARRC ROW. However, over time, the embankment at the outfall became overgrown causing the end of the pipe to clog with debris, effectively blocking the outlet from discharging stormwater and likely causing surcharging conditions during rain events. Additionally, CCTV identified significant corrosion and metal loss at the invert of the pipe. Pipe 32996 is in poor condition and will require replacement if this system is to remain in the future.

In addition to the CCTV inspection, a storm drain condition assessment was performed by CRW in July 2021, to evaluate the condition of the existing storm drain structures located at the intersections of Arctic Boulevard and 57th and 58th Avenues and the connecting storm drain pipes. This infrastructure is critical to the project as the proposed storm drain improvements associated with this project will likely connect to this system. The two inspected manholes (MOA ID 1930-034 & 1930-039, see APPENDIX C for storm drain grid map SW1930) were in overall good condition. Both structures are relatively deep with approximately 9 to 10 feet of cover over the main line storm drain pipe running north to south along Arctic Boulevard. Several minor issues were identified including cracked grade rings, missing ladder rungs, and frame offsets. A total of eight storm drain pipe segments were inspected and the condition ranged widely from poor to good. Some of the issues noted include sediment deposits in invert, blockages/build-up, mineralization, deflections, joint offsets, and root intrusion.

Refer to APPENDIX C for the complete CCTV Pipeline & Structures Inspection Report (MOA Street Maintenance) and the Storm Drain Condition Assessment memorandum (CRW).

4.1.5 Drainage Concerns

Significant ponding occurs throughout the project limits after rain events and spring break up due to flat grades, settled asphalt, and heaving/discontinuous curb and gutter. Runoff cannot effectively drain to the existing curb inlets along the roadway in these conditions, resulting in further roadway degradation such as potholes, cracking, and pavement failure. These issues could be resolved by upgrading the roadway by forcing high/low points to improve surface drainage and extend a storm drain system to collect runoff at the design low points.

The inspected storm drain infrastructure discussed above noted minor deficiencies in the existing storm drain manholes at the intersections of 57th & 58th Avenues and Arctic Boulevard and some more significant issues with the Cope Street/ARRC system. In addition to the poor condition of the outfall pipe for the Cope Street/ARRC system (MOA ID 32996), it is also difficult to maintain due to limited access. MOA Street Maintenance and ARRC would like to remove/abandon this pipe and reroute runoff away from ARRC ROW, if feasible.

4.2 Hydrologic and Hydraulic Analysis

A hydrologic and hydraulic (drainage) model was developed to analyze the existing and proposed conditions for the project corridor and contributing areas. The methodology and key input parameters required to prepare this drainage model are described below.

4.2.1 Design Storm Depth and Distribution

The design storm distribution used for this drainage analysis is based on the Anchorage and Eagle River 24-hour storm duration provided in Appendix D of the Anchorage Stormwater Manual (ASM). The base design storm depth values are per ASM Table 4.2-1 (MOA Design Storm Depths) and are as follows:

- Water Quality Treatment: 90th Percentile, 24-hour – 0.52-inches.
- Conveyance Design and Peak Flow Control: 10-year, 24-hour – 2.28-inches.
- Project Flood Bypass: 100-year, 24-hour – 3.59-inches.

The 10-year, 24-hour design storm event was used to evaluate the conveyance capacity of the existing storm drain systems and if they are adequately sized. The proposed storm drain system will utilize the same storm event to size the piped system.

4.2.2 Orographic Factor

Based on the project location, no orographic factor was applied to the base design storm depths listed above. Orographic factors are used to adjust design storm volumes to reflect the increase in storm intensity based on your proximity to mountainous geography. Refer to FIGURE 3, APPENDIX D.

4.2.3 Model Information

The Soil Conservation Service (SCS) TR-55 method was used for this drainage analysis. The drainage analysis was developed using 2023 Autodesk Storm and Sanitary Analysis (SSA) computer software. This software allows the user to analyze the stormwater runoff response

from the project area and calculate data such as peak flow at specific design points in the system, evaluate pipe sizing, and identify problems areas such as flooding and surcharged pipes.

Precipitation losses were estimated using the SCS Curve Numbers based on land cover type, slope, and the hydrologic soil group for the project area. *Soil Type B* used for this drainage analysis based on Web Soil Survey (WSS) mapping developed by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). Refer to FIGURE 2, APPENDIX D for a map showing the project area and the soil groups in the surrounding area.

The time of concentration (T_c) was calculated for each contributing catchment using the SCS TR-55 method. Time of concentration is defined as the time for runoff to travel from the hydraulically most distant point of the watershed to a design point or point of interest.

The input paraments for the existing storm drain piping systems included in the model were based on surveyed data, record drawings, and information from the condition assessment report. These parameters included information like pipe size, type, inverts, and slopes.

4.2.4 Model Results

Five contributing catchments were delineated and evaluated for runoff response for the existing condition drainage model. These catchments were delineated based on the inlet structures that surface runoff will be conveyed to. The peak stormwater runoff of each catchment and the peak discharge leaving the project corridor (at specific locations) during the 10-year, 24-hour design storm event is show on FIGURE 4, APPENDIX D.

The drainage model results indicate that the existing Cope Street/ARRC system is inadequately sized to convey the design storm. This system surcharges and the two catch basins on Cope Street overtop, resulting in ponding/flooding into the roadway. While the 10-inch CMP piped system is undersized, the reverse grade between the two intercepting curb inlets associated with this system only compounds the problem.

The SSA software does not account for the runoff associated with the overtopping conditions described above and therefore makes it appear that the peak flows in each piped system are relatively low. While this is true to a point, in that the surcharged pipes have exceeded their design capacity and will allow no additional flow through, the overtopping flows will continue to flow down gradient to the next available inlet, conveyance, or low-lying area, potentially inundating or flooding areas downstream. These conditions should be considered when comparing the existing system capacity with the proposed system capacity.

It should be noted that the Arctic Boulevard system and systems downstream of it were not modeled due to the limited scope of this analysis. As such, any potential backwater and/or surcharging of these systems was not incorporated in this drainage model.

Complete drainage modeling results and input parameters for the existing conveyance systems and contributing areas described above are provided in APPENDIX D. For reference, the naming convention used for the storm drain pipes and structures in this modeling analysis uses the identification numbers as presented int the MOA Stormwater Asset online GIS mapping tool.

5.0 Geotechnical Analysis

CRW conducted a geotechnical investigation on May 11th, 2021 consisting of drilling and sampling 6 boreholes along the project roadways. Borehole locations were selected by CRW following the guidelines presented in the DCM Section 1.7 – Soil Investigation Standards. The soil locations were approved by PM&E prior to performing the field investigations. The investigation also included placing a PVC piezometer well in three borings for groundwater level monitoring. Boring locations along with the soil boring logs and details of the investigation can be found in the final Geotechnical Report in APPENDIX F.

5.1 Existing Conditions

5.1.1 Historical Bore Logs

CRW consulted the on-line MOA Soil Boring map to evaluate historic borings in the project area. No historic borings were noted to have been completed along 57th and 58th Avenues. One boring along Cope Street and two borings along Arctic Boulevard were reviewed.

On Cope Street, from an investigation completed in 1974, the closest boring encountered a 1-foot layer of gravelly sand with silt overlaying silty sand, silt with sand, and sand with silt to a total depth of 10 feet. No groundwater was observed.

Two borings along Arctic Boulevard completed in 1980, at the intersections of 57th and 58th Avenues, encountered materials consisting of a 2-to-3-foot layer of well graded gravel with sand and silt. Underlying the gravel was peat which ranged from 3.5 to 6 feet in thickness. Below the peat was silt or silty sand which extended to the depth of the borings to 10 feet. No groundwater was observed.

5.1.2 CRW Field Investigation

The pavement thickness, where encountered, ranged from 1.5 to 2.5 inches based on measurements of recovered samples. The subsurface conditions within the existing road prism where borings occurred generally consisted of a 1 to 3-foot thick layer of granular fill underlain by fine grained material. The granular fill classification mixed between poorly graded gravel to poorly graded sand with varying fines content. The frost susceptibility was estimated to be F-1 frost classification. The fine-grained material below the granular fill varied between poorly graded sand, silty sand, silt, sandy silt, and clayey silt. The frost susceptibility was estimated or determined to range from F-2 to F-4 frost classification.

A layer of peat was encountered in BH-06 from approximately 2.5 to 6 feet below ground surface (BGS). The moisture content ranged from 157 to 216 percent. BH-06 was in the alley north of 58th Avenue beyond the ROW line extended. Peat was not encountered in any other borings.

The groundwater table was observed during drilling between 9 and 16 feet BGS, with two boreholes not encountering groundwater. Subsequent groundwater measurements varied between 6 and 15 feet BGS.

5.2 Recommendations

5.2.1 Site Preparation and Dewatering

All pavements, existing fill, existing curbs and gutters, trees, stumps, and other deleterious material should be cleared from the roadway reconstruction limits. Exposed subgrade at the bottoms of excavations should be scarified a minimum of 6 inches, moisture conditioned, and rolled smooth.

Subsurface conditions show the groundwater table below anticipated roadway excavation bottoms based on measurements taken at the time of drilling and during subsequent readings. Dewatering is generally not anticipated to be required for the project except for deep utility excavations.

5.2.2 Utility Excavation

Any excavations for utilities should follow proper local, state, and federal requirements, including Occupational Safety and Health Administration (OSHA) standards. The soil and groundwater conditions for utility excavations may vary. The contractor is responsible for trench stability, worker safety, and regulatory compliance as he will be present daily and can adjust efforts to obtain the needed stability. Surface runoff entering the excavation could present challenges and should be accounted for during construction. We anticipate excavations to use benching/sloping or shielding.

All utilities should be bedded, backfilled, and compacted as required per Municipality of Anchorage Standard Specifications (MASS). Board. The satisfactory performance of piped utilities is highly dependent upon the quality of soil below and along the sides of the pipe. Existing fill and native material that meets the classification for bedding/backfill material can be reused in utility trenches.

5.2.3 Recommended Road Structural Section

The project area contains frost susceptible subgrade with a F-2 to F-4 frost classification within 8 feet of the ground surface. Based on this, an insulated structural section is recommended using the Limited Subgrade Frost Penetration Method for the entire project alignment. We have developed a recommended structural section based on the BERG2 analysis as shown in the TABLE 4 below.

Table 4 – Recommended Structural Section

Layer	Minimum Thickness (inches)
Asphalt Pavement (Class E)	2
Leveling Course	2
MOA Type II-A	16
Insulation (R9)	2
MOA Type II	24
Geotextile	N/A
Total Thickness	46

We recommend the insulation have a minimum R-value of R-4.5 per inch and meet current MASS requirements. Board insulation installation should be extended a minimum of 4 feet beyond the back of the curb when no sidewalk is present. Extending the insulation 4 feet will reduce the risk of the curb heaving up or "curb rolling." The risk of curb rolling decreases as the distance the insulation extends beyond the BOC increases. When frost susceptible soils are present, extending the insulation 4 feet beyond the back of curb has protected the curb well on past projects. This is especially important when roadway grades are flat like on 57th and 58th Avenues.

Transitions between insulated and non-insulated sections should involve the extension of insulation beyond the roadway section 8 to 12 feet with the thickness reduced in these areas to minimize the possibility of differential heave. The insulation can be tapered from an R-value of 9 to an R-value of 4.5 in the transition zone. The subgrade in transitions should be graded (tapered) at a 10H:1V (horizontal to vertical) slope if construction distances permit. We recommend the transitions not be steeper than 5H:1V.

Based on groundwater measurements along the project alignment, subdrains are not required.

6.0 Design Criteria and Standards

Project design criteria are based on the roadway characteristics, functional classification, and road ownership. The Norann project roadways are classified as secondary (local) urban residential roadways are owned and maintained by the MOA. The DCM provides detailed design criteria for the development of roadways and infrastructure within the MOA. Anchorage Municipal Code (AMC) Title 21 also provides design requirements for all municipal land within the corporate limits of the MOA.

6.1 Roadway Design Criteria

A summary of roadway design criteria pertinent to this project can be found in TABLE 5 below. Proposed variances from design criteria are described in SECTION 16.0.

Table 5 – Roadway Design Criteria Summary

	Criteria	Design Standard Value	Reference
Traffic Data	Functional Classification	Secondary Street: Urban Residential	OSH&P
	AADT (average)	155	2021 Traffic Study
	Design Vehicle	WB-50	DCM 6.4 B
	Design Structural Loading	HS 20	ASM 5.3.10
	Design/Posted Speed	25 MPH	DCM Table 1-6
Horizontal Alignment	Horizontal Curve Radius, Minimum, No Superelevation	150 ft	DCM Table 1-9
	Stopping Sight Distance, Min	155 ft	DCM Figure 1-20
	Clear Sight Triangle Length	280 ft	DCM Figure 1-19
Vertical Alignment	Vertical Grade, Maximum	6.0%	DCM 1.9.D.2.b
	Vertical Grade, Minimum	0.5% for street w/ curb and gutter	DCM 1.9.D.2.a
	Vertical Curve K-Value, Min, Crest	12	DCM Figure 1-16
	Vertical Curve K-Value, Min Sag	26	DCM Figure 1-17
Cross Section	Side slopes	2Horizontal:1Vertical max	DCM 1.9.D.5
	Snow storage area	7 feet outward from back of curb	AMC Title 21.08.030.F.3
	Number of Traffic Lanes and Width	2, 10 ft	DCM Table 1-6
	Number of Parking Lanes and Width	1, 7 ft	DCM Table 1-6
	Shoulder Width (No Parking Lane)	3.5 ft	DCM Table 1-6
	Curb & Gutter Type	Type 2 (DCM) Type 1 or Type 2 if warranted (Title 21)	DCM 1.9.F.1.c AMC Title 21.08.050.G
	Sidewalk Requirements and Width	Both sides of the roadway, 5 ft min	AMC Title 21.07.060.E.2.b
	Sidewalk Separation from Back of Curb	7 ft (for collectors and higher classification)	DCM 4.2 H
Intersections & Driveways	Curb Return Radii at Side Streets	20 ft (local/local) 30 ft (local/collector or arterial)	DCM Figure 1-22
	Driveway width: up to 7-plex	14 – 20 ft; (28 ft with restrictions)	MOA Driveway Standards 11/3/21
	Max residential driveway grade and Landing grade/length	Max grade = ± 12% ± 2% for 12 ft	MOA Driveway Standards 11/3/21

6.2 Roadway Cross Section Standards

Per the DCM Table 1-6, secondary (local) urban residential streets with less than 300 ADT should have a street width of 31 feet (measured from BOC) with 2 travel lanes, 1 parking lane (or 2 shoulders), and curb and gutter. The lane width for a local residential street with less than 300 ADT is 10 feet and the parking lane width is 7 feet. If a parking lane is not provided, shoulders should be provided with typical widths of 3.5 feet. Per the MOA Traffic Engineering Department, no roadway traffic markings are typically installed on local roads.

Per the DCM 1.5.G, pedestrian facilities shall be provided as specified in AMC Title 21 for local streets. Per AMC 21.07.060.E.2.b 5-foot wide sidewalks shall be provided on both sides of a local street in Class A zoning districts. It is preferable for the sidewalks to be separated from the roadway to provide pedestrian comfort and safety, increase intersection sight distances, and provide room for snow storage however separation is not required for a local roadway. A clear area of 7 feet beyond the back of curb is required for snow storage. The sidewalk can be considered as part of the snow storage area. Roadway sections with narrow shoulders provide little room for snow storage on the street and require snow to be temporarily plowed behind the curb. This may impede pedestrian passage on an attached sidewalk and/or buffer area during major snow events until the snow is cleared.

Per DCM 1.9.F.1 curb type for secondary (local) streets is required to be Type 2 (rolled) curb and gutter. AMC Title 21.08.050.G requires curb and gutters to be in accordance with the DCM but shall be Type 1 (barrier) except for the following exceptions:

1). Curb and gutter within the arc of a residential scale cul-de-sac may be Type 2 (rolled) curb and gutter.

2). Type 2 (rolled) curb and gutter may be provided for residential minor streets as defined in Subsection 21.08.050.D.1.a.i.

i.) that do not require installation of sidewalks per Section 21.08.050.H; or

ii.) when the pedestrian facilities will be separated from the curb by a minimum of 3 feet; or

iii.) if the Municipal Traffic Engineer determines that strict adherence to Type 1 curb is not expected to improve walkability or is not achievable based on documentation to include topography, developmental lot size, anticipated driveway spacing, and dimensional standards.

a) AMC Title 21.08.050.D.1.a.i. states residential minor states have the sole purpose of providing frontage for service and access to individual lots. These streets carry only traffic having either an origin or a destination on the street itself, and include cul-de-sacs or small loops carrying 500 average daily trips.

6.3 Drainage Criteria

A summary of the pertinent storm drain design criteria per the Anchorage Stormwater Manual (ASM) Volume 1 is provided below:

- Storm drain pipes shall be Type S corrugated polyethylene pipe (CPEP) or Type S pre-coated corrugated metal pipe (PCMP) due to corrosion issues in Anchorage area.
- Minimum diameter of storm drain pipe is 12 inches. Catch basin lead minimum size is 10-inch in diameter.
- Minimum pipe slope is 0.30%.
- The storm drain system shall not be surcharged during the design storm event.
- At the design flow, minimum pipe flow velocity is two feet per second (fps). Maximum pipe flow velocity is 13 fps.
- Minimum depth of cover over a gravity storm drain pipe without thaw protection is four feet.
- Insulation is required for pipes if the depth of cover is less than four feet. If storm drain pipe is located under a roadway structural section and insulation is included in roadway section, additional insulation for pipe is not required.
- A thaw system is required if the depth of cover is less than three feet.
- Maximum manhole spacing is 300 feet.
- Minimum invert elevation difference across a manhole is 0.05 feet.
- Flared end sections or headwalls are required on all storm outfalls.

6.4 Lighting Criteria

Light levels and uniformity ratios for roadway, pedestrian facilities, and at intersections per Chapter 5 of the DCM are summarized below:

- Roadway (not including intersections):

  For a local roadway with low pedestrian activity, such as the roadways in the project area, the DCM recommends a minimum maintained average of 0.4 foot-candles with an average-to-minimum uniformity ratio no greater than 6:1 and a veiling luminance ratio no greater than 0.4.

- Pedestrian Facilities:

  Pedestrian activity within the project area meets the “low” criteria provided in Chapter 5 of the DCM. For adjacent pedestrian facilities within the low pedestrian volume criteria, Chapter 5 of the DCM includes three light level requirements based on land use: rural/semi-rural, low-density residential, and medium-density residential. In areas with medium-density homes such as the project area, a minimum maintained average of 0.4 foot-candles with an average-to-minimum uniformity ratio no greater than 4:1 is required.

- Intersections:

  For the purpose of lighting intersections, the DCM uses the following roadway classifications based upon the Average Daily Traffic (ADT), note these do not apply to standard street classifications:

  Major: over 3,500 ADT

Collector: 1,500 to 3,500 ADT

Local: 100 to 1,500 ADT

Below, in TABLE 6, is a summary from the DCM Table 5-5 for lighting design criteria of intersections and is based upon the ADT roadway classifications.

Table 6 – Illuminance & Maximum Uniformity for Intersections (DCM Table 5-5)

Functional Lighting Classification	Average Maintained Illuminance (low pedestrian area)	Maximum Uniformity Ratio
Major/Major	1.8	3.0
Major/Collector	1.5	3.0
Major/Local	1.3	3.0
Collector/Collector	1.2	4.0
Collector/Local	1.0	4.0
Local/Local	0.8	6.0

All intersections in the project area are considered Local/Local and will require a minimum average illuminance of 0.8 FC foot-candles with an average-to-minimum uniformity ratio no greater than 6:1. Providing illumination within Arctic Boulevard is not part of the scope of this project.

7.0 General Design Considerations

7.1 Right-of-Way Acquisition and Temporary Construction Permits

A key element for the successful completion of any project is the acquisition of any required ROW, easements, and/or permits while providing fair and equitable treatment to all affected property owners, tenants and lessees. Individual parcel's acquisition details are determined on a case-by-case basis and negotiated privately between the MOA and the property owner.

In general, public use easements (PUE) are required in areas where the footprint of the improvements is outside the ROW. Slope easements (SE) are required for areas where the cut and fill slopes are outside of the ROW and need to be maintained. Drainage easements (DE) are required for drainage facilities installed outside the ROW. Temporary construction permits (TCP) are required outside the ROW for matching new driveway grades to existing driveway grades, installation of sewer services or water key boxes at the property line, and the relocation, removal or repair of improvements such as mailboxes, curbs, landscaping, fencing, and encroaching structures. Temporary construction easements (TCE) allow contractors temporary access outside the ROW to construct improvements that are within the ROW, but where there is insufficient space within the ROW or an existing easement to conduct the work. Right-of-way impacts are discussed in SECTION 10.0 below.

7.2 Mailboxes

Individual mailboxes at the single-family residences will be impacted by the proposed improvements. Some past projects have attempted to change mail delivery from individual mailboxes to cluster mailboxes. Recent communication with the United States Postal Service (USPS) indicates that to change from individual to cluster mailboxes the following must occur:

- Every affected resident must agree to the change from individual mailboxes to cluster. If even one resident doesn't agree, the mailboxes cannot be switched to cluster style. To officially make the change in mail service, a signed concurrence from each owner is required.
- MOA is required to purchase the cluster mailboxes and install concrete foundations.

From past PM&E project experiences, it is very hard to gain concurrence from all affected residents, thus this project plans to re-install individual mailboxes. Individual mailboxes can be re-used where feasible. If the existing mailboxes/posts do not meet current postal standards or are damaged during removal, they will be replaced with new boxes and posts that meet current standards.

7.3 Lighting

The proposed lighting system for the Norann project roadways will include round streetlight poles with light fixtures mounted at 30 feet above the roadway surface. Cast-in-place luminaire foundations will be installed to minimize potential impacts to existing water/sewer infrastructure due to the location and age/material type of the water/sewer mains. Per Chapter 5 of the DCM, in low-speed urban areas like the Norann project area, luminaire pole bases should be fixed base (i.e. non-breakaway). This is because the impact on a vehicle and its occupants with a fixed base at low speeds is considered less hazardous than the potential harm from falling (breakaway) poles.

The lighting system will include energy efficient LED luminaires that provide a full cutoff light distribution. Where feasible, the poles will be located at property lines to reduce the light trespass into adjacent homes located on each parcel. The lights will also be equipped with backlight shields to minimize light trespass.

Based upon the ADT, all roadways in the project area are classified as Local roads. Roadway lighting between intersections will meet the DCM requirements for a local low-speed urban road with low pedestrian activity.

The proposed lighting system will consist of approximately 14 LED street light poles and a new Type 1A load center. The load center location will need to be coordinated and approved by CEA during the detailed design, but the initial proposed location is on 57th Avenue near the intersection with Arctic Boulevard.

7.4 Private Improvements in ROW

Property owners who have personal improvements in the ROW, such as fences or retaining walls have the option of applying for encroachment permits for the improvements, removing them at their own expense, or allowing the corrective action be incorporated into the project design.

Encroachment permits for fences and retaining walls within the roadway clear zone or within the snow storage area (7 feet from back of curb) are usually not granted. Fences within the ROW for this project will be removed and reset onto the property line. If an owner doesn't wish for the fence to be reset, it will be disposed. Retaining walls will be removed and placed onto the property. If an owner doesn't wish for the retaining walls to be placed on property, it will be disposed.

8.0 Roadway Design Alternatives

To correct the poor condition of the roadway surfacing and irregular curbs, the roadway structural section needs to be replaced. Vertical profile adjustments are anticipated to improve drainage and promote positive stormwater flows to the new storm drain system. Pedestrian facilities are proposed to provide safe walking routes for residents. Details of the roadway design elements are discussed below. Roadway plan and profile drawings depicting alternatives for upgrades and the location of individual parcels can be found in APPENDIX A.

8.1 Design Challenges

Some of the significant roadway design challenges associated with the Norann project include:

- There are 41 single-family homes and 1 duplex that have direct access to the project roadways in the project area with some driveways located closely together. The closely spaced driveways limit available snow storage between the driveways.
- Some single-family homes were constructed prior to municipal code requirements for offsets from ROW lines which require parking to extend into the ROW.
- The existing rolled (Type 2) curb along 57th/58th Avenue and lack of curb on Cope Street allows for full frontage access to on-property parking. Installation of barrier (Type 1) curb and gutter along the roadway will limit property access to driveway curb cut locations and could affect the ability for property owners to access existing parking spaces.
- Many existing driveways have no landings, and a several driveways have grades steeper than MOA DCM maximum allowable grade of 12%.
- Roadway grades are typically flat, as low as 0% in some places. There are known surface drainage issues in the project area.
- Residents may perceive the grassed ROW area in front of their house as part of "their front yard." Reconstructing the roadway and impacting those improvements, may be perceived as impacting private property. Also, many private improvements extend into the ROW.

Parcel 20 (west) driveway has no landing, the driveway grade is over the DCM maximum, the driveway is wider than allowable, and the garage is located only 8' from the property line which requires parked vehicles to park in the ROW

8.2 Roadway Alternative Cross Sections

Two roadway cross section alternatives were developed to upgrade the roadways to be in conformance or closer to conformance with current DCM and AMC requirements. Both alternatives include two 10-foot wide travel lanes with one 7-foot wide parking lane and Type 1 (barrier) curb and gutter for a total width measured to BOC equal to 31 feet. No roadway traffic markings are proposed, effectively allowing parking along either side of the roadway. The structural section will adhere to the geotechnical recommendations discussed in SECTION 5.0. Below is a description of each alternative.

8.2.1 Alternative 1

Alternative 1 (see FIGURE 3) includes proposed 5-foot wide sidewalks on both sides of the roadway with 3-foot wide concrete buffers to provide space to install the individual mailboxes. Providing sidewalks on both sides of the roadway meets the requirements of AMC Title 21 however results in more negative impacts to existing driveways as discussed in SECTION 8.5 below. The proposed concrete buffer is eliminated along the east side of Cope Street along Parcels 20 and 47 to allow for better grade matching into the existing steep driveways.

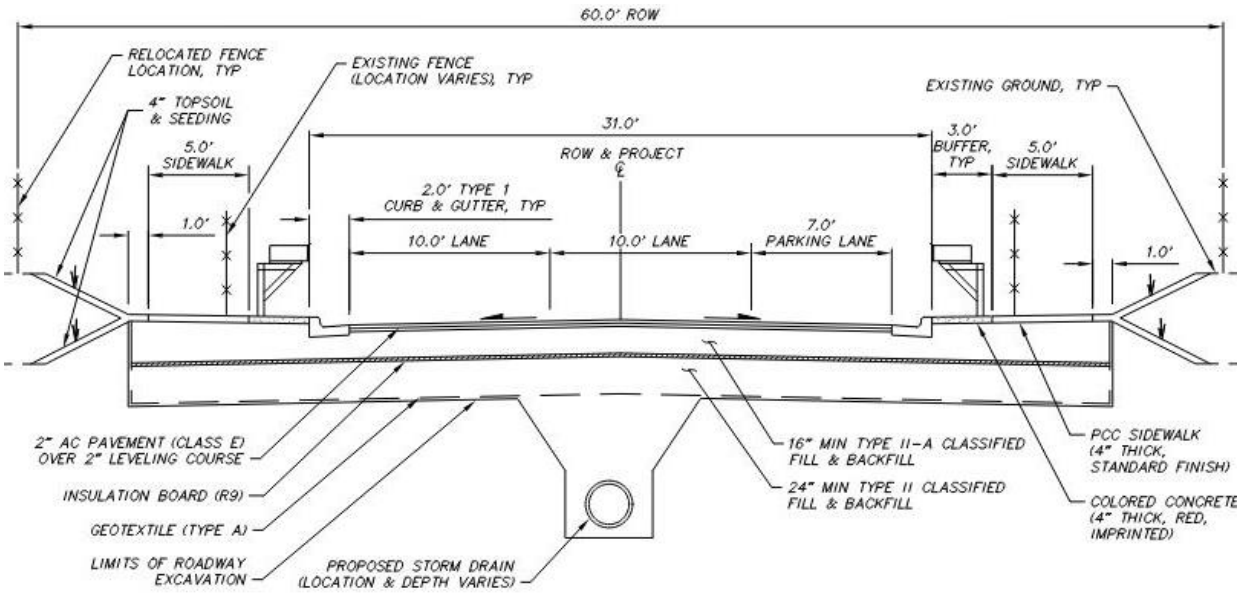


Figure 3 - Alternative 1 Roadway Cross Section

8.2.2 Alternative 2 (Preferred)

Alternative 2 (see FIGURE 4) includes a proposed 5-foot wide sidewalk on one side of the roadway with a 3-foot wide concrete buffer to provide space to install the individual mailboxes. One sidewalk has less impact to existing driveways compared to Alternative 1 however it doesn't meet the requirements of AMC Title 21 but does bring the facility in closer conformance. The proposed sidewalk is located on the north side of 57th Avenue. It's located on the west side of Cope Street and south side of 58th Avenue due to the steep driveway to Parcel 20 (west) side garage and the steep full frontage driveway along Parcel 47. Alternative 2 is the preferred alternative since it has less impacts to driveways as compared to Alterative 1. Installing Type 2 curb and gutter at select locations will be investigated during the 65% design to eliminate the on-property storm drain catch basin along Cope Street. The use of a grass buffer instead of a concrete buffer will also be investigated.

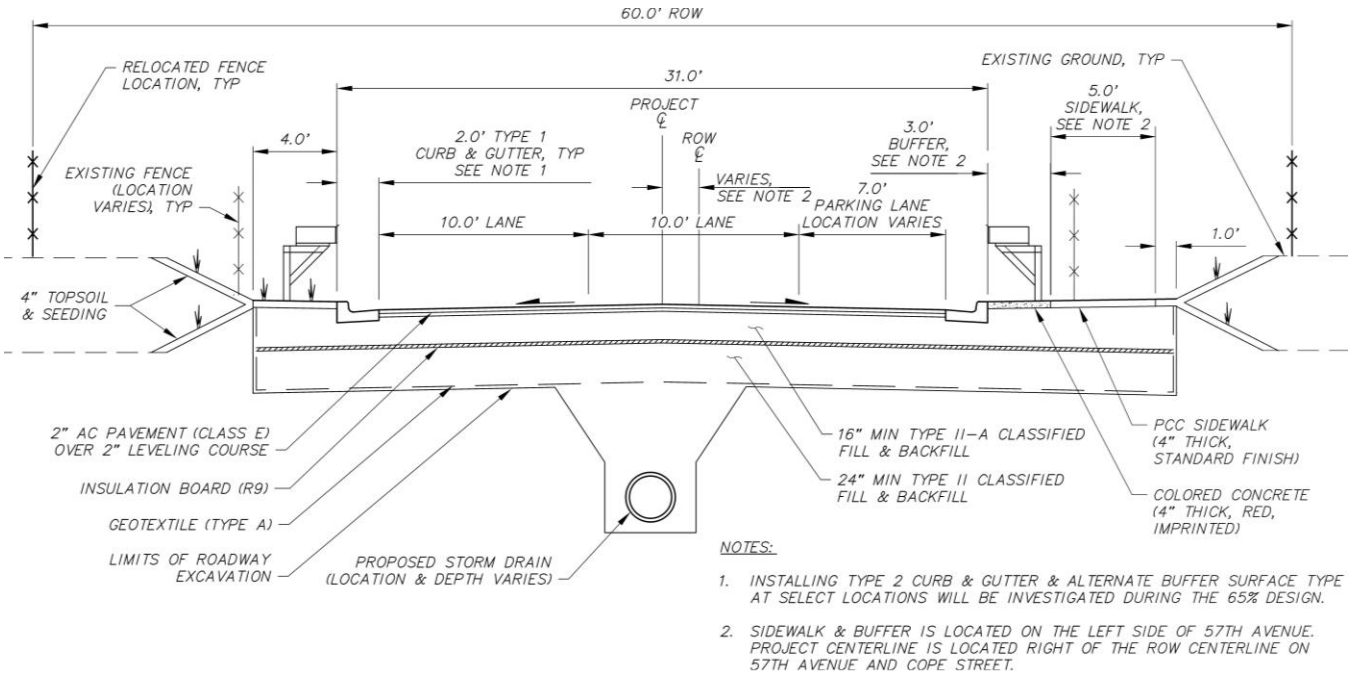


Figure 4 - Alternative 2 Roadway Cross Section

8.3 Horizontal Design Alignment

The horizontal roadway design varies per alternative as described below.

8.3.1 Alternative 1

Alternative 1 is symmetrical and therefore is typically centered within the ROW to balance adjacent impacts. The exception is along Cope Street where the proposed roadway is shifted to the west of the ROW centerline to allow for an equivalent proposed driveway grade to the Parcel 20 (west) garage. The horizontal curves at the transition from Cope Street to Cope Street are proposed to have a 100-foot radius to match the centerline ROW curves. The proposed curves will be less than the minimum 150-foot radius required per the DCM but will keep the improvements within the ROW.

8.3.2 Alternative 2 (Preferred)

Alternative 2 is not symmetrical on both sides of the roadway therefore this alternative typically centers the proposed overall roadway cross section (measured from back of curb to back of sidewalk) within the ROW to balance adjacent impacts. For 57th Avenue the proposed sidewalk is on the north side, thus the proposed roadway centerline is shifted to the south and for 58th Avenue the proposed sidewalk is on the south side, thus the roadway centerline is shifted to the north. Like Alternative 1, along Cope Street the proposed roadway is shifted to the west of the ROW centerline to allow for an equivalent proposed driveway grade to the Parcel 20 (west) garage. The northern horizontal curve radius at the transition from Cope Street to 58th Avenue is proposed to be 100 feet while the southern curve radius is proposed to be 125 feet. The 125-foot radius is required to avoid the proposed curb and gutter from impacting an existing sewer

manhole and with only one proposed sidewalk still allows for the improvements to fit within the ROW.

For 57th and 58th Avenue, centering the overall roadway cross section within the ROW places the proposed storm drain catch basins close to the existing AC sewer main. During the 65% design, shifting the roadway to provide more separation between the proposed storm drain catch basins and the existing sewer main will be investigated in more detail.

8.4 Vertical Profile Design Alignment

The overall intent of the proposed roadway vertical profile design is to increase roadway grades to promote positive drainage to storm drain structures while minimizing impacts to driveways and minimizing easements/permits on adjacent properties. As can be expected, there will be more impacts beyond the sidewalk/back of curb the more the roadway is changed from the existing grade. For both design alternatives the vertical profile design forces high/low spots and has a minimum grade of 0.65%. Both alternatives will require some special fill grading areas be constructed onto property to provide positive drainage toward the roadway where the proposed profile grade is raised. The locations where the profile grade is to be adjusted were chosen to balance driveway grade changes by not making proposed driveway grades too steep while also maintaining minimum driveway grades to ensure positive drainage. Even though undesirable, there may be some locations where a storm drain field inlet will need to be installed behind the sidewalk/curb and gutter to drain the area appropriately.

8.5 Driveways

Driveways will need to be reconstructed to match the proposed vertical profile design. The length of driveway improvements will depend on the proposed grade adjustments required at each driveway. Proposed conceptual driveway grades for both alternatives were analyzed and are summarized along with existing grades in APPENDIX H. Many driveways do not have the DCM required landings and have relatively steep grades (8-17%). Therefore, driveway landings beyond the back of sidewalk are not recommended to minimize significant grade changes. Since Type 1 (barrier) curb and gutter is proposed, driveway curb cuts will need to be provided at each driveway. Proposed conceptual plan view driveway locations, widths and reconstruction limits for both alternatives are shown on the roadway plan and profile drawings in APPENDIX A. The proposed driveway widths meet the requirements of the DCM but are narrower than the existing width for the following Parcels: 16, 20 (west), and 47. Specific driveway impacts per Alternative are discussed below.

8.5.1 Alternative 1

For Alternative 1, the following parcels have proposed driveway grades that are steeper than the DCM maximum grade of 12% and greater than the existing driveway grade: 14, 15, 20 (west & north) and 47.

8.5.2 Alternative 2 (Preferred)

For Alternative 2, the following parcels have proposed driveway grades that are steeper than the DCM maximum grade of 12% but are less than or equal to the existing driveway grade: 14,

15, and 20 (west). Because only one sidewalk is proposed, there are less non-compliant proposed driveways compared to Alternative 1.

8.6 Posted Speed Limit

The recommended posted speed limit is 25 mph, which matches the current posted speed limit.

9.0 Drainage Design Alternatives

The storm drain inspection work and the hydrologic & hydraulic analysis discussed in SECTION 3.3 identified several deficiencies in the existing storm drain systems within the project limits. Also noted throughout this study is the poor condition of the roadway, heaving curb and gutter, and ponding issues either caused by or made worse by the lack of proper drainage facilities along the project corridor. This project will correct these drainage issues and install the appropriate infrastructure to provide a functioning roadway for years to come.

The proposed drainage improvements consist of the following:

- Install new storm drain system to accommodate the design storm event.
- Abandon existing, failing Cope Street/ARRC storm drain system.
- Install catch basins at designed roadway low points and provide positive roadway drainage to alleviate ponding issues.
- Provide water quality treatment for stormwater runoff exiting project corridor.
- Provide freeze protection for proposed storm drain systems as required.
- Fix deficiencies in existing storm drain systems within project limits.

9.1 Storm Drain Alternatives

Two storm drain alternatives were developed and evaluated to correct the drainage issues along the project corridor and comply with current ASM design requirements. Below is a description of each alternative.

9.1.1 Alternative 1

Alternative 1 consists of three new storm drain systems within the project limits.

For 57th Avenue, a 12-inch corrugated polyethylene pipe (CPEP) will extend west approximately 420 linear feet from the existing storm drain manhole (MOA ID 1930-034) located in Arctic Boulevard. The main line pipe will be installed north of centerline, placing manhole lids outside of wheel paths when possible. The roadway design for this alternative forces 2 low points along 57th Avenue. A combination of curb inlets and manholes are designed to collect stormwater runoff at these low points and convey it to the gravity piped system. Curb inlets will be placed in the curb returns at the east end of 57th Avenue to intercept runoff prior to the curb ramps adjacent to Arctic Boulevard. All runoff from the 57th Avenue system will flow west to east and discharge into the existing manhole in Arctic Boulevard.

The proposed storm drain system on 58th Avenue mirrors the 57th Avenue system. This system also consists of a 12-inch CPEP that will extend approximately 310 linear feet west from the existing storm drain manhole (MOA ID 1930-039) located in Arctic Boulevard. This system will also collect drainage at two forced roadway low points and any remaining runoff at the east end of the roadway. Runoff from this system will also discharge into the Arctic Boulevard system.

The existing system located at the south end of Cope Street will be removed and replaced as part of Alternative 1. The upgrades will include replacing the north curb inlet with a standard catch basin and the south curb inlet (downstream) with a Type II catch basin manhole, which will provide much needed access to this structure for maintenance of the upstream and downstream pipes. The existing undersized and deteriorated 10-inch CMP will be replaced with 12-inch CPEP in its current location. The outfall pipe will continue to discharge runoff onto ARRC ROW as it currently does. However, the outlet end of the pipe will be upgraded with a riprap energy dissipator to minimize erosion and protect the pipe from being overgrown and clogged.

Removal and installation of a new storm drain outfall to the ARRC ROW will require excavation very close to Parcel 26 and 27 homes. If Alternative 1 is chosen, special construction techniques will be investigated further during the preliminary design to minimize potential impacts to the homes.

Refer to the Alternative 1 Roadway Plan & Profile drawings in APPENDIX A that show the proposed storm drain configuration for each of these systems.

9.1.2 Alternative 2 (Preferred)

Alternative 2 consists of two new storm drain systems and removes the existing Cope Street/ARRC system.

The 57th Avenue system described in Alternative 1 above remains unchanged in Alternative 2.

The proposed storm drain system for 58th Avenue is similar to Alternative 1; however, the system will extend further west and north just south of the Cope Street/57th Avenue intersection. The roadway design for this alternative forces two additional low points along Cope Street. Curb inlets will be installed at these low points to collect stormwater runoff and convey it east to the existing system on Arctic Boulevard. The main line pipe for this system ranges in size from 12-inch CPEP for the upstream segments and increases to 15-inch CPEP for the final 3 pipe segments before connecting to existing storm drain manhole (MOA ID 1930-039) located in Arctic Boulevard.

As noted in SECTION 4.1.4, the existing Arctic Boulevard storm drain system is relatively deep with approximately 9 to 10 feet of cover over the main line storm drain pipe (typical cover is 4 feet). The proposed storm drain design takes advantage of that depth by connecting into the Arctic Boulevard system at a depth deeper than typical. This allows the proposed 58th Avenue/Cope Street system to extend to the existing low point at the south end of Cope Street, as well as the new low point south of the Cope Street/57th Avenue intersection. In doing so, the existing outfall pipe associated with the Cope Street/ARRC ROW can be removed entirely.

It should be noted that the drawback to lowering the pipe along 58th Avenue are the conflicts with existing water and sewer service lines along this roadway, as well as the conflict with the 10-inch water main crossing in Arctic Boulevard. The impacted services and main will need to be raised/lowered to avoid conflict and provide sufficient vertical separation to meet DEC requirements.

Alternative 2 also includes abandoning the existing storm drain outfall from Cope Street to the ARRC ROW in place by installing concrete slurry in the pipe to avoid potential impacts to the existing Parcel 26 and 27 homes.

Alternative 2 is the preferred alternative for the storm drain upgrades for this project. This alternative provides a more continuous storm drain system along the project corridor that will improve the overall drainage along the roadway. It also eliminates the Cope Street/ARRC outfall pipe, which is preferred by MOA Street Maintenance and ARRC.

Storm drain plan and profile drawings depicting the improvements described in this section can be found in APPENDIX B.

9.2 Water Quality Treatment

Section 3.3.2.1 of the ASM states that roadway projects with narrow ROW (60-feet or less) may choose to provide water quality treatment for stormwater runoff through either Green Infrastructure (GI) or traditional treatment. Cope Street and 57th and 58th Avenues were constructed within a 60-foot ROW corridor. Given the narrow ROW, location of existing utilities, and other site constraints, implementation of Green Infrastructure (GI) was determined to be infeasible for this project. Therefore, water quality treatment will be provided by oil & grit separators (OGS).

For both Alternative 1 and 2, an OGS will be installed just upstream of the tie-in to the Arctic Boulevard system on both 57th and 58th Avenues. A bypass system will be installed around each OGS for maintenance purposes. The OGS and bypass systems will be detailed during assembly of the preliminary design drawings.

If Alternative 1 is selected, GI may be implemented at the outfall of the reconstructed Cope Street/ARRC system. A GI stormwater control such as an infiltration trench or small sediment pond will be analyzed as options for water quality treatment and detention/retention, if required.

9.3 Improvements to Existing Infrastructure

Alternatives 1 & 2 connect to the existing storm drain manholes in Arctic Boulevard (MOA ID 1930-034 & 1930-039). These structures were inspected (see SECTION 4.1.4) and minor deficiencies were noted including cracked grade rings, missing ladder rungs, and frame offsets. These deficiencies will be corrected regardless of which alternative is

Cracked grade rings (MOA ID 1930-039)

selected.

9.4 Freeze Protection

According to ASM Section 5.3.3, the minimum depth of cover over a gravity storm drain pipe without thaw protection is 4-feet. Insulation is required for pipes with a diameter less than 30-inches if the depth of cover is less than four feet. However, if a storm drain pipe is located under a roadway structural section with insulation, additional insulation for the pipe is not required. A thaw system is required if the depth of cover is less than 3-feet.

The roadway structural section includes insulation for this project, so additional insulation will not be required for storm drain that is located between three and four feet of cover. Heat trace will be installed for pipes that have less than 3-feet of cover. Heat trace is proposed to be installed for Alternative 1 in the storm drain outfall to ARRC ROW and for Alternative 2 in the storm drain system along Cope Street.

9.5 Hydrologic and Hydraulic Model Results

A hydrologic and hydraulic (drainage) model was developed for the proposed storm drain conveyance systems for both Alternatives 1 and 2, using the same methodology as outlined for the existing conditions drainage model in SECTION 4.2. The purpose of the proposed drainage model is to properly size the new stormwater system and correct any issues identified in the existing system.

A total of 15 and 20 contributing catchments were delineated and evaluated for runoff response for the proposed condition for Alternatives 1 and 2, respectively. The contributing catchments within the project boundaries were adjusted from the existing condition to account for the addition of new inlets planned along 57th and 58th Avenues and Cope Street.

Peak runoff from each catchment and peak flows exiting the project corridor at select locations for the proposed drainage systems are reflected in FIGURES 5 & 6, APPENDIX D. The complete SSA modeling report and results can also be found in APPENDIX D. Proposed pipe sizing, type, and configuration for the drainage improvements is described in SECTION 9.1 above.

10.0 Right-of-Way Impacts

Preliminary estimated easement and permit requirements are summarized for each alternative in TABLE 7 below and are detailed in APPENDIX J. As the planning and design of this project progresses, the required easements and temporary construction permits will be refined.

Table 7 - Preliminary Estimated Easements / Permits

Alternative	Public Use Easements (PUE)	Slope Easements (SE)	Drainage Easements (DE)	Temporary Construction Easements (TCE)	Temporary Construction Permits (TCP)
1	4	3	1	3	48
2	3	3	1	2	48

11.0 Utility Impacts

When roadway and drainage improvements are made in urban areas, impacts to utilities need to be analyzed. Existing utility facilities are shown in the roadway plan and profile drawings in APPENDIX A. The location of the utilities are based on field locates/survey/utility potholes and utility company facility maps.

During the development of the Draft DSM, the following utilities were potholed to attain the elevation of the top of the utility to determine the feasibility of the storm drain alternatives:

- Sewer services – Parcels 6-9 on 57th Avenue. Parcels 32 and 34-38 on 58th Avenue.
- Gas lines – At the alley crossing 57th Avenue and at Arctic Boulevard crossing 58th Avenue.
- Telephone/fiber optic duct – At Arctic Boulevard crossing both 57th Avenue and 58th Avenue.

The vertical location of the sewer services that were potholed are shown in the storm drain plan and profile drawings in APPENDIX B.

In the ROW, the Municipality requires a minimum burial depth of 42 inches for buried gas lines, electric cables, fiber optic lines, telephone cables, and cable television lines. For utilities that were not potholed it is assumed that the existing buried facilities in the project area are buried at the minimum depth. As a result, any reduction of cover over existing facilities or impacts from storm drain improvements will require relocation of the facility. In some locations, the structural section excavation will impact utilities. In these locations the utilities will either require relocation or will require support in place for the contractor to work around the utility. The utility relocation cost estimates for each Alternative are shown in APPENDIX G.

AWWU requires a minimum depth of cover of 10 feet over their water mains and 8 feet over their sewer mains. Changes to the roadway grade where sewer and water mains exist along the corridor are minor and are not anticipated to substantially reduce the existing cover over the water and sewer mains.

Water and sewer services will be impacted by the proposed storm drain improvements for both alternatives. The following assumptions were made to quantify water and sewer service impacts:

- Water/sewer services that are impacted due to construction will be reconstructed from the main to the property line.
- Due to the age and AC material type of the sewer services, if a proposed storm drain main is to be installed beneath a sewer service it will require that the sewer service be reconstructed.
- Sewer services that are to be reconstructed below the proposed storm drain will require the use of vertical fittings. See sewer service reconstruction figure in APPENDIX K for the worst-case scenario of a sewer service needing to be reconstructed below the proposed storm drain.
- Since no water services were potholed, it's assumed that when the bottom of the proposed storm drain main is within 2 feet of the top of the existing water main, the crossing existing water service will need to be reconstructed assuming it conflicts with the proposed storm drain main.

The water and sewer service reconstruction quantities for each alternative are included in the Schedule B storm drain quantity/cost estimates included in APPENDIX G. Due to the age and AC material type of the existing water/sewer mains if new taps are required for the reconstructed water and/or sewer services some portions of the existing water/sewer mains may also need to be replaced. Additional coordination with AWWU will be necessary as the project progresses into the preliminary design to ensure impacts to water/sewer infrastructure are adequately addressed.

12.0 Permitting Requirements

Permits and agency approvals for the Norann area project required for construction of proposed improvements will be limited. Because the roadway is classified as a secondary (local) urban road, it is not necessary to obtain approval of the DSM from the MOA Planning and Zoning Commission or the MOA Urban Design Commission. Anticipated permits and agency approvals required for design include:

- MOA Watershed Management Services Stormwater Plan Approval
- ADEC Approval to Construct Storm Drain Improvements and Separation Waivers
- ARRC approval of existing storm drain outfall abandonment (preferred Alternative 2)
- ARRC approval of new storm drain outfall (Alternative 1)

Additional permit requirements may be identified as the design develops.

13.0 Quantity and Cost Estimates

A summary of estimated project costs for the proposed improvements is presented below for each alternative. A breakdown of the ROW, construction, utility, design, and management cost estimates can be found in APPENDIX G.

Table 8 – Summary of Estimate Project Costs

Category	Alternative 1	Alternative 2 (Preferred)
Design & Management Total (estimated)	$854,000	$845,000
ROW Acquisition Total	$79,000	$66,000
Utility Relocation (with 15% Contingency) Total	$135,000	$115,000
A. Design, ROW Acquisition, Utility Relocation	***$1,059,000***	***$1,026,000***
Construction		
Roadway Improvements	$2,905,000	$2,470,000
Drainage Improvements	$604,000	$1,026,000
Illumination Improvements	$268,000	$268,000
Construction Subtotal	*$3,777,000*	*$3,764,000*
Construction Contingency (15%)	$567,000	$565,000
Construction Management / Inspection / Testing	$389,000	$388,000
B. Total Estimated Construction Cost (rounded)	***$4,733,000***	***$4,717,000***
C. Overhead / Grant Accounting	***$1,022,000***	***$1,013,000***
Total Estimated Project Cost (A + B + C)	***$6,814,000***	***$6,756,000***

14.0 Stakeholder Coordination/Public Involvement

The public involvement for the Norann Subdivision Area Road Reconstruction project is following the MOA Context Sensitive Solutions (CSS) process for a local roadway as a general guide for best practices. The goal of the CSS process is to collaborate with all stakeholders to improve the roadway, balance diverse interests, find areas of compromise that address concerns and solicit feedback from stakeholders. A description of public involvement activities is below. All public involvement documents can be found in APPENDIX L.

14.1 Stakeholders

The project team began the public and agency outreach in January of 2021 with the identification of approximately 80 project stakeholders. See TABLE 9 below for list of stakeholders. Note, that initial project communications occurred prior to state and local elections and redistricting. Senators, Representatives, and Assembly Member contacts will be updated as the project moves forward.

Table 9 – List of Stakeholders

MOA Agencies	Other
Project Management & Engineering Traffic Engineering Street Maintenance and Operations AWWU Anchorage Fire Department Anchorage Police Department Solid Waste Services Anchorage Assembly Member Kameron Perez-Verdia (Will update to Assembly Member Meg Zaletel and Felix Rivera)	Area Property Owners, Business Owners, Property Managers, Employees, and Residents Alaska Communications Systems (ACS) and GCI Chugach Electric Association, Inc. ENSTAR Natural Gas Company Taku-Campbell Community Council Alaska Railroad Corporation Former Senator Natasha von Imhoff (will be updated with Senator Elvi Gray-Jackson) Former Representative Chris Tuck (will be updated with Representative Andy Josephson)

14.2 Stakeholder Involvement Activities

A variety of forms of outreach were used to inform, consult, involve, and collaborate with stakeholders including website updates, mailed postcards, e-newsletters, virtual community council updates, a project questionnaire, and a virtual open house.

TABLE 10 below summarizes each major public involvement activity for the duration of the project through August of 2021.

Table 10 – Public Involvement Activities

Date	Activity	Comments
January 2021	Mailing List Developed	Approximately 80 Contacts
January 2021 - Present	Website Development & Maintenance	Launched and Updated at Key Project Milestones
February 5, 2021	Postcard Mailer #1	Project Introduction
February 8, 2021	Questionnaire Mailer #2	Announce Questionnaire
February 11, 2021	Taku-Campbell Community Council Presentation	Project Introduction, Announce Questionnaire
February 16, 2021	E-Newsletter #1	Project Intro, Announce Questionnaire
February 1 – March 12, 2021	Project Questionnaire	Collected Responses for 39 Days
April 21, 2021	Postcard Mailer #3 & E-Newsletter #2	Announce Field Work
June 22, 2021	Agency Stakeholder Meeting	Meeting with MOA Traffic Engineering Department and MOA Street Maintenance Department
August 9, 2021	Postcard Mailer #4 & E-Newsletter #3	Announce Open House #1
August 10, 2021	Federation of Community Councils E-Newsletter to Taku-Campbell Community Council Area	Announce Open House #1
August 23, 2021	E-Newsletter #4	Open House #1 Reminder
August 24, 2021	Open House #1	Introduce project and receive comments on existing conditions and issues in the project area
August 30, 2021	E-Newsletter #5	Thank you for attending Open House #1

14.3 Project Website

The project website (www.norannreconstruction.com) was developed for ease of project information sharing and soliciting comments from the public. Website content includes a project home page overview, a documents and resources page, a 'how to get involved' page, project team contact information, a link to provide comments, and a link to sign up to receive e-newsletter project updates. An interactive map comments page was also posted on the website to gather

public comments until September 2021. The website will continue to be updated with information, meeting details, and documents as the project progresses.

14.4 Project Questionnaire

A project questionnaire was mailed via the USPS to the project mailing list to gather additional, site specific information from project stakeholders. This tool also allows people to provide comments who cannot attend meetings in-person. The paper mailer included return postage and a QR code for respondents to fill out the questionnaire online. The questionnaire was open from February 1, 2021, through March 12, 2021. There were 19 responses to the questionnaire (6 paper, 13 online). A full summary of questions and results can be found in APPENDIX L.

14.5 Community Council Meeting

Project representatives attended the Taku-Campbell Community Council (TCCC) meeting on February 11, 2021, to provide a project introduction, announce the project questionnaire, answer project questions, and listen to stakeholder comments. A full meeting summary can be found in the APPENDIX L.

14.6 Open House

A virtual open house was held on August 24, 2021, from 5:00 – 6:30 pm via Microsoft Teams. The meeting was initially intended to be held in-person, however due to increases in Covid-19 infection rates, adjustments were made to hold the meeting virtually.

The goal of the meeting was to introduce the project, provide background, and listen and learn about existing conditions in the project area from meeting participants. Attendees were able to participate using a smart phone, tablet, desktop computer, or a call-in number, and the link and phone number were posted on the website, in the e-newsletters, and on the postcard. Copies of the presentation were made available for pick-up in advance for anyone utilizing the call-in number.

The following information was presented during the open house:

- Project Location
- Project Timeline
- Project Purpose and Need
- Existing Conditions
- Proposed Typical Cross Section
- Next Steps
- How to Stay Involved and Submit Comments

Attendees were able to ask questions throughout the presentation using the chat box, and there was a question session at the end of the presentation for participants to ask questions and provide comments.

A self-guided virtual tour was created for those who could not attend the Virtual Open House and made available on the project website. On 8/30/2021 a link to the virtual tour was provided to the email list via an E-Newsletter. Between 8/30/2021 and 9/30/2021 the virtual tour was viewed 114

times. Finally, a video recording of the Open House is available on the project website as well as all meeting presentation materials.

14.7 Summary of Public Comments Received

Comments were received from individuals through the virtual open house, community council meeting, interactive map, and on-line questionnaire responses.

Stakeholders and members of the public will have the continued opportunity to obtain information and provide feedback via the project website and through direct feedback by phone calls and emails to project staff as the design progresses.

15.0 Design Recommendations

To achieve the project goals, meet the requirements of the DCM and AMC Title 21, and based on comments received from public, agency, and stakeholders the recommended improvements for the project are as follows:

15.1 Roadway Cross Section

The preferred roadway cross section is Alternative 2 (see FIGURE 4) and includes two 10-foot wide travel lanes with one 7-foot wide parking lane (31 feet total width from BOC), Type 1 (barrier) curb and gutter and a single 5-foot wide sidewalk with a 3-foot wide concrete buffer. Installing Type 2 curb and gutter at select locations will be investigated during the 65% design to eliminate the on-property storm drain catch basin along Cope Street. The use of a grass buffer instead of a concrete buffer will also be investigated. No roadway traffic markings are proposed, effectively allowing parking along either side of the roadway. Installing only one sidewalk is preferred to installing two sidewalks due to minimizing adverse impacts to several existing driveways.

15.2 Roadway Horizontal and Vertical Alignment

The proposed overall roadway cross section (measured from back of curb to back of sidewalk) will be typically centered within the ROW to balance adjacent impacts. Along Cope Street the proposed roadway is shifted to the west of the ROW centerline to allow for an equivalent proposed driveway grade to the Parcel 20 (west) garage. The northern horizontal curve radius at the transition from Cope Street to 58th Avenue is proposed to be 100 feet while the southern curve radius is proposed to be 125 feet. The vertical profile design forces high/low spots and has a minimum grade of 0.65%.

15.3 Posted Speed

It is proposed that the posted speed limit for Norann project roadways remain at 25 mph. A design speed of 25 mph is proposed to match the requirements of the DCM.

15.4 Drainage

The preferred drainage design is Alternative 2 and includes two new storm drain systems, one on 57th Avenue and one on 58th Avenue/Cope Street. Both systems include new catch basins at low points to alleviate ponding issues and connections to the existing Arctic Boulevard storm drain

system. Water quality treatment for storm runoff will be provided by installation of OGS's with bypass systems prior to the tie-in to the Arctic Boulevard system. Heat trace will be installed in storm drain pipes that have less than 3 feet of cover. Several water and sewer services will need to be reconstructed due to the new storm drain systems.

15.5 Lighting

A continuous LED lighting system, consistent with current MOA standards will be installed along the Norann project roadways. The power for the lighting system will come from a new Type 1A load center. The load center location will need to be coordinated and approved by CEA during the detailed design, but the initial proposed location is on 57th Avenue near the intersection with Arctic Boulevard.

16.0 Proposed Variances

16.1 AMC Title 21

AMC Title 21.07.060.E.2 requires sidewalks be installed on both sides of local roadways. Only one sidewalk is proposed to minimize adverse impacts to several driveways. A variance requesting relief from installing two sidewalks will be requested by CRW for approval from the MOA Platting Board during the design process.

16.2 MOA DCM

The proposed variances from the DCM will be justified and approved under a separate document during the design process. A variance request from CRW will be sent to the Municipal Engineer and the Municipal Traffic Engineer for approval. There are several design criteria that may not be able to meet the DCM. Below is a list of potential variances for this project for the preferred alternative. Additional variances may be required as the design progresses:

- Horizontal Curve Radii - The DCM Table 1-9 requires a minimum horizontal centerline radius of 150 feet for local roadways. Two existing horizontal curves as the roadway transitions from Cope Street to 58th Avenue do not meet this minimum radius requirement; each has a 100-foot radius. Both proposed horizontal curves don't meet the minimum radius requirement either, but one horizontal curve is proposed to be increased to a 125-foot radius to bring the roadway in closer conformance with the DCM. A variance will be required for not providing the minimum horizontal curve radius for two curves.
- Curb Type - DCM Section 1.9.F requires Type 2 (rolled) curb on local roadways. Type 1 (barrier) curb is proposed for this project. A variance will be required for installing Type 1 curb.
- Curb Returns – The DCM requires a 30-foot curb return radius for local roads that intersect collectors or above. To provide a 30-foot curb return radius on the south side of the 57th and 58th intersection with Arctic Boulevard, it would require relocation of a utility pole at each intersection which would be a significant project utility relocation cost and not desired by PM&E. A variance will be required for not providing the minimum curb return radii on the south side of the 57th and 58th Avenues intersection with Arctic Boulevard.

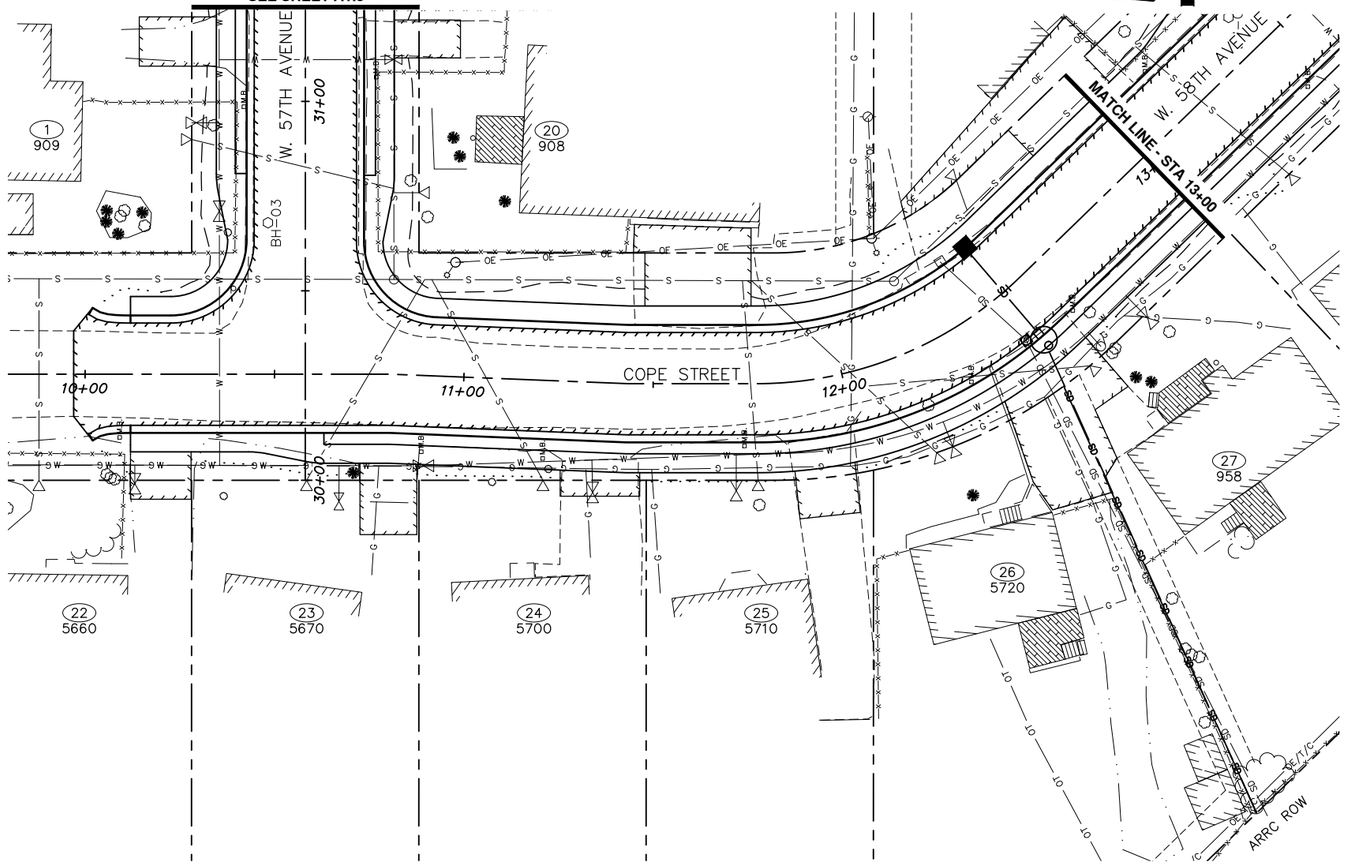
- Driveway landings and grades - The DCM requires that residential driveways have a minimum 12-foot landing length and a maximum grade of ±12%; The grade of the landings must be 2% maximum. Some of the driveways will not be able to meet these landing or grade requirements due to existing infrastructure/grades and will require a variance.

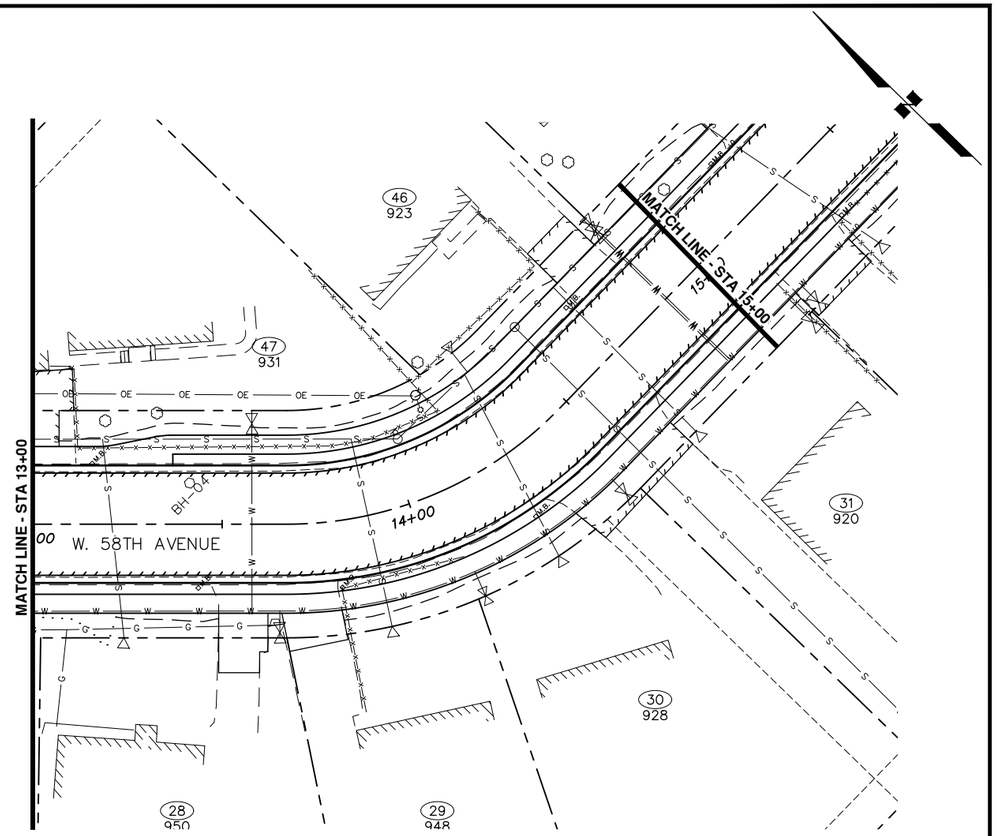
****** End of Memorandum******

Roadway Plan & Profile Drawings

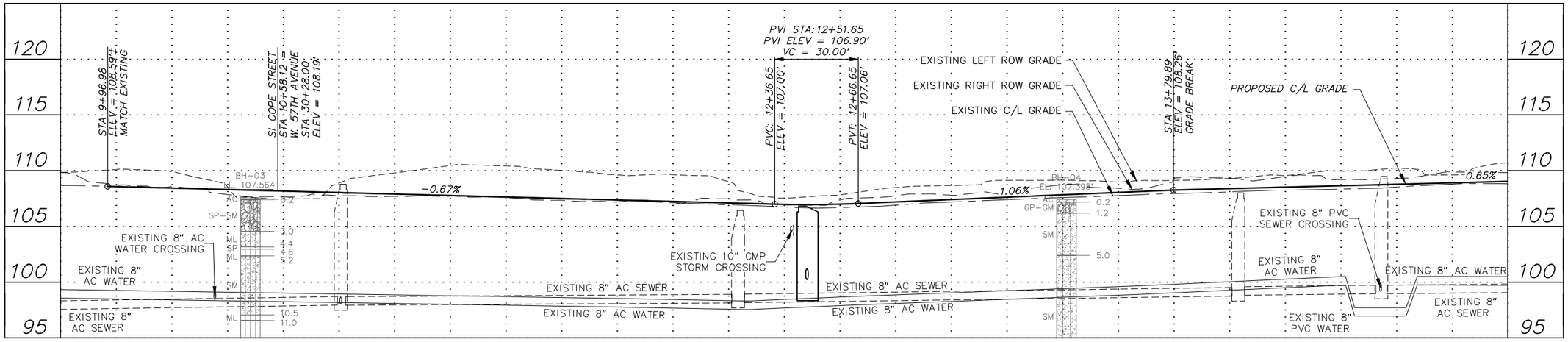
Appendix A

SEE SHEET A1.3





ALTERNATIVE #1



RECORD DRAWING

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   THIS WILL SERVE TO CERTIFY THAT THESE RECORD DRAWINGS ARE A TRUE AND ACCURATE REPRESENTATION OF THE PROJECT AS CONSTRUCTED.
   CONTRACTOR: _____
   BY: _____ TITLE: _____ DATE: _____
2. DATA TRANSFERRED BY: _____ TITLE: _____
   COMPANY: _____ DATE: _____
3. BASED ON PERIODIC FIELD OBSERVATIONS BY THE ENGINEER (OR AN INDIVIDUAL UNDER HIS/HER DIRECT SUPERVISION), THE CONTRACTOR-PROVIDED DATA APPEARS TO REPRESENT THE PROJECT AS CONSTRUCTED.
   DATA TRANSFER CHECKED BY: _____ TITLE: _____
   COMPANY: _____ DATE: _____
   BY: _____

DATA	DRAWN BY	CHECKED BY
BASE	BW	AR
TOPOGRAPHY	BW	AR
PROFILE	RB	JK
STORM SEWER	RB	JH
WATER/SANITARY SEWER	KY	JK
GAS	BW	AR
TELEPHONE	BW	AR
ELECTRIC	JH	TK
DESIGN	RB	JK
QUANTITIES	RB	JK
PRELIMINARY/FINAL	RB	JK
MUNICIPAL/STATE	RB	JK
PLAN CHECK		

GRAPHIC SCALE 40 20 0 20 40

FIELD BOOKS	BM NO.	LOCATION	ELEV.
DESIGN			
STAKING			
ASBUILT			
CONTRACTOR	BASIS OF THIS DATUM		
INSPECTOR			

CONSTRUCTION RECORD | VERTICAL DATUM

REV	DATE	DESCRIPTION	BY

REVISIONS

CRW ENGINEERING GROUP, INC.
3940 ARCTIC BLVD. SUITE 300
ANCHORAGE, ALASKA 99503
PHONE: (907) 562-3252
#AECL882-AK

CONSULTANT | SEAL

MUNICIPALITY OF ANCHORAGE

PROJECT MANAGEMENT AND ENGINEERING DEPARTMENT

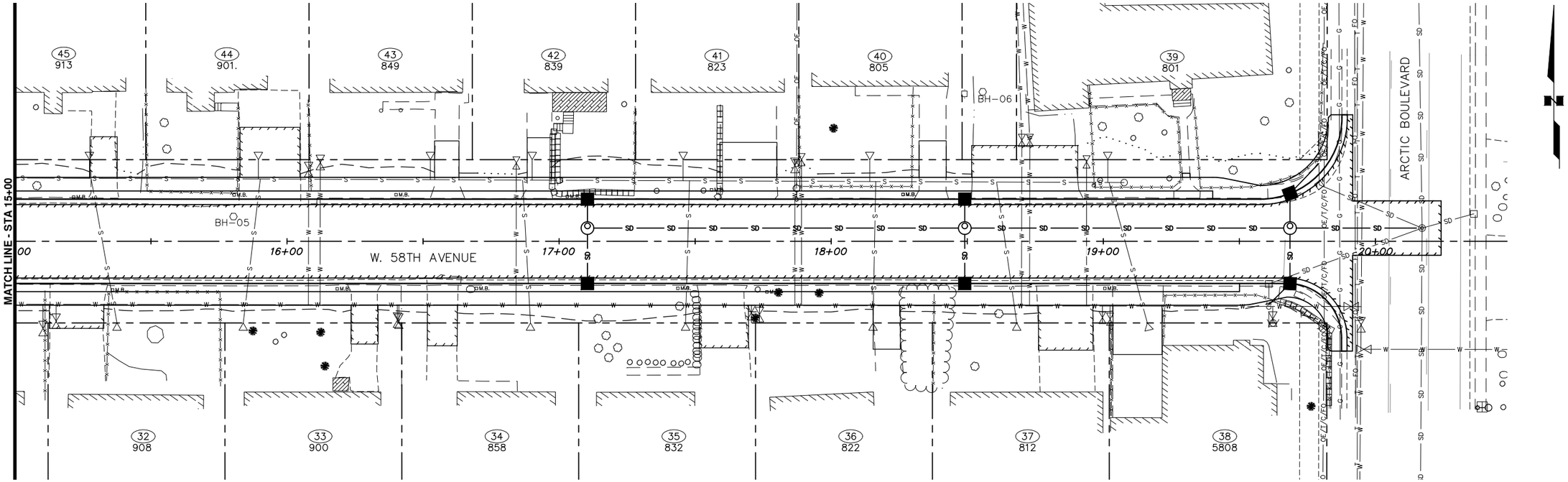
20-14 NORANN SUBDIVISION AREA ROAD RECONSTRUCTION SCHED A

ROADWAY PLAN & PROFILE

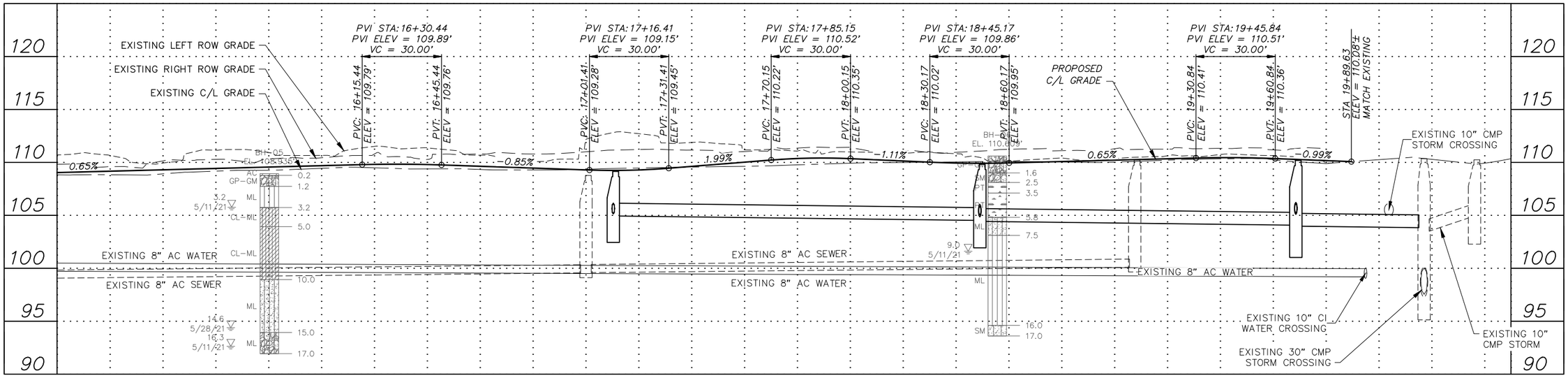
COPE STREET – BOP TO STA 15+00

SCALE HOR. 1"=20' VER. 1"=5' | GRID SW1929 | DATE DEC 2023 | STATUS DSM | SHEET A1.1 of A1.4

File: J:\JobsData\10149.00 Norann Subdivision Road Reconstruction\00 CADD 2019\01 Working Set\01 Civil\10149.00 Plan & Profile – Roadway_Alt 1.dwg



ALTERNATIVE #1



RECORD DRAWING

1. DATA PROVIDED BY: _____ TITLE: _____
   THIS WILL SERVE TO CERTIFY THAT THESE RECORD DRAWINGS ARE A TRUE AND ACCURATE REPRESENTATION OF THE PROJECT AS CONSTRUCTED.
   CONTRACTOR: _____
   BY: _____ TITLE: _____ DATE: _____
2. DATA TRANSFERRED BY: _____ TITLE: _____
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   DATA TRANSFER CHECKED BY: _____ TITLE: _____
   COMPANY: _____ DATE: _____
   BY: _____

DATA	DRAWN BY	CHECKED BY
BASE	BW	AR
TOPOGRAPHY	BW	AR
PROFILE	RB	JK
STORM SEWER	RB	JH
WATER/SANITARY SEWER	KY	JK
GAS	BW	AR
TELEPHONE	BW	AR
ELECTRIC	JH	TK
DESIGN	RB	JK
QUANTITIES	RB	JK
PRELIMINARY/FINAL	RB	JK
MUNICIPAL/STATE	RB	JK
PLAN CHECK		

GRAPHIC 40 20 0 20 40 SCALE

FIELD BOOKS	BM NO.	LOCATION	ELEV.
DESIGN			
STAKING			
ASBUILT			
CONTRACTOR	BASIS OF THIS DATUM		
INSPECTOR			
CONSTRUCTION RECORD	VERTICAL DATUM		

REV	DATE	DESCRIPTION	BY
REVISIONS			

CRW ENGINEERING GROUP, INC.
3940 ARCTIC BLVD. SUITE 300
ANCHORAGE, ALASKA 99503
PHONE: (907) 562-3252
#AECL882-AK

CONSULTANT

SEAL

MUNICIPALITY OF ANCHORAGE

PROJECT MANAGEMENT AND ENGINEERING DEPARTMENT

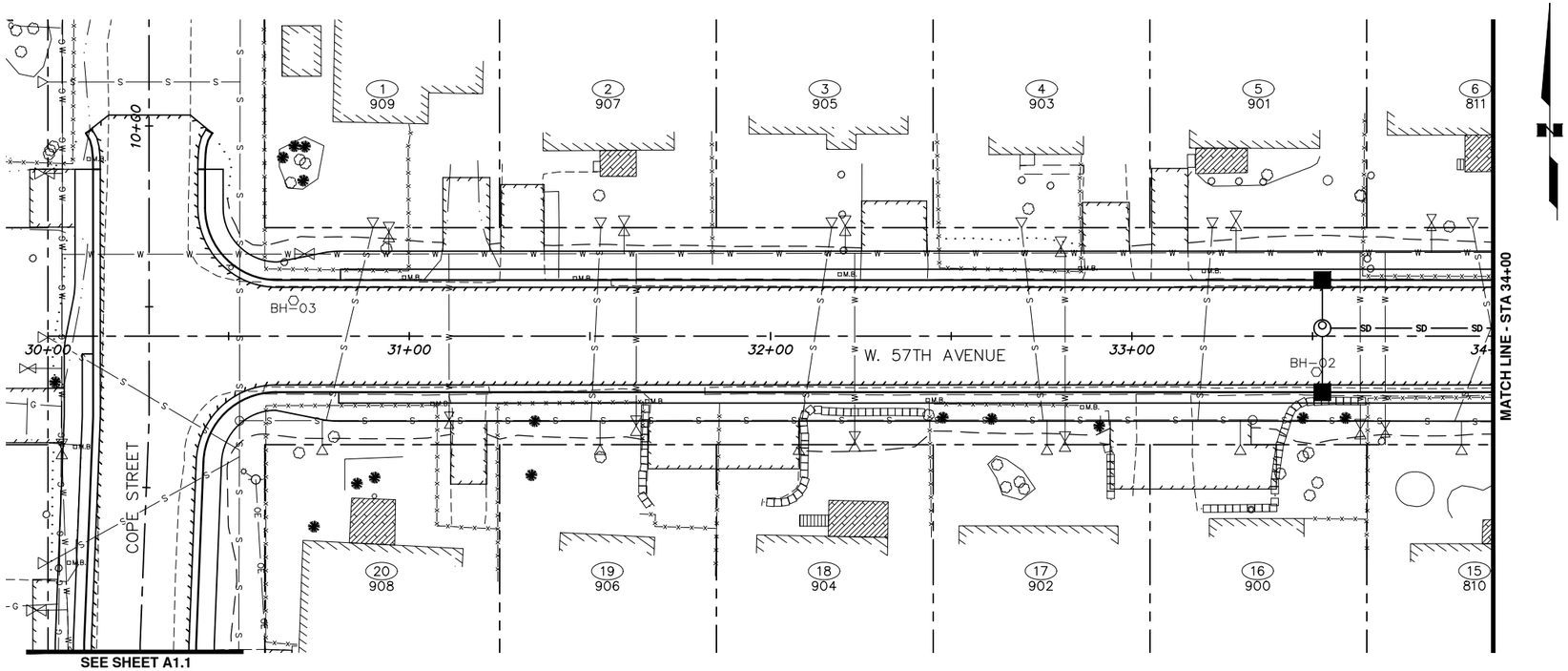
20-14 NORANN SUBDIVISION AREA ROAD RECONSTRUCTION SCHED A

ROADWAY PLAN & PROFILE

W. 58TH AVENUE – STA 15+00 TO STA 19+90

SCALE HOR. 1"=20' VER. 1"=5' | GRID SW1929 | DATE DEC 2023 | STATUS DSM | SHEET A1.2 of A1.4

File: J:\JobsData\10149.00 Norann Subdivision Road Reconstruction\00 CADD 2019\01 Working Set\01 Civil\10149.00 Plan & Profile – Roadway_Alt 1.dwg



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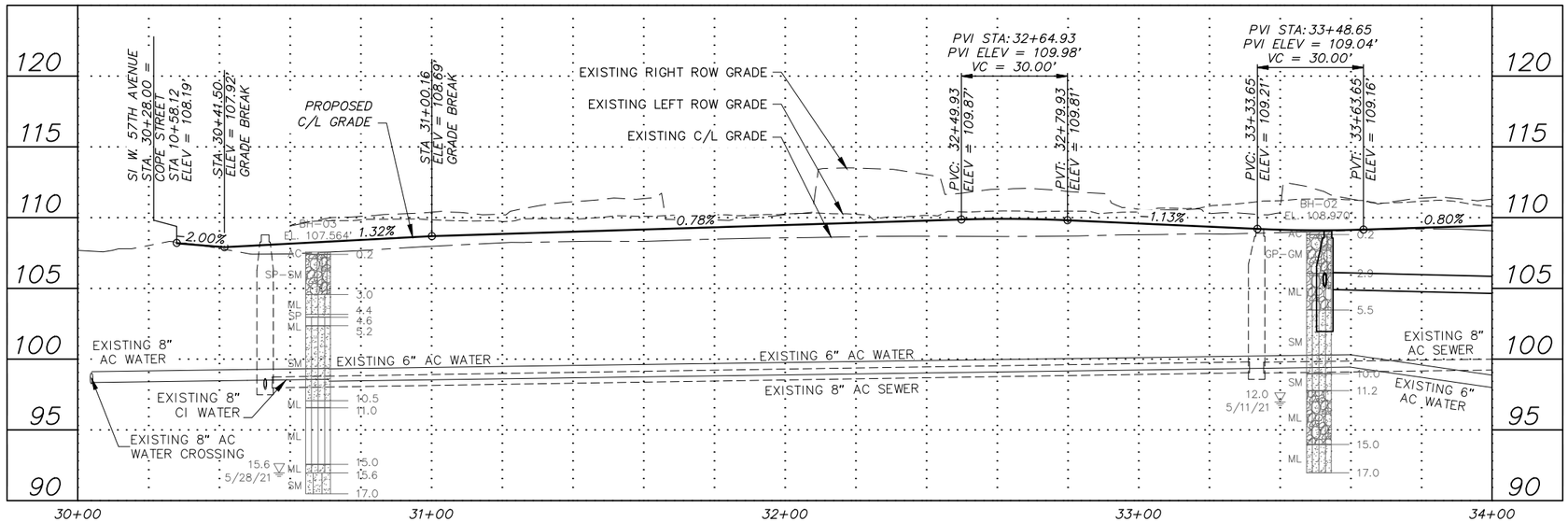

RECORD DRAWING

1. DATA PROVIDED BY: _____ TITLE: _____
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DATA	DRAWN BY	CHECKED BY
BASE	BW	AR
TOPOGRAPHY	BW	AR
PROFILE	RB	JK
STORM SEWER	RB	JH
WATER/SANITARY SEWER	KY	JK
GAS	BW	AR
TELEPHONE	BW	AR
ELECTRIC	JH	TK
DESIGN	RB	JK
QUANTITIES	RB	JK
PRELIMINARY/FINAL	RB	JK
MUNICIPAL/STATE	RB	JK

PLAN CHECK

GRAPHIC SCALE 40 20 0 20 40

FIELD BOOKS	BM NO.	LOCATION	ELEV.
DESIGN			
STAKING			
ASBUILT			
CONTRACTOR	BASIS OF THIS DATUM		
INSPECTOR			

CONSTRUCTION RECORD | VERTICAL DATUM

REV	DATE	DESCRIPTION	BY

REVISIONS

CRW ENGINEERING GROUP, INC.
3940 ARCTIC BLVD. SUITE 300
ANCHORAGE, ALASKA 99503
PHONE: (907) 562-3252
@ECL882-AK

CONSULTANT | SEAL

MUNICIPALITY OF ANCHORAGE

PROJECT MANAGEMENT AND ENGINEERING DEPARTMENT

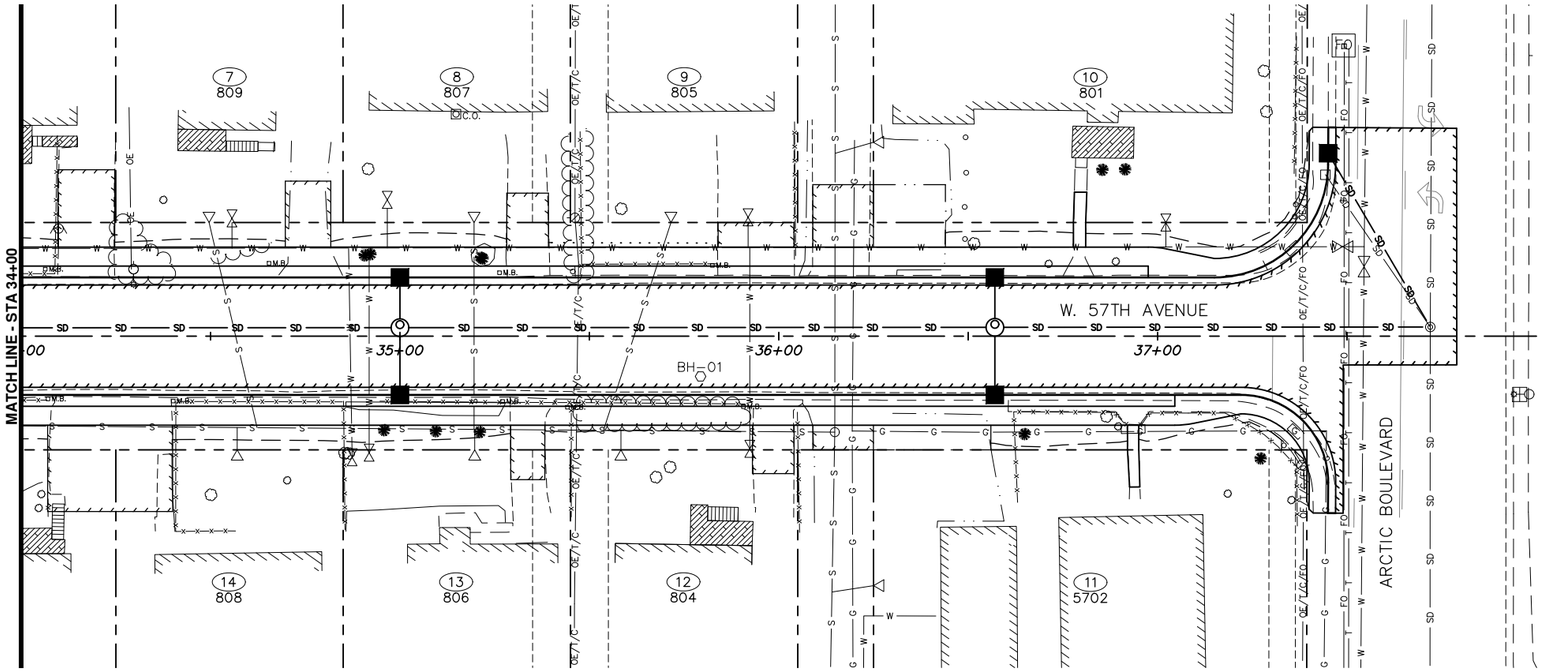
20-14 NORANN SUBDIVISION AREA ROAD RECONSTRUCTION SCHED A

ROADWAY PLAN & PROFILE

W. 57TH AVENUE – STA 30+28 TO STA 34+00

SCALE HOR. 1"=20' VER. 1"=5' | GRID SW1929 | DATE DEC 2023 | STATUS DSM | SHEET A1.3 of A1.4

File: J:\JobsData\10149.00 Norann Subdivision Road Reconstruction\00 CADD 2019\01 Working Set\01 Civil\10149.00 Plan & Profile - Roadway_Alt 1.dwg



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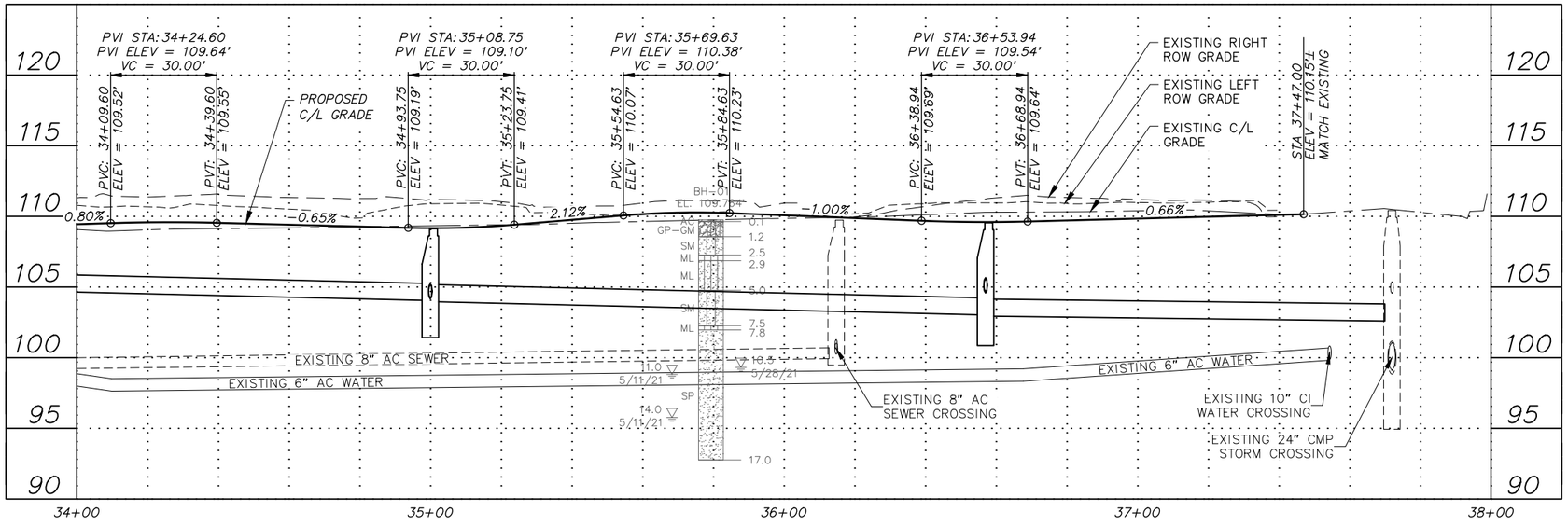

RECORD DRAWING

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DATA	DRAWN BY	CHECKED BY
BASE	BW	AR
TOPOGRAPHY	BW	AR
PROFILE	RB	JK
STORM SEWER	RB	JH
WATER/SANITARY SEWER	KY	JK
GAS	BW	AR
TELEPHONE	BW	AR
ELECTRIC	JH	TK
DESIGN	RB	JK
QUANTITIES	RB	JK
PRELIMINARY/FINAL	RB	JK
MUNICIPAL/STATE	RB	JK

PLAN CHECK

GRAPHIC SCALE 40 20 0 20 40

FIELD BOOKS	BM NO.	LOCATION	ELEV.
DESIGN			
STAKING			
ASBUILT			
CONTRACTOR	BASIS OF THIS DATUM		
INSPECTOR			

CONSTRUCTION RECORD | VERTICAL DATUM

REV	DATE	DESCRIPTION	BY

REVISIONS

CRW ENGINEERING GROUP, INC.
3940 ARCTIC BLVD. SUITE 300
ANCHORAGE, ALASKA 99503
PHONE: (907) 562-3252
@ECL882-AK

CONSULTANT | SEAL

MUNICIPALITY OF ANCHORAGE

PROJECT MANAGEMENT AND ENGINEERING DEPARTMENT

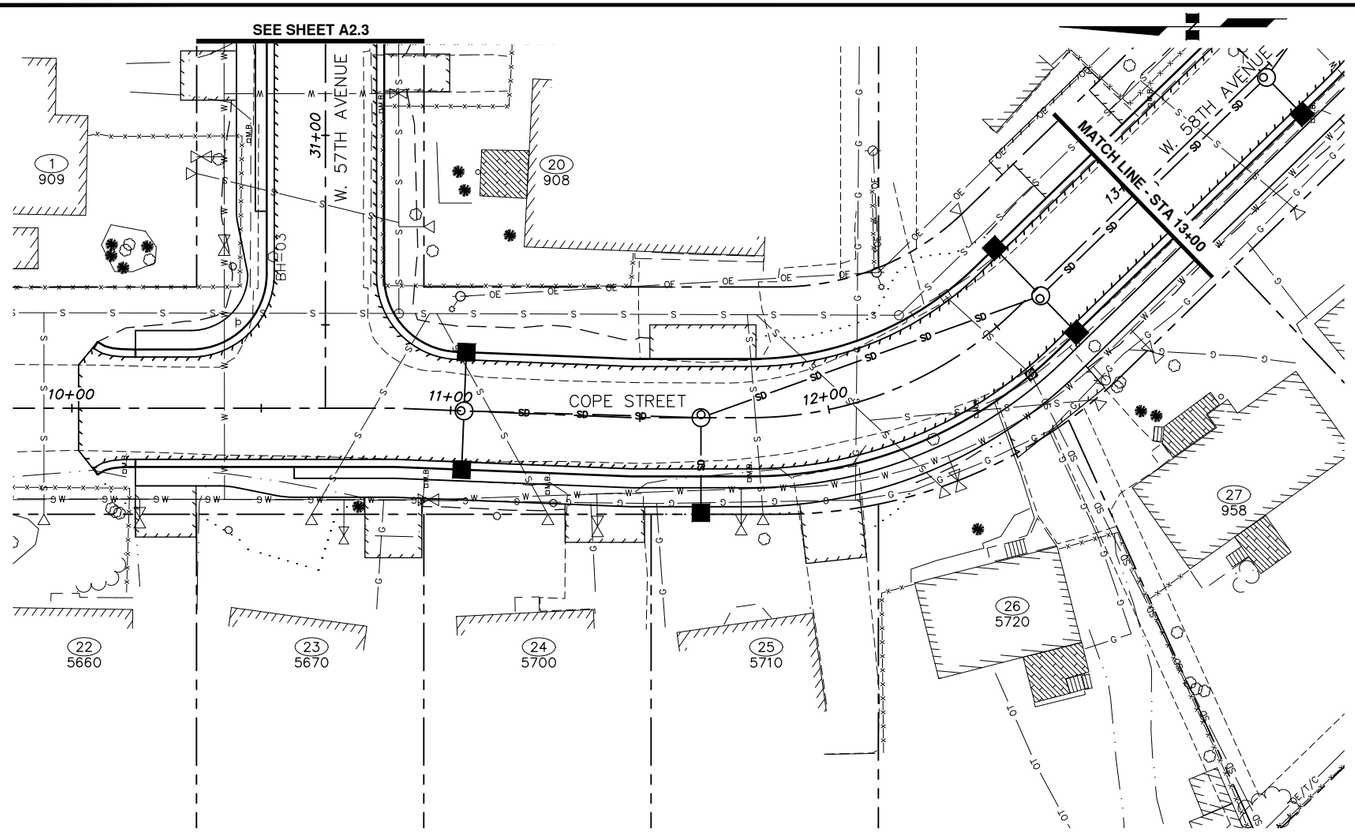
20-14 NORANN SUBDIVISION AREA ROAD RECONSTRUCTION SCHED A

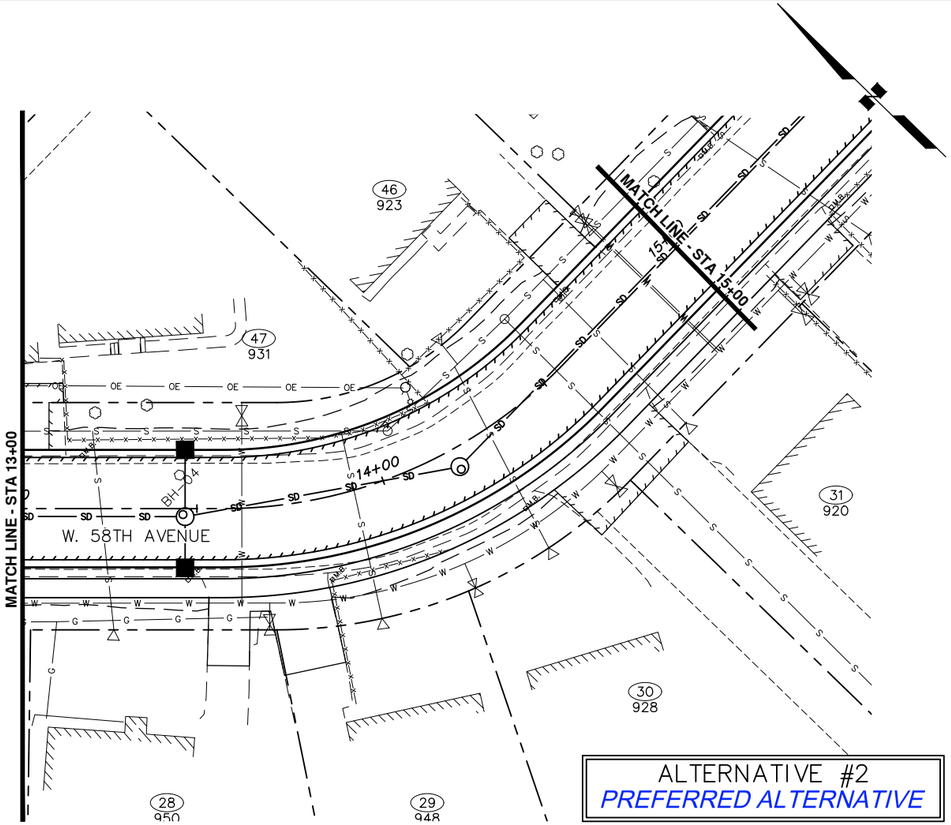
ROADWAY PLAN & PROFILE

W. 57TH AVENUE – STA 34+00 TO EOP

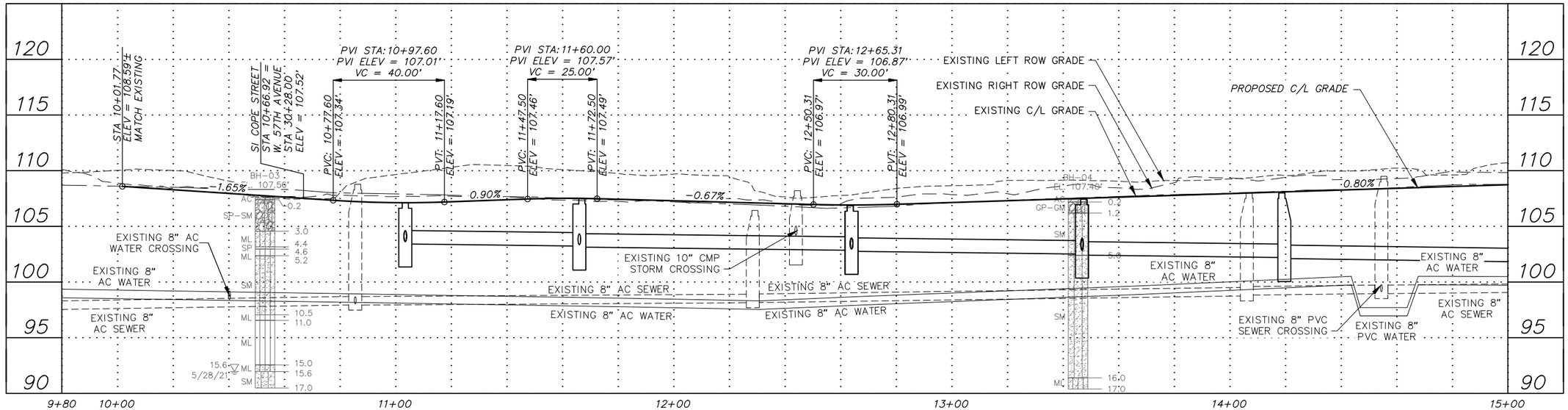
SCALE HOR. 1"=20' VER. 1"=5' | GRID SW1929 | DATE DEC 2023 | STATUS DSM | SHEET A1.4 of A1.4

File: J:\JobsData\10149.00 Norann Subdivision Road Reconstruction\00 CADD 2019\01 Working Set\01 Civil\10149.00 Plan & Profile - Roadway_Alt 1.dwg





ALTERNATIVE #2
PREFERRED ALTERNATIVE



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DATA	DRAWN BY	CHECKED BY
BASE	BW	AR
TOPOGRAPHY	BW	AR
PROFILE	RB	JK
STORM SEWER	RB	JH
WATER/SANITARY SEWER	KY	JK
GAS	BW	AR
TELEPHONE	BW	AR
ELECTRIC	JH	TK
DESIGN	RB	JK
QUANTITIES	RB	JK
PRELIMINARY/FINAL	RB	JK
MUNICIPAL/STATE	RB	JK

PLAN CHECK

GRAPHIC SCALE 40 20 0 20 40

FIELD BOOKS	BM NO.	LOCATION	ELEV.
DESIGN			
STAKING			
ASBUILT			
CONTRACTOR	BASIS OF THIS DATUM		
INSPECTOR			

CONSTRUCTION RECORD | VERTICAL DATUM

REV	DATE	DESCRIPTION	BY

REVISIONS

CRW ENGINEERING GROUP, INC.
3940 ARCTIC BLVD. SUITE 300
ANCHORAGE, ALASKA 99503
PHONE: (907) 562-3252
#AECL882-AK

CONSULTANT | SEAL

MUNICIPALITY OF ANCHORAGE

PROJECT MANAGEMENT AND ENGINEERING DEPARTMENT

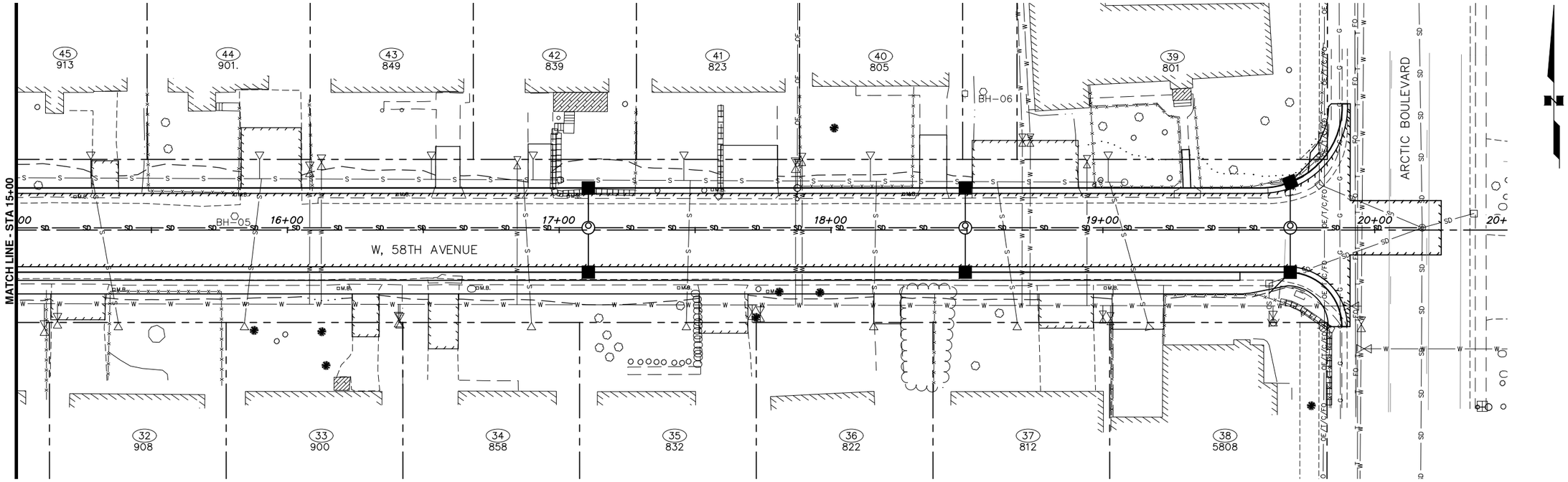
20-14 NORANN SUBDIVISION AREA ROAD RECONSTRUCTION SCHED A

ROADWAY PLAN & PROFILE

COPE STREET – BOP TO STA 15+00

SCALE HOR. 1"=20' VER. 1"=5' | GRID SW1929 | DATE DEC 2023 | STATUS DSM | SHEET A2.1 of A2.4

File: J:\JobsData\10149.00 Norann Subdivision Road Reconstruction\00 CADD 2019\01 Working Set\01 Civil\10149.00 Plan & Profile – Roadway_Alt 2.dwg



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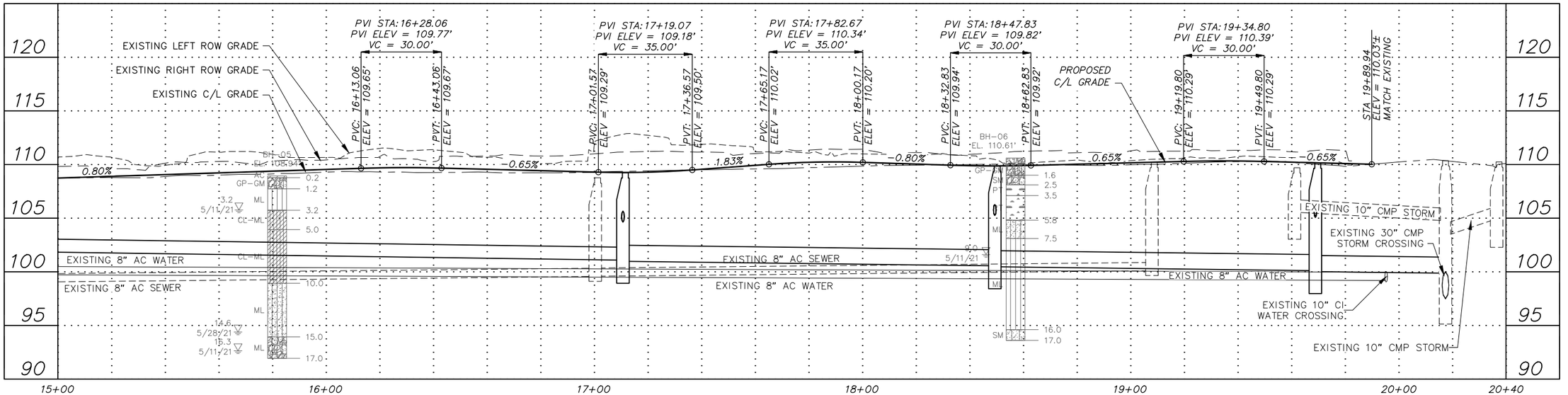
PREFERRED ALTERNATIVE



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   COMPANY: _____ DATE: _____
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DATA	DRAWN BY	CHECKED BY
BASE	BW	AR
TOPOGRAPHY	BW	AR
PROFILE	RB	JK
STORM SEWER	RB	JH
WATER/SANITARY SEWER	KY	JK
GAS	BW	AR
TELEPHONE	BW	AR
ELECTRIC	JH	TK
DESIGN	RB	JK
QUANTITIES	RB	JK
PRELIMINARY/FINAL	RB	JK
MUNICIPAL/STATE	RB	JK

PLAN CHECK

GRAPHIC SCALE 40 20 0 20 40

FIELD BOOKS	BM NO.	LOCATION	ELEV.
DESIGN			
STAKING			
ASBUILT			
CONTRACTOR	BASIS OF THIS DATUM		
INSPECTOR			

CONSTRUCTION RECORD | VERTICAL DATUM

REV	DATE	DESCRIPTION	BY

REVISIONS

CRW ENGINEERING GROUP, INC.
3940 ARCTIC BLVD. SUITE 300
ANCHORAGE, ALASKA 99503
PHONE: (907) 562-3252
#AECL882-AK

CONSULTANT | SEAL

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PROJECT MANAGEMENT AND ENGINEERING DEPARTMENT

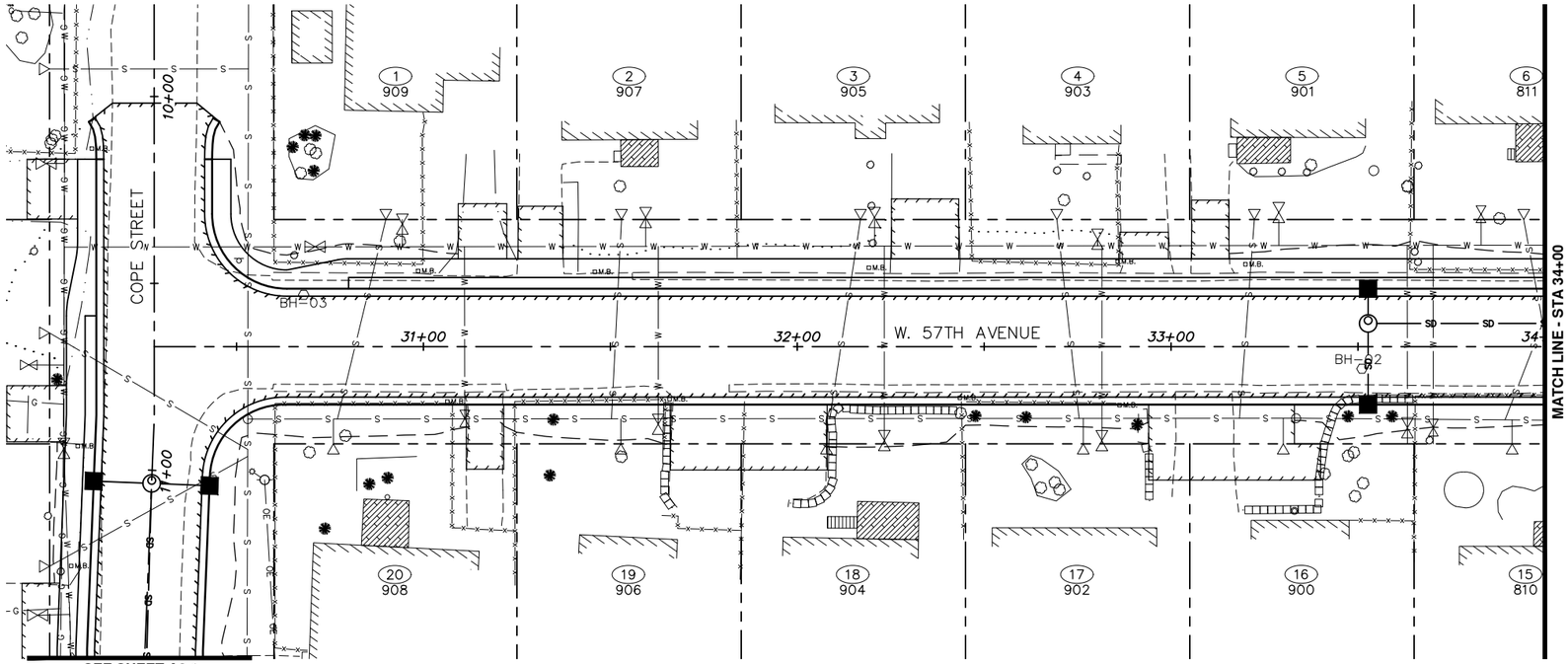
20-14 NORANN SUBDIVISION AREA ROAD RECONSTRUCTION SCHED A

ROADWAY PLAN & PROFILE

W. 58TH AVENUE – STA 15+00 TO STA 19+90

SCALE HOR. 1"=20' VER. 1"=5' | GRID SW1929 | DATE DEC 2023 | STATUS DSM | SHEET A2.2 of A2.4

File: J:\JobsData\10149.00 Norann Subdivision Road Reconstruction\00 CADD 2019\01 Working Set\01 Civil\10149.00 Plan & Profile – Roadway_Alt 2.dwg



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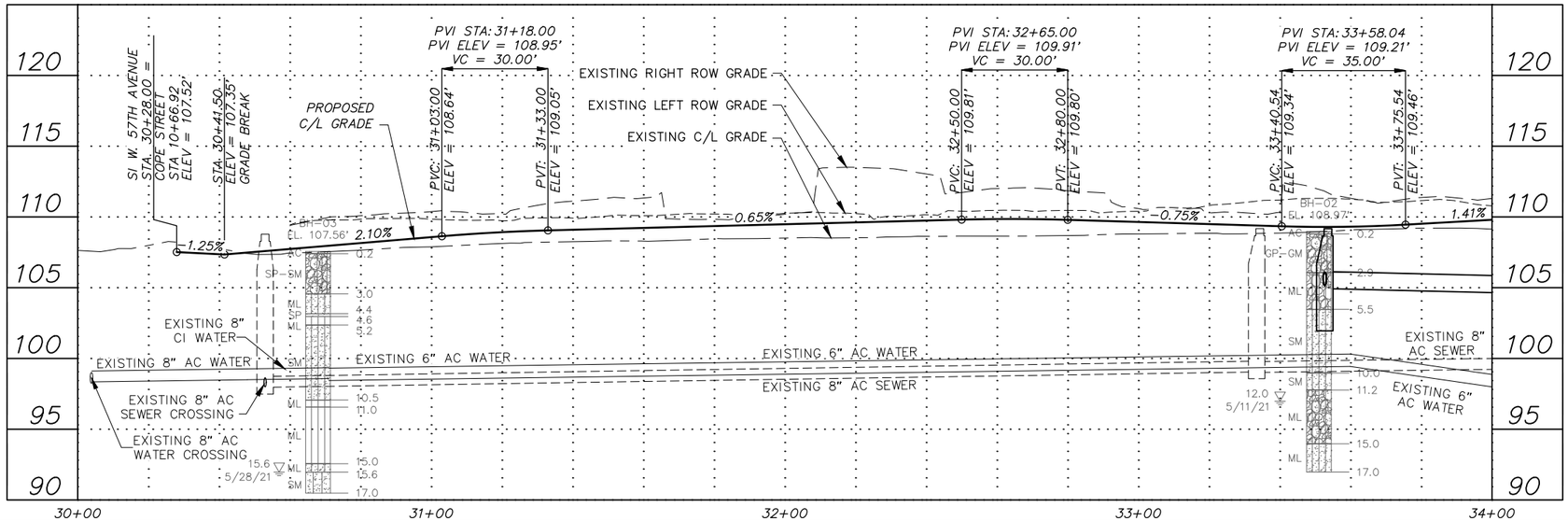
PREFERRED ALTERNATIVE



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DATA	DRAWN BY	CHECKED BY
BASE	BW	AR
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GAS	BW	AR
TELEPHONE	BW	AR
ELECTRIC	JH	TK
DESIGN	RB	JK
QUANTITIES	RB	JK
PRELIMINARY/FINAL	RB	JK
MUNICIPAL/STATE	RB	JK

PLAN CHECK

GRAPHIC SCALE 40 20 0 20 40

FIELD BOOKS	BM NO.	LOCATION	ELEV.
DESIGN			
STAKING			
ASBUILT			
CONTRACTOR	BASIS OF THIS DATUM		
INSPECTOR			

CONSTRUCTION RECORD | VERTICAL DATUM

REV	DATE	DESCRIPTION	BY

REVISIONS

CRW ENGINEERING GROUP, INC.
3940 ARCTIC BLVD. SUITE 300
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CONSULTANT | SEAL

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PROJECT MANAGEMENT AND ENGINEERING DEPARTMENT

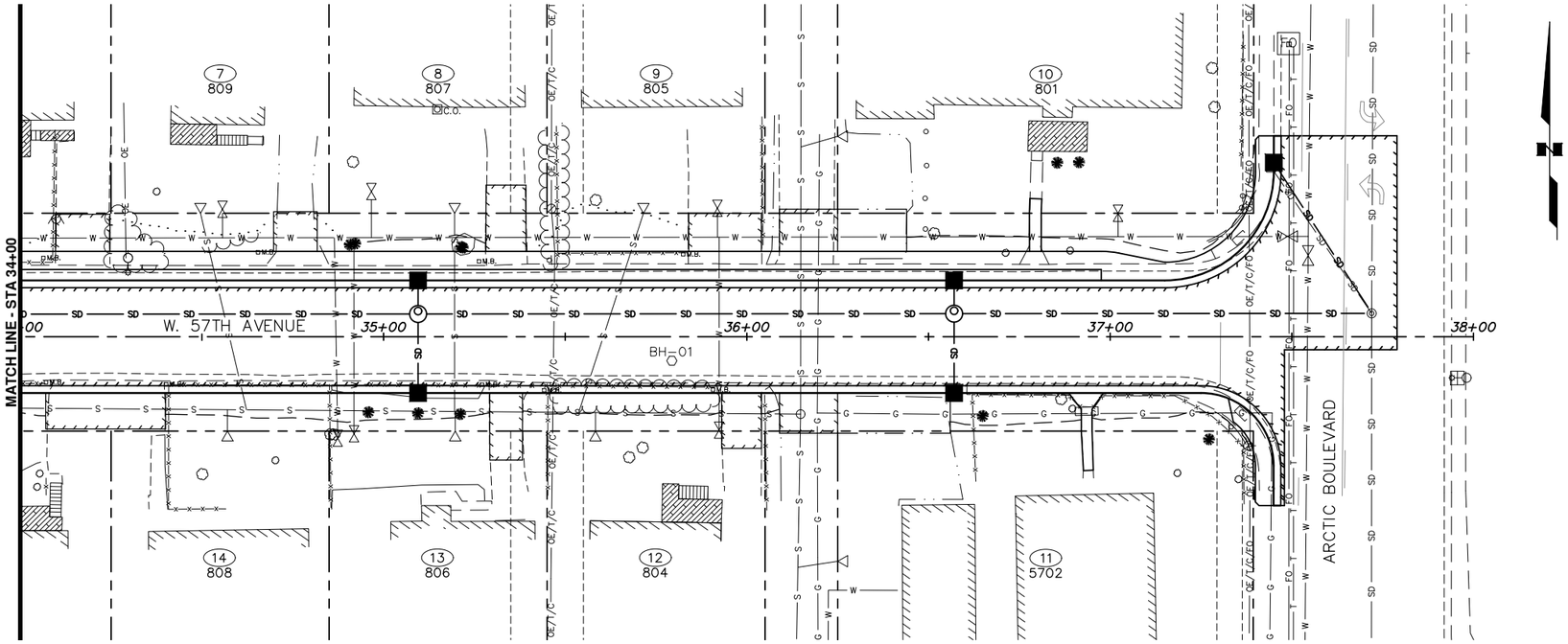
20-14 NORANN SUBDIVISION AREA ROAD RECONSTRUCTION SCHED A

ROADWAY PLAN & PROFILE

W. 57TH AVENUE – STA 30+28 TO STA 34+00

SCALE HOR. 1"=20' VER. 1"=5' | GRID SW1929 | DATE DEC 2023 | STATUS DSM | SHEET A2.3 of A2.4

File: J:\JobsData\10149.00 Norann Subdivision Road Reconstruction\00 CADD 2019\01 Working Set\01 Civil\10149.00 Plan & Profile – Roadway_Alt 2.dwg



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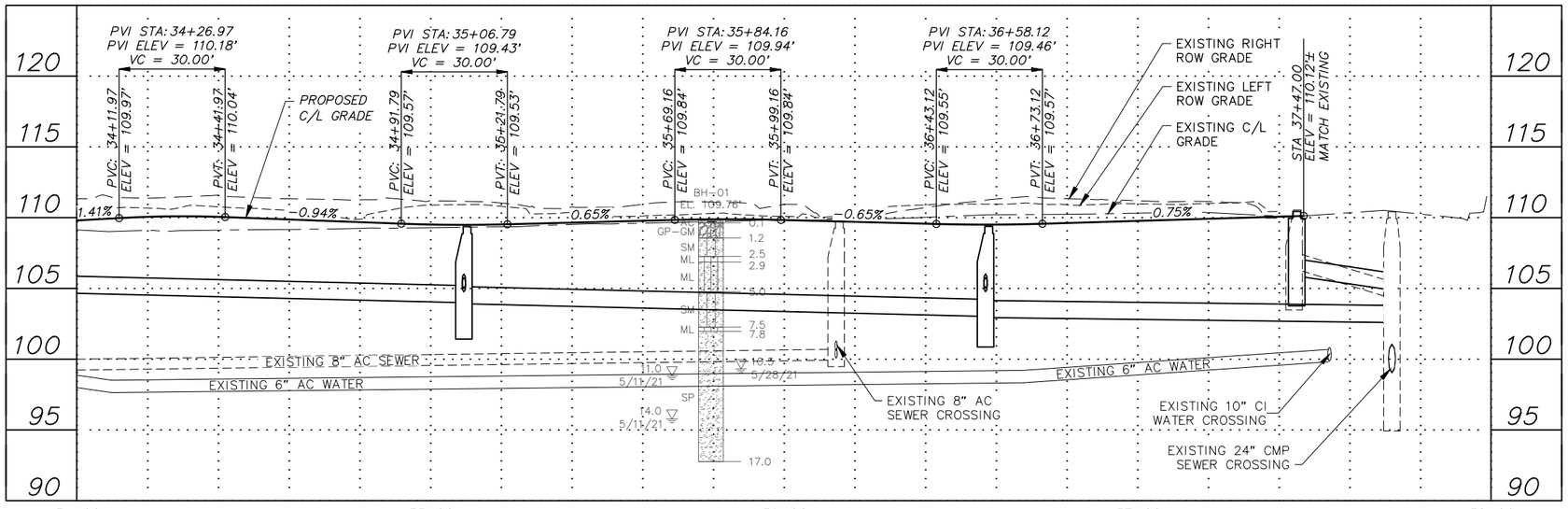
PREFERRED ALTERNATIVE



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DATA	DRAWN BY	CHECKED BY
BASE	BW	AR
TOPOGRAPHY	BW	AR
PROFILE	RB	JK
STORM SEWER	RB	JH
WATER/SANITARY SEWER	KY	JK
GAS	BW	AR
TELEPHONE	BW	AR
ELECTRIC	JH	TK
DESIGN	RB	JK
QUANTITIES	RB	JK
PRELIMINARY/FINAL	RB	JK
MUNICIPAL/STATE	RB	JK
PLAN CHECK		

GRAPHIC SCALE 40 20 0 20 40

FIELD BOOKS	BM NO.	LOCATION	ELEV.
DESIGN			
STAKING			
ASBUILT			
CONTRACTOR	BASIS OF THIS DATUM		
INSPECTOR			
CONSTRUCTION RECORD	VERTICAL DATUM		

REV	DATE	DESCRIPTION	BY
REVISIONS			

CRW ENGINEERING GROUP, INC.
3940 ARCTIC BLVD. SUITE 300
ANCHORAGE, ALASKA 99503
PHONE: (907) 562-3252
#AECL882-AK
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SEAL

MUNICIPALITY OF ANCHORAGE

PROJECT MANAGEMENT AND ENGINEERING DEPARTMENT

20-14 NORANN SUBDIVISION AREA ROAD RECONSTRUCTION SCHED A

ROADWAY PLAN & PROFILE

W. 57TH AVENUE – STA 34+00 TO EOP

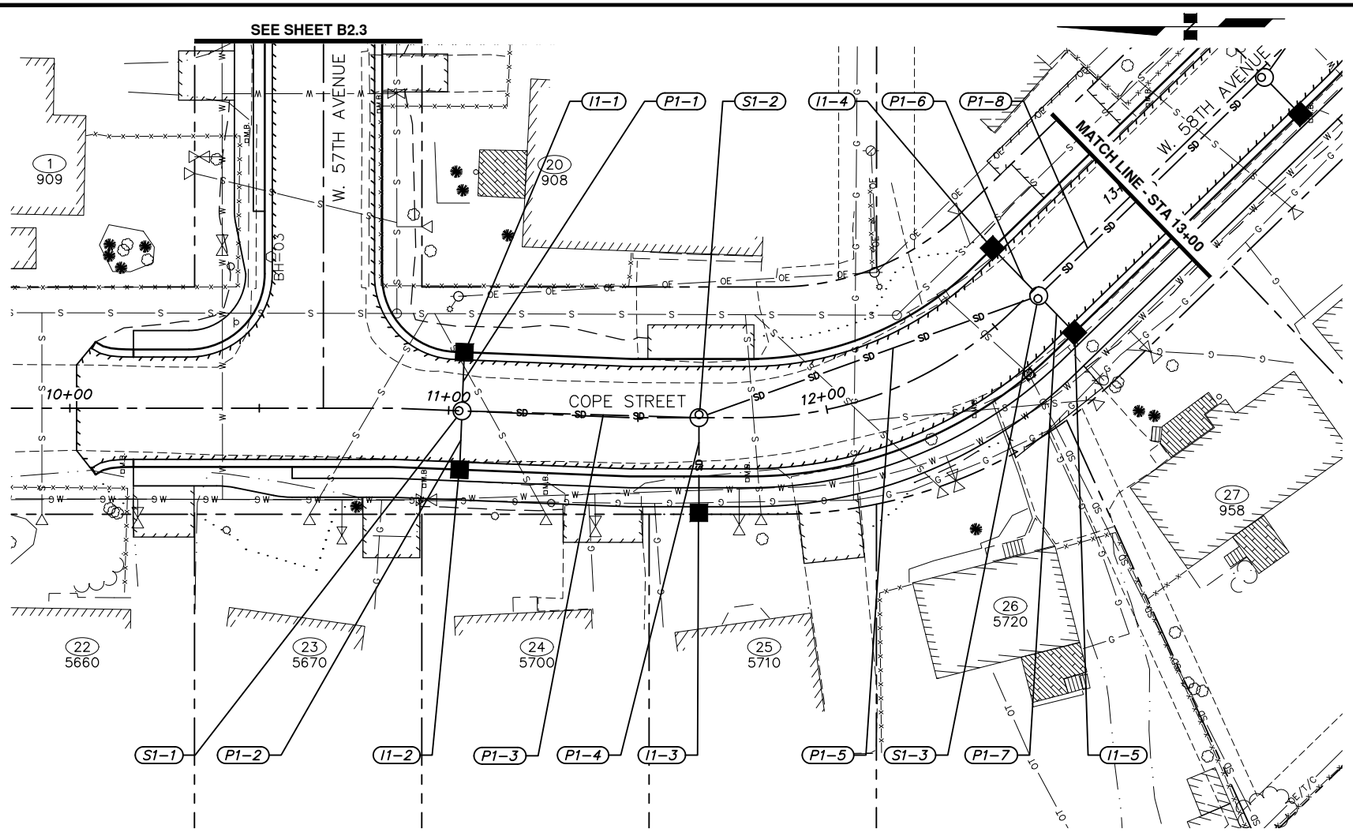
SCALE HOR. 1"=20' VER. 1"=5' | GRID SW1929 | DATE DEC 2023 | STATUS DSM | SHEET A2.4 of A2.4

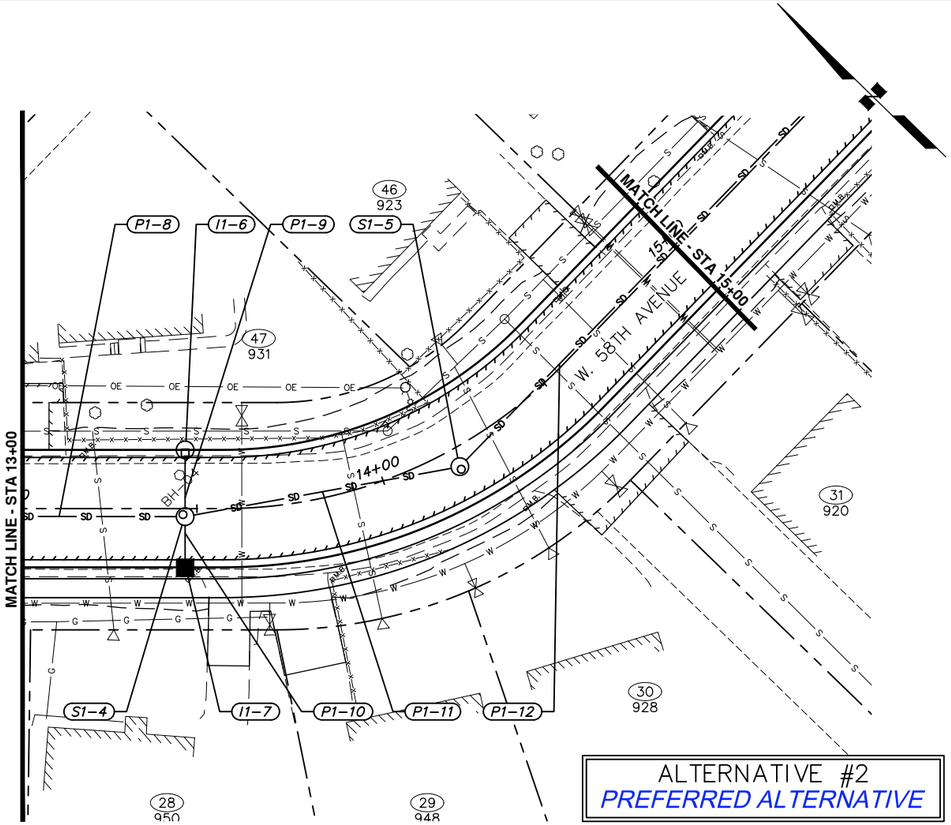
File: J:\JobsData\10149.00 Norann Subdivision Road Reconstruction\00 CADD 2019\01 Working Set\01 Civil\10149.00 Plan & Profile – Roadway_Alt 2.dwg

Storm Drain Plan & Profile Drawings

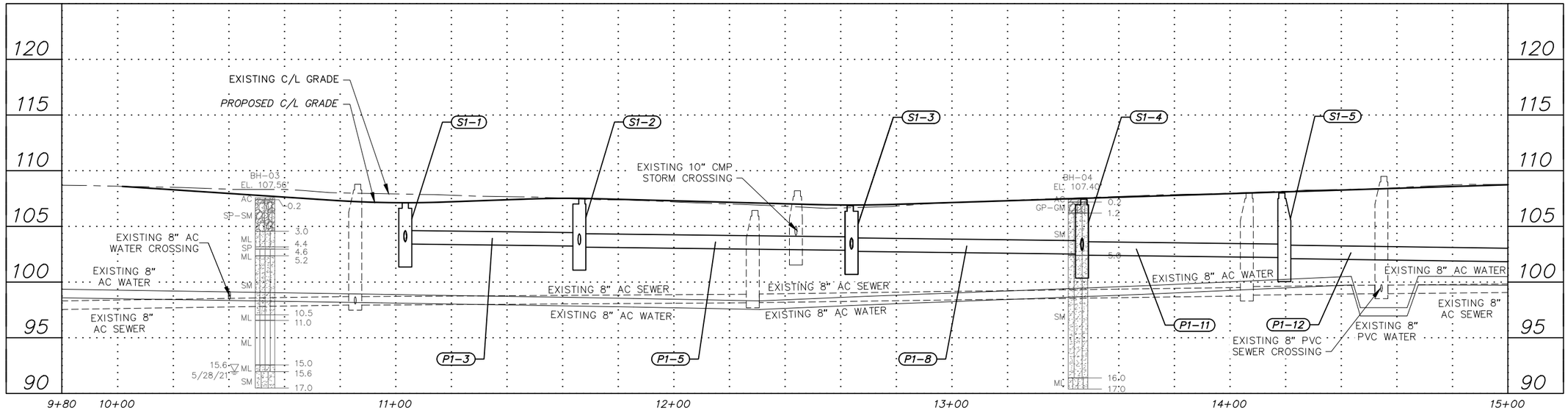
Appendix B

SEE SHEET B2.3





ALTERNATIVE #2
PREFERRED ALTERNATIVE



RECORD DRAWING

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GAS	BW	AR
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QUANTITIES	RB	JK
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MUNICIPAL/STATE	RB	JK

PLAN CHECK

GRAPHIC 40 20 0 20 40 SCALE

FIELD BOOKS	BM NO.	LOCATION	ELEV.
DESIGN			
STAKING			
ASBUILT			
CONTRACTOR	BASIS OF THIS DATUM		
INSPECTOR			

CONSTRUCTION RECORD | VERTICAL DATUM

REV	DATE	DESCRIPTION	BY

REVISIONS

CRW ENGINEERING GROUP, INC.
3940 ARCTIC BLVD. SUITE 300
ANCHORAGE, ALASKA 99503
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PROJECT MANAGEMENT AND ENGINEERING DEPARTMENT

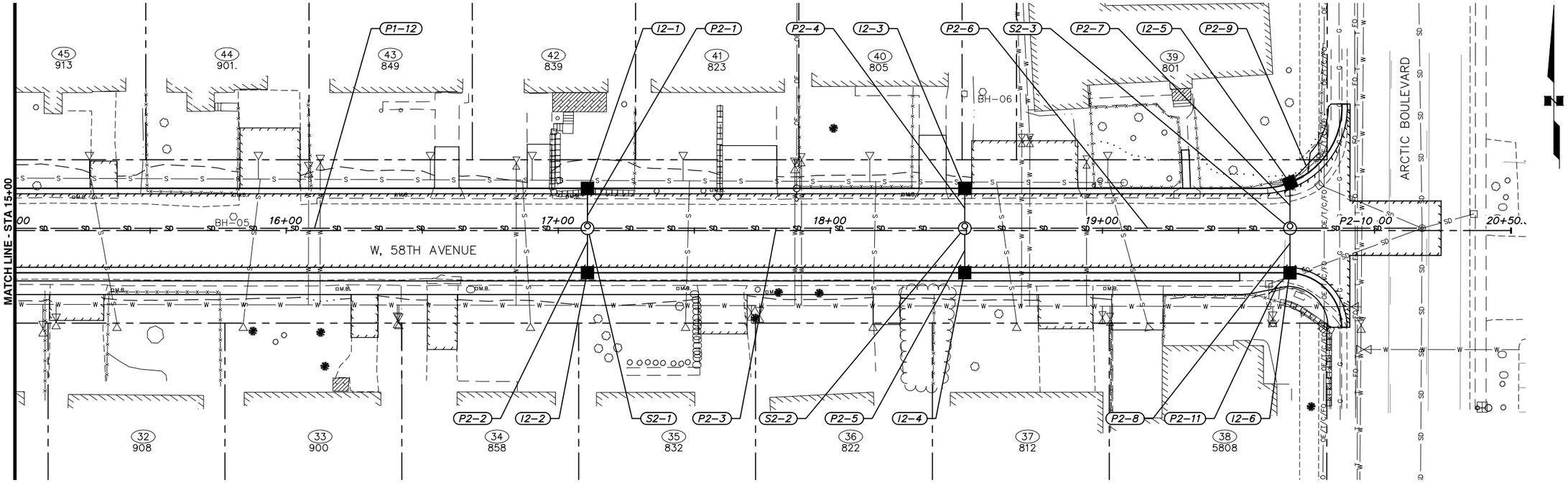
20-14 NORANN SUBDIVISION AREA ROAD RECONSTRUCTION SCHED B

STORM DRAIN PLAN & PROFILE

STA 9+80 TO STA 15+00

SCALE HOR. 1"=20' VER. 1"=5' | GRID SW1929 | DATE DEC 2023 | STATUS DSM | SHEET B2.1 of B2.4

File: J:\JobsData\10149.00 Norann Subdivision Road Reconstruction\00 CADD 2019\01 Working Set\01 Civil\10149.00 Plan & Profile - Storm Drain_Alt 2.dwg



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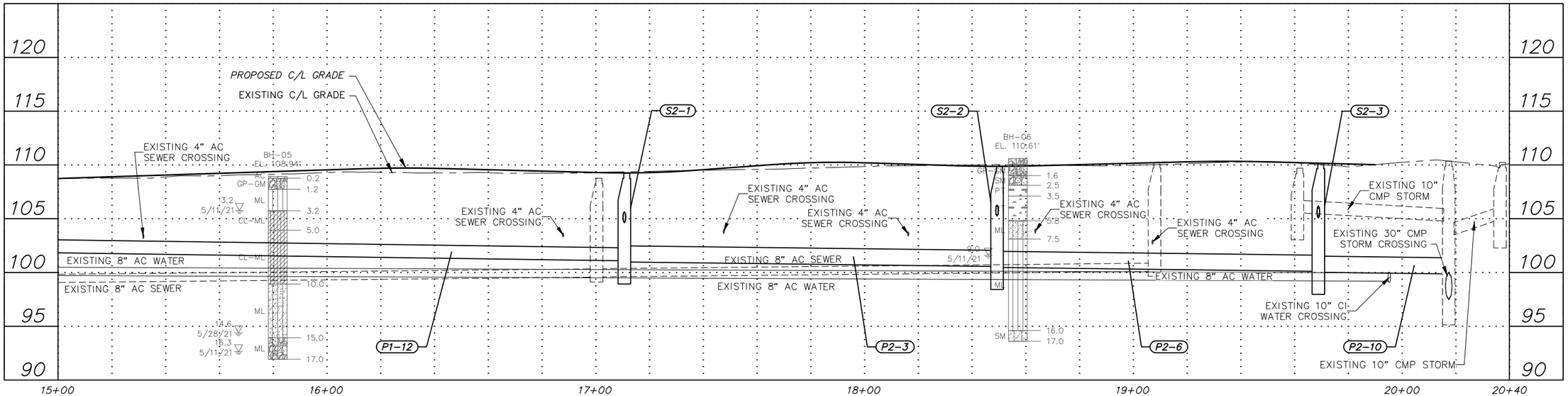
PREFERRED ALTERNATIVE



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   THIS WILL SERVE TO CERTIFY THAT THESE RECORD DRAWINGS ARE A TRUE AND ACCURATE REPRESENTATION OF THE PROJECT AS CONSTRUCTED.
   CONTRACTOR: _____
   BY: _____ TITLE: _____ DATE: _____
2. DATA TRANSFERRED BY: _____ TITLE: _____
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3. BASED ON PERIODIC FIELD OBSERVATIONS BY THE ENGINEER (OR AN INDIVIDUAL UNDER HIS/HER DIRECT SUPERVISION), THE CONTRACTOR-PROVIDED DATA APPEARS TO REPRESENT THE PROJECT AS CONSTRUCTED.
   DATA TRANSFER CHECKED BY: _____ TITLE: _____
   COMPANY: _____ DATE: _____
   BY: _____

DATA	DRAWN BY	CHECKED BY
BASE	BW	AR
TOPOGRAPHY	BW	AR
PROFILE	RB	JK
STORM SEWER	RB	JH
WATER/SANITARY SEWER	KY	JK
GAS	BW	AR
TELEPHONE	BW	AR
ELECTRIC	JH	TK
DESIGN	RB	JK
QUANTITIES	RB	JK
PRELIMINARY/FINAL	RB	JK
MUNICIPAL/STATE	RB	JK

PLAN CHECK

GRAPHIC SCALE 40 20 0 20 40

FIELD BOOKS	BM NO.	LOCATION	ELEV.
DESIGN			
STAKING			
ASBUILT			
CONTRACTOR	BASIS OF THIS DATUM		
INSPECTOR			

CONSTRUCTION RECORD | VERTICAL DATUM

REV	DATE	DESCRIPTION	BY

REVISIONS

CRW ENGINEERING GROUP, INC.
3940 ARCTIC BLVD. SUITE 300
ANCHORAGE, ALASKA 99503
PHONE: (907) 562-3252
#AECL882-AK

CONSULTANT | SEAL

MUNICIPALITY OF ANCHORAGE

PROJECT MANAGEMENT AND ENGINEERING DEPARTMENT

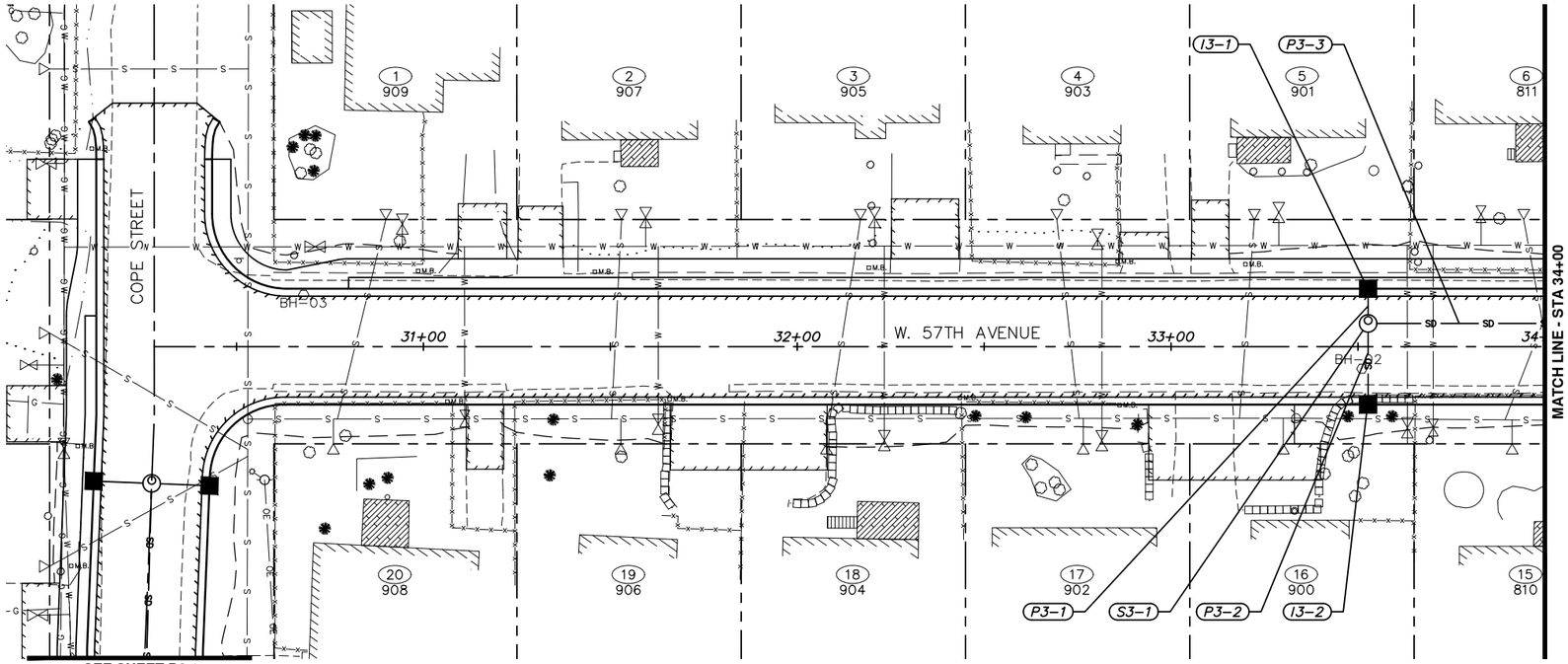
20-14 NORANN SUBDIVISION AREA ROAD RECONSTRUCTION SCHED B

STORM DRAIN PLAN & PROFILE

STA 15+00 TO STA 20+40

SCALE HOR. 1"=20' VER. 1"=5' | GRID SW1929 | DATE DEC 2023 | STATUS DSM | SHEET B2.2 of B2.4

File: J:\JobsData\10149.00 Norann Subdivision Road Reconstruction\00 CADD 2019\01 Working Set\01 Civil\10149.00 Plan & Profile - Storm Drain_Alt 2.dwg



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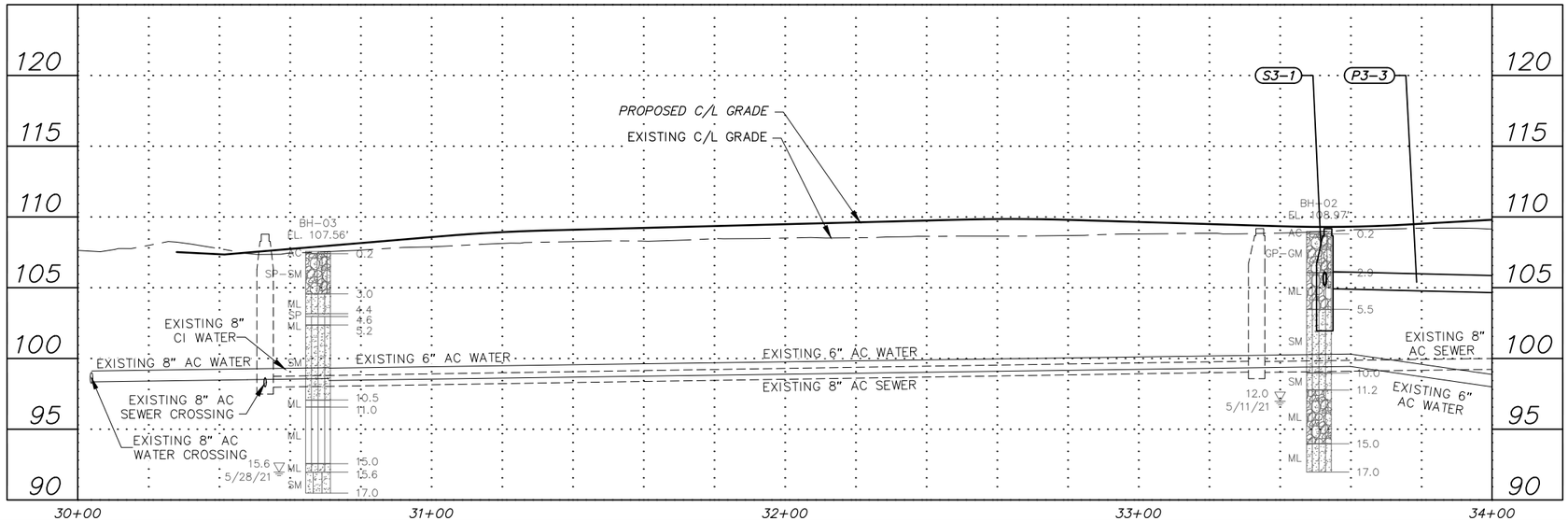
PREFERRED ALTERNATIVE



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   CONTRACTOR: _____
   BY: _____ TITLE: _____ DATE: _____
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   DATA TRANSFER CHECKED BY: _____ TITLE: _____
   COMPANY: _____ DATE: _____
   BY: _____

DATA	DRAWN BY	CHECKED BY
BASE	BW	AR
TOPOGRAPHY	BW	AR
PROFILE	RB	JK
STORM SEWER	RB	JH
WATER/SANITARY SEWER	KY	JK
GAS	BW	AR
TELEPHONE	BW	AR
ELECTRIC	JH	TK
DESIGN	RB	JK
QUANTITIES	RB	JK
PRELIMINARY/FINAL	RB	JK
MUNICIPAL/STATE	RB	JK

PLAN CHECK

GRAPHIC SCALE 40 20 0 20 40

FIELD BOOKS	BM NO.	LOCATION	ELEV.
DESIGN			
STAKING			
ASBUILT			
CONTRACTOR	BASIS OF THIS DATUM		
INSPECTOR			

CONSTRUCTION RECORD | VERTICAL DATUM

REV	DATE	DESCRIPTION	BY

REVISIONS

CRW ENGINEERING GROUP, INC.
3940 ARCTIC BLVD. SUITE 300
ANCHORAGE, ALASKA 99503
PHONE: (907) 562-3252
#AECL882-AK

CONSULTANT | SEAL

MUNICIPALITY OF ANCHORAGE

PROJECT MANAGEMENT AND ENGINEERING DEPARTMENT

20-14 NORANN SUBDIVISION AREA ROAD RECONSTRUCTION SCHED B

STORM DRAIN PLAN & PROFILE

STA 30+00 TO STA 34+00

SCALE HOR. 1"=20' VER. 1"=5' | GRID SW1929 | DATE DEC 2023 | STATUS DSM | SHEET B2.3 of B2.4

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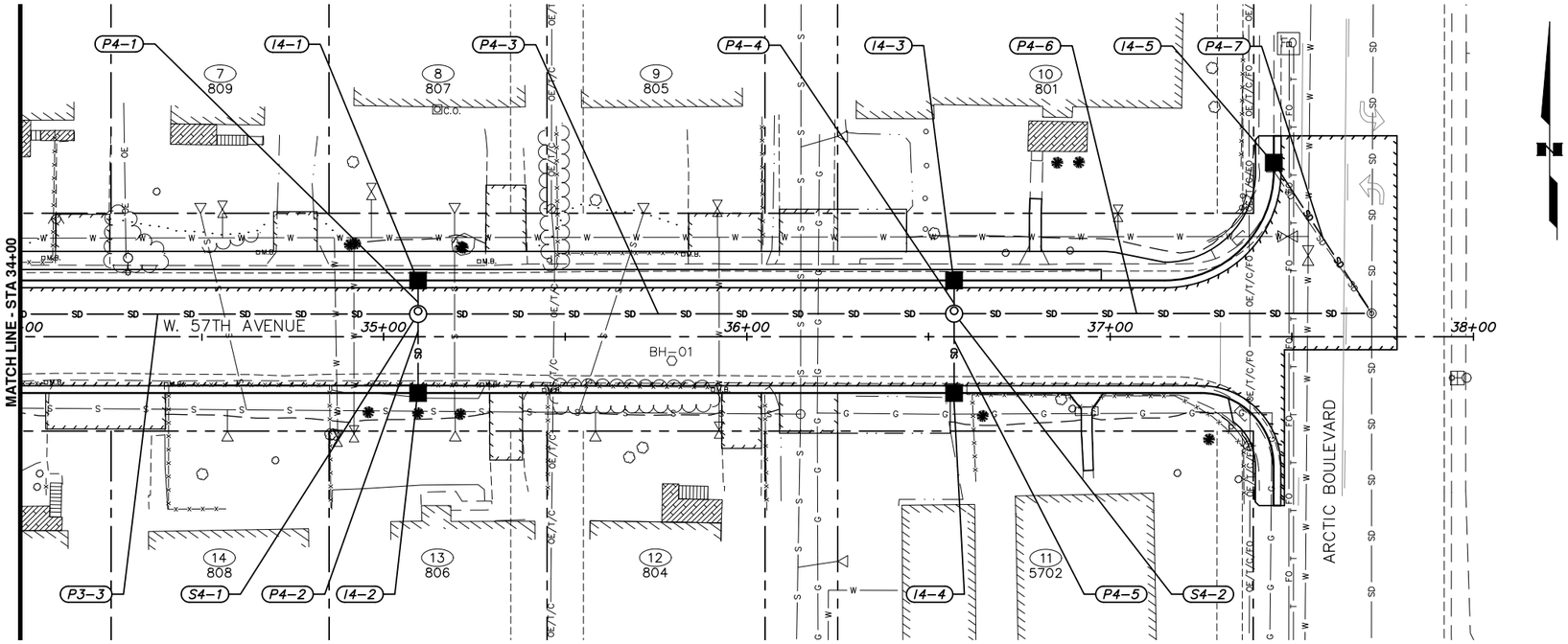

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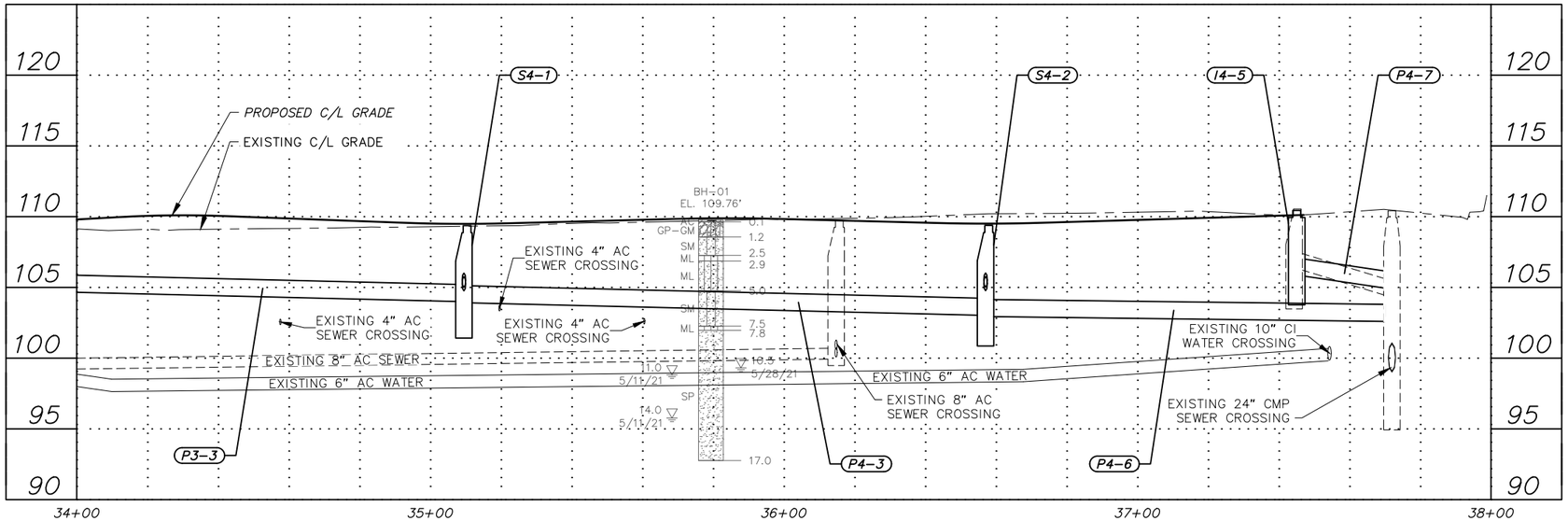

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   BY: _____ TITLE: _____ DATE: _____
2. DATA TRANSFERRED BY: _____ TITLE: _____
   COMPANY: _____ DATE: _____
3. BASED ON PERIODIC FIELD OBSERVATIONS BY THE ENGINEER (OR AN INDIVIDUAL UNDER HIS/HER DIRECT SUPERVISION), THE CONTRACTOR-PROVIDED DATA APPEARS TO REPRESENT THE PROJECT AS CONSTRUCTED.
   DATA TRANSFER CHECKED BY: _____ TITLE: _____
   COMPANY: _____ DATE: _____
   BY: _____

DATA	DRAWN BY	CHECKED BY
BASE	BW	AR
TOPOGRAPHY	BW	AR
PROFILE	RB	JK
STORM SEWER	RB	JH
WATER/SANITARY SEWER	KY	JK
GAS	BW	AR
TELEPHONE	BW	AR
ELECTRIC	JH	TK
DESIGN	RB	JK
QUANTITIES	RB	JK
PRELIMINARY/FINAL	RB	JK
MUNICIPAL/STATE	RB	JK
PLAN CHECK		

GRAPHIC SCALE 40 20 0 20 40

FIELD BOOKS	BM NO.	LOCATION	ELEV.
DESIGN			
STAKING			
ASBUILT			
CONTRACTOR	BASIS OF THIS DATUM		
INSPECTOR			
CONSTRUCTION RECORD	VERTICAL DATUM		

REV	DATE	DESCRIPTION	BY
REVISIONS			

CRW ENGINEERING GROUP, INC.
3940 ARCTIC BLVD. SUITE 300
ANCHORAGE, ALASKA 99503
PHONE: (907) 562-3252
#AECL882-AK
CONSULTANT

SEAL

MUNICIPALITY OF ANCHORAGE

PROJECT MANAGEMENT AND ENGINEERING DEPARTMENT

20-14 NORANN SUBDIVISION AREA ROAD RECONSTRUCTION SCHED B

STORM DRAIN PLAN & PROFILE

STA 34+00 TO STA 38+00

SCALE HOR. 1"=20'
VER. 1"=5'
GRID SW1929
DATE DEC 2023
STATUS DSM
SHEET B2.4 of B2.4

File: J:\JobsData\10149.00 Norann Subdivision Road Reconstruction\00 CADD 2019\01 Working Set\01 Civil\10149.00 Plan & Profile - Storm Drain_Alt 2.dwg

Storm Drain Condition Assessment

Appendix C

Municipality of Anchorage

Maintenance & Operations Department
Street Maintenance Division
Stormwater Drainage System (SDS)

SDS CCTV PIPELINE & STRUCTURE INSPECTIONS
OPERATOR'S REPORT
Performed By: Steven N. Rupp

PM&E Project #: N/A
CCTV Request #: N/A / Project Name: Cope St. Outfall Drainage Investigation
Completion Date: 10/27/2021
Revision Date: 11/10/2021

Scope of Work

Provide CCTV evaluation information for the existing storm drain system as depicted on the PM&E attached diagram. Please video and provide comments as requested regarding all storm drainpipe, structures, and all other components related to the system. All comprehensive observations are located at the file path G:\Public Works\MNO\Street\ENGINEERING\ CCTV\CCTV inspections. Operators notes will be scanned into the G Drive in the PM&E Project File.

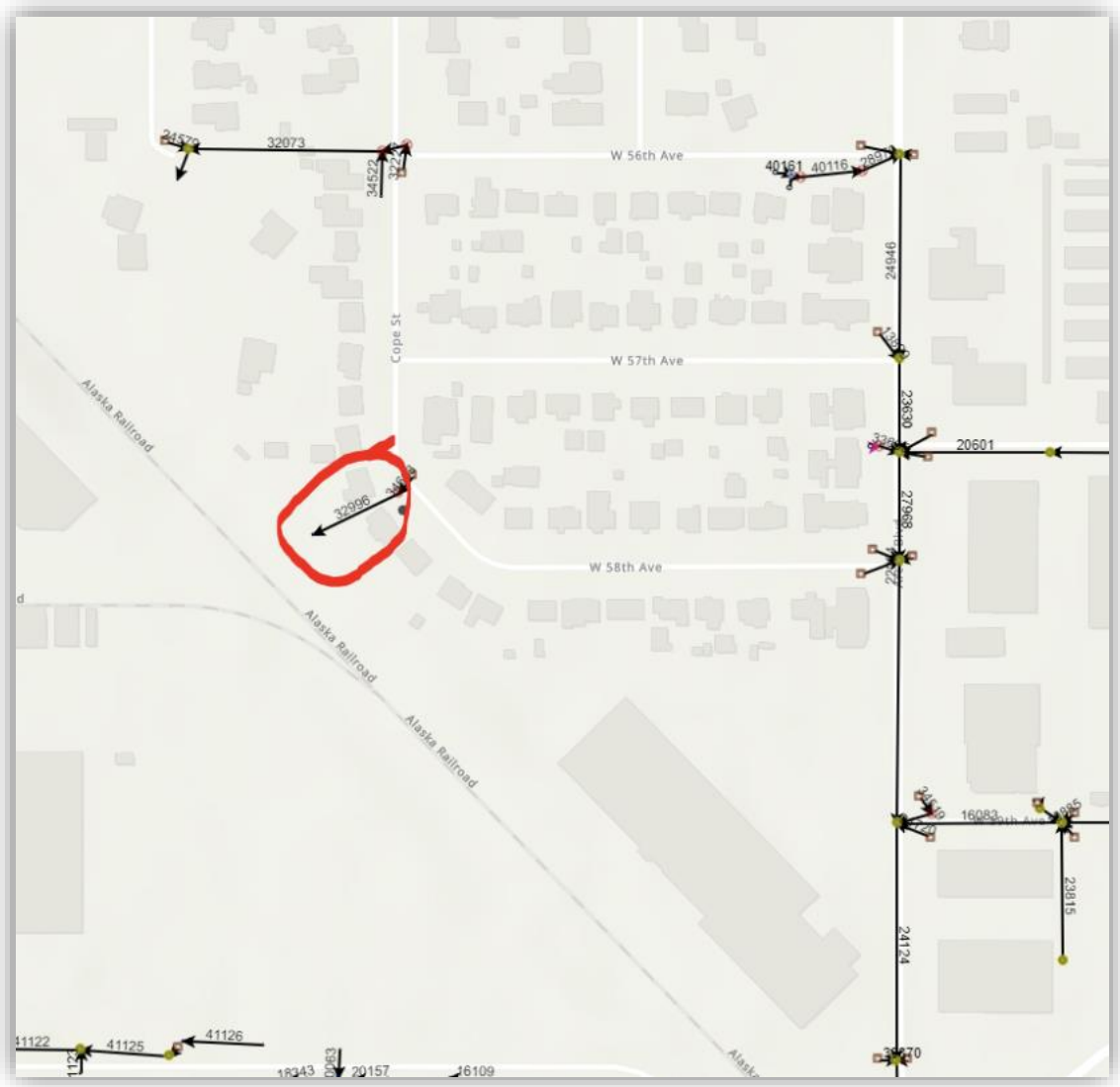
Summary of Findings

Overall, the upper end of the system appeared to be in fair condition, but the lower end of the system had severe deposits within the last 10 feet of the system nearest the outfall to the embankment. We had an abandoned survey because of severe deposits preventing the camera from proceeding in the outfall section.

In follow up, this outfall is on the Vactor list to jet the last 10 feet of the outfall pipe segment. We are suspecting that the outfall at the embankment is overgrown and surcharging the system back upstream. In addition to jetting the outlet of the outfall may need some attention to remove any overburden and growth.

Jetting was completed by 11/08/2021 and a CCTV re-evaluation was performed on 11/09/2021 to video the post cleaning. CCTV was able to video the entire line and verify the outfall was buried sub grade. The outfall would benefit from a dig out or pipe extension to aid the outlet to maintain fall and flow successfully to where the embankment starts to drop off in grade.

Field Notes


W 56th Ave
W 57th Ave
W 58th Ave
Cope St
Alaska Railroad
Alaska Railroad
Alaska Railroad
32073
40161
40116
24946
23630
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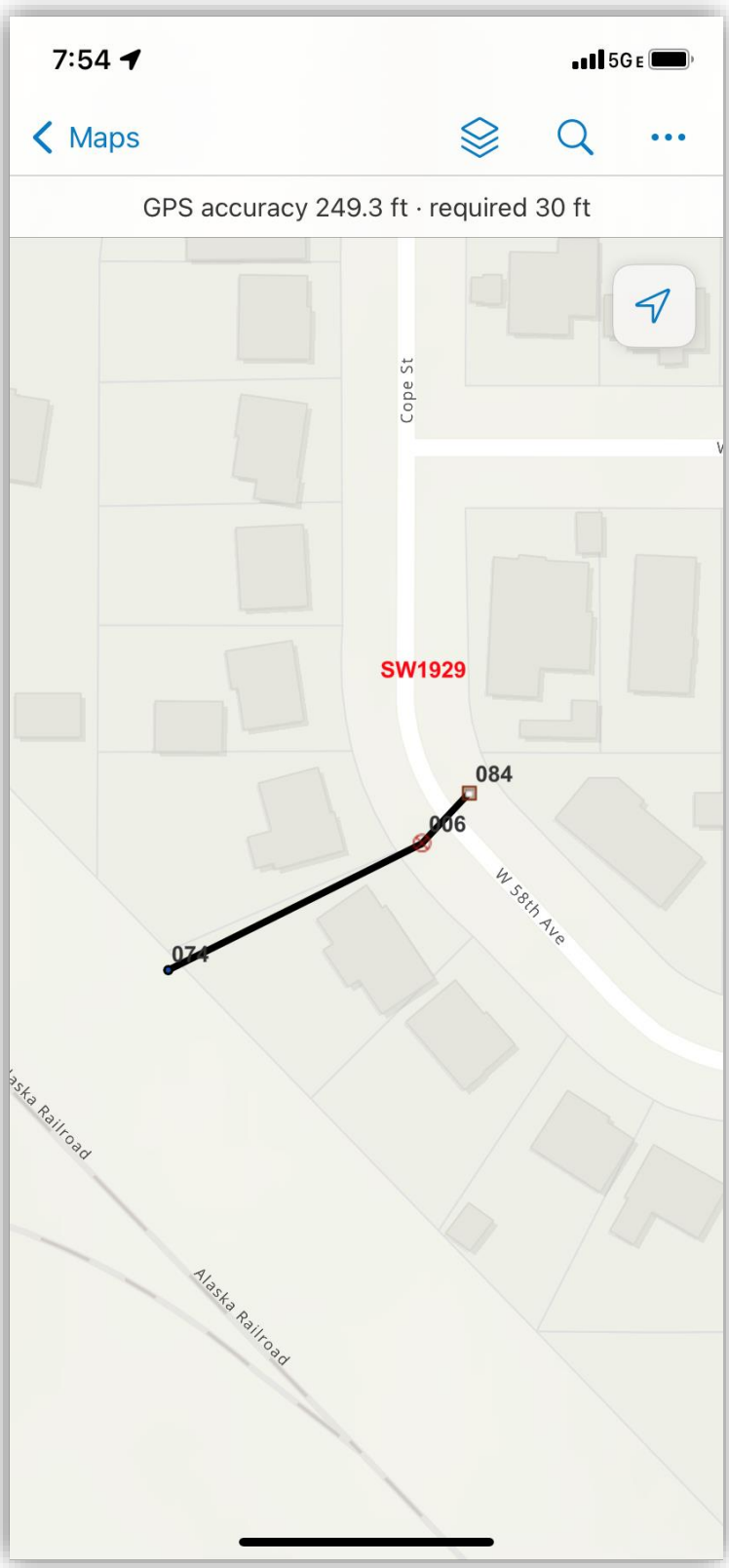
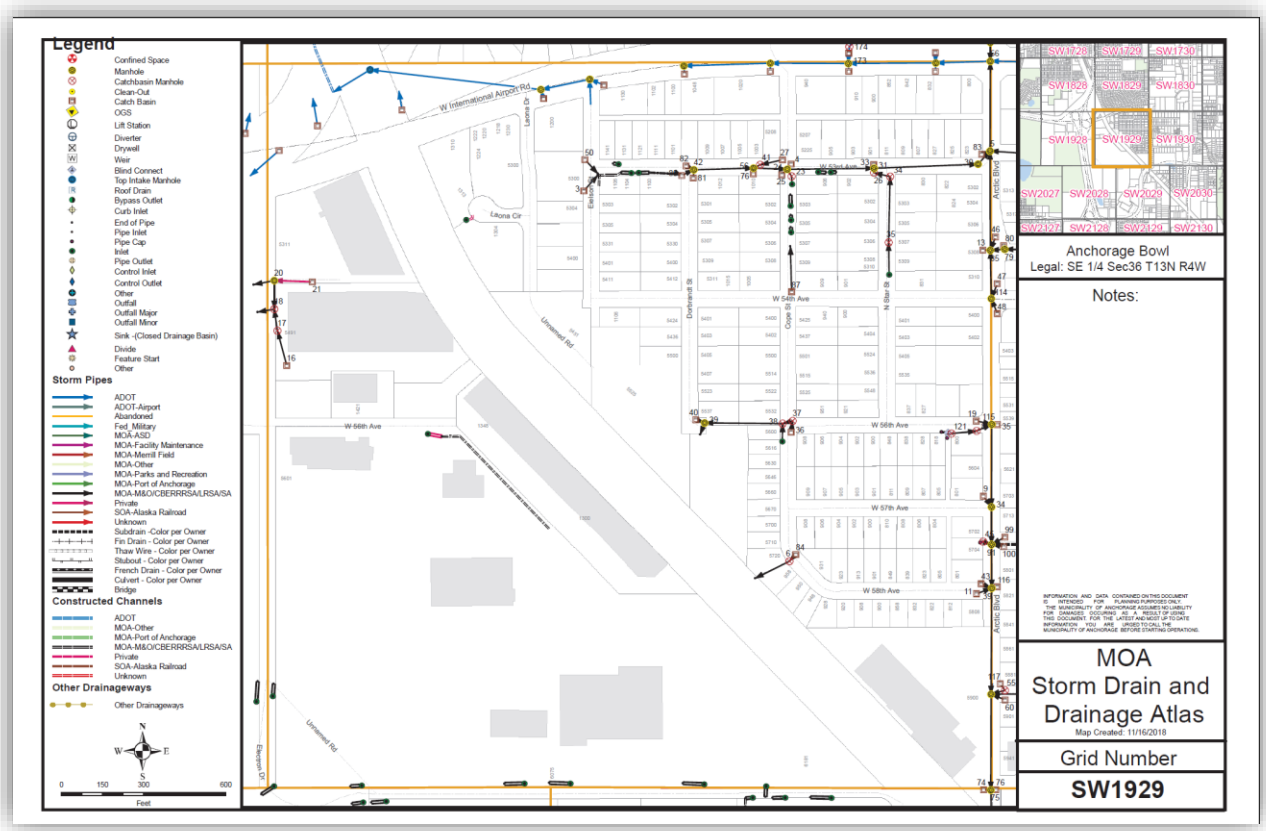
27968
32996
16083
23815
24124
41122
41125
41126
18343
20157
16109


7:54
5G E
Maps
GPS accuracy 249.3 ft · required 30 ft
Cope St
SW1929
084
006
074
W 58th Ave
Alaska Railroad
Alaska Railroad


Legend
Confined Space
Manhole
Catchbasin Manhole
Clean-Out
Catch Basin
OGS
Lift Station
Diverter
Drywell
Weir
Blind Connect
Top Intake Manhole
Roof Drain
Bypass Outlet
Curb Inlet
End of Pipe
Pipe Inlet
Pipe Cap
Inlet
Pipe Outlet
Control Inlet
Control Outlet
Other
Outfall
Outfall Major
Outfall Minor
Sink -(Closed Drainage Basin)
Divide
Feature Start
Other
Storm Pipes
ADOT
ADOT-Airport
Abandoned
Fed_Military
MOA-ASD
MOA-Facility Maintenance
MOA-Merrill Field
MOA-Other
MOA-Parks and Recreation
MOA-Port of Anchorage
MOA-M&O/CBERRRSA/LRSA/SA
Private
SOA-Alaska Railroad
Unknown
Subdrain -Color per Owner
Fin Drain - Color per Owner
Thaw Wire - Color per Owner
Stubout - Color per Owner
French Drain - Color per Owner
Culvert - Color per Owner
Bridge
Constructed Channels
ADOT
MOA-Other
MOA-Port of Anchorage
MOA-M&O/CBERRRSA/LRSA/SA
Private
SOA-Alaska Railroad
Unknown
Other Drainageways
Other Drainageways
N
W
E
S
0
150
300
600
Feet
W International Airport Rd
Lorna Cir
Unnamed Rd
W 54th Ave
W 56th Ave
W 57th Ave
W 58th Ave
Arctic Blvd
Elderberry Dr
Dorbrandt St
Ginger St
N Blair St
SW1728
SW1729
SW1730
SW1828
SW1829
SW1830
SW1928
SW1929
SW1930
SW2027
SW2028
SW2029
SW2030
SW2127
SW2128
SW2129
SW2130
Anchorage Bowl
Legal: SE 1/4 Sec36 T13N R4W
Notes:
INFORMATION AND DATA CONTAINED ON THIS DOCUMENT IS INTENDED FOR PLANNING PURPOSES ONLY. THE MUNICIPALITY OF ANCHORAGE ASSUMES NO LIABILITY FOR DAMAGES OCCURING AS A RESULT OF USING THIS DOCUMENT. YOU ARE ADVISED TO FIELD VERIFY INFORMATION YOU ARE PLANNING TO USE WITH THE MUNICIPALITY OF ANCHORAGE BEFORE STARTING OPERATIONS.
MOA
Storm Drain and Drainage Atlas
Map Created: 11/16/2018
Grid Number
SW1929

CCTV Inspection Schedule

Asset ID.	Direct.	Type	US. Node	DS. Node	Video	Cond.	CCTV Date
34663	U	10” PCMP	31929084	31929006	PIC	Fair	N/A
32996	D	10” PCMP	31929006	31929074	DUC	Poor	10/27/2021
32996	D	10” PCMP	31929006	31929074	DUC	Poor	11/09/2021

Cope St. Outfall Storm Drain Subdrain System

Pipe Asset ID 34663 - Quadrant 3 - GRID 1929 - CB 006 to CB 084

Weather Cloudy - Dry

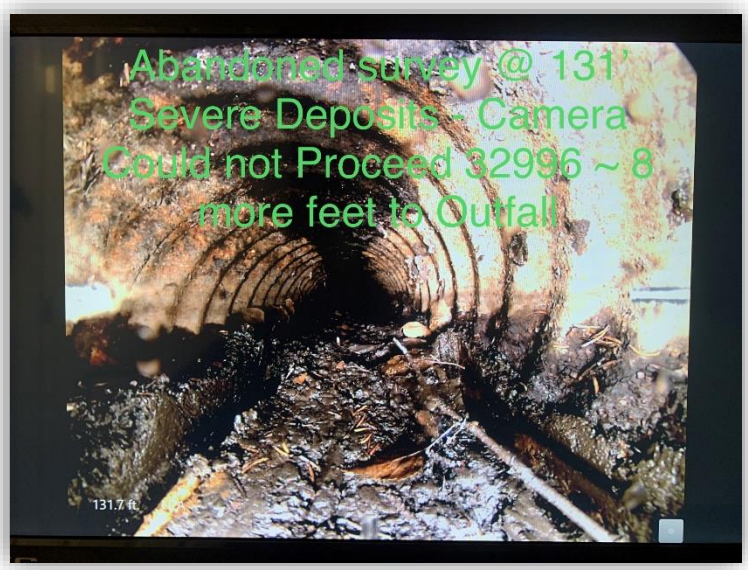
10-27-2021

Overall Assessment: This CCTV Inspection was started from CB 006 and headed against the flow to CB 084 and lamped with the portable iphone camera up the mainline (CB31929084CB31929006). This 10" PCMP is recorded in GIS as 34' in length. This service runs across the cope street & W 58th Ave. dogleg corner and outfalls passing through a backlot pipe segment. This subdrain service is a total of 2 pipe segments. But services part of Cope St, part of W 58th Ave, and part of W 74th Ave. While lamping up this pipe segment we were able to visually assess that the overall pipe condition was fair to good. Overall pipe alignment and grade appeared to be in fair condition with minimal flow. There were no major defects visible. We located the defects with our iphone camera visually. The full video footage and all observations are on GraniteNet.

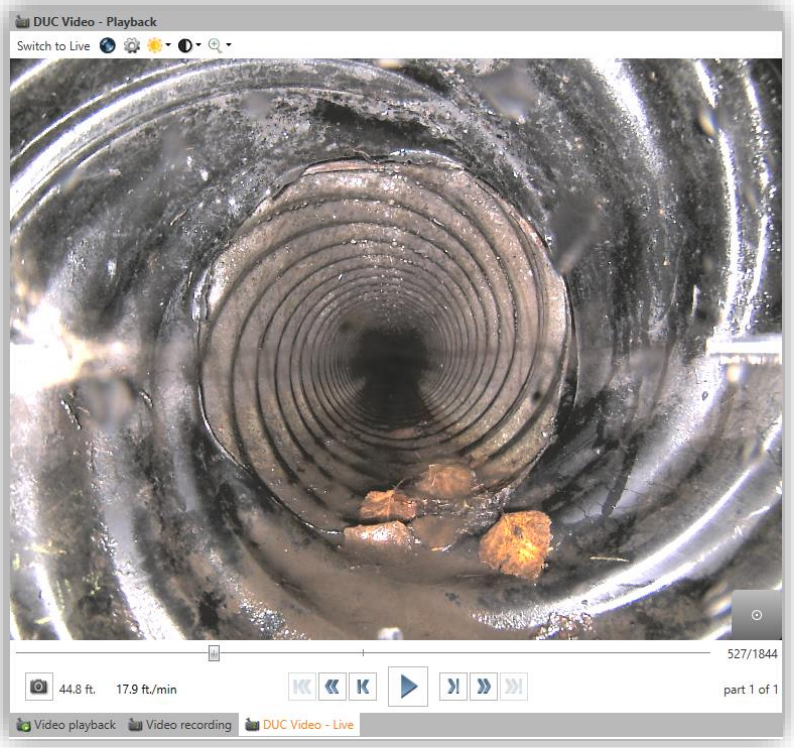
Pipe Asset ID 32996 - Quadrant 3 - GRID 1929 - CB 006 to End of Pipe 074

Weather Cloudy - Dry

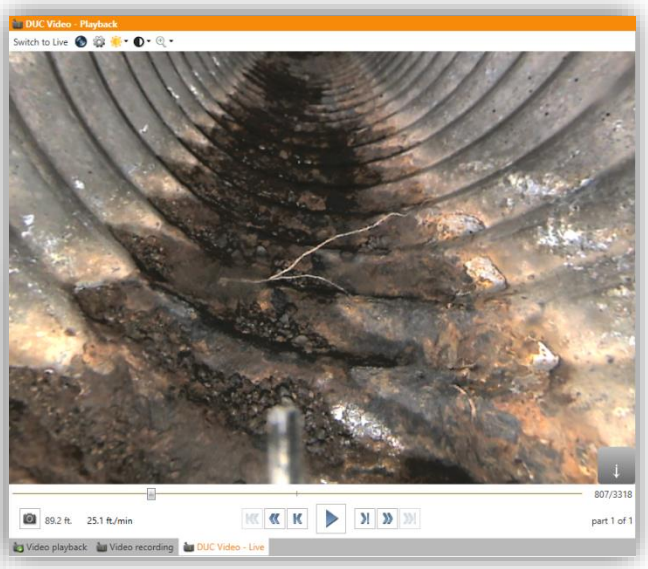
10-27-2021

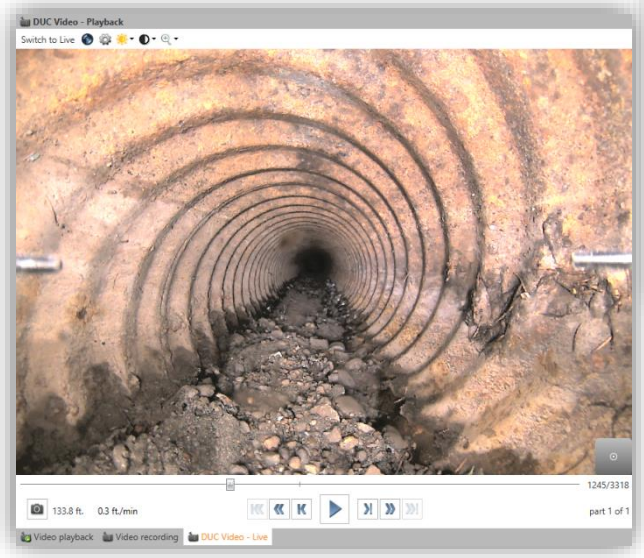


Overall Assessment: This CCTV Inspection was started from CB 006 and headed with the flow to the end of pipe at the outfall to an embankment 074. This inspection was performed with the DUC and transporter with the 10" rubber tires. (CB31929006CB31929074). This 10" PCMP is recorded in GIS as 139' in length. This service runs across the cope street & W 58th Ave. dogleg corner and outfalls passing through a backlot pipe segment. This subdrain service is a total of 2 pipe segments. But services part of Cope St, part of W 58th Ave, and part of W 74th Ave. In the assessment we visually identified a pipe type change at 44.8' from PCMP to CMP-Spiral pipe. We identified some light debris, light deposits and some joint separated smalls. At 128' into the inspection suddenly there was a dramatic increase in deposits progressing from light to severe in a couple feet. At 131' we abandoned survey due to severe deposits preventing the camera from proceeding. Overall pipe alignment and grade appeared to be in fair condition with minimal flow. At this time, we were unable to gain access into the backyard to do our surface inspection on the outfall at the embankment. We located the defects with our DUC camera visually. The full video footage and all observations are on GraniteNet.



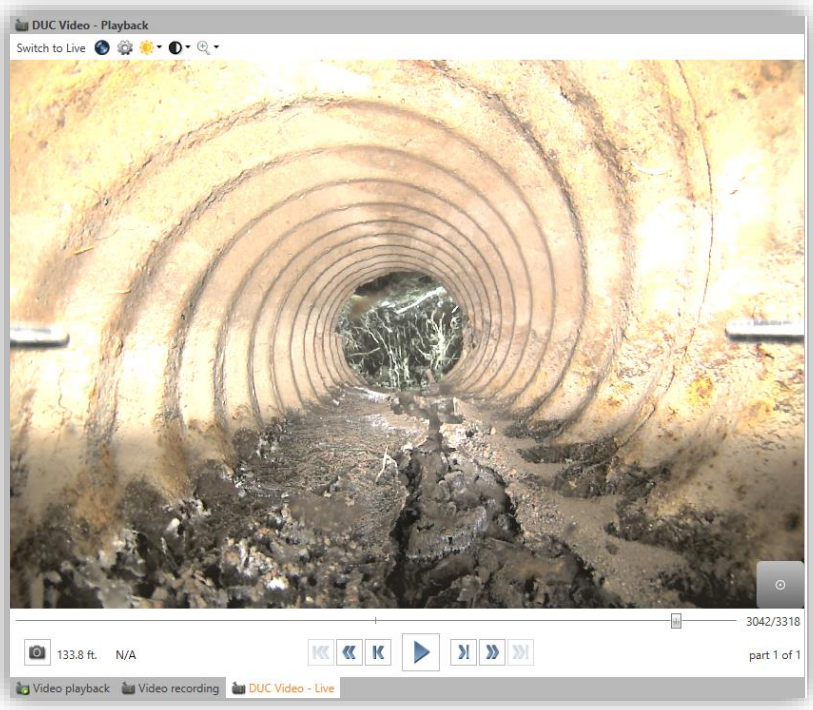
We performed a re-evaluation of this pipe after it was jetted and cleaned to assess any further information beyond the abandoned survey point and the condition of the pipe under the deposits in the pipe. What we found was the flowline showed





signs of surface damage from erosion and it was difficult to tell in spots if the pipe bottom had deteriorated to the point where we were looking at pipe bedding or if we were looking at deposits in the pipe. When we made it to the point where we abandoned survey last time at 131' we saw again

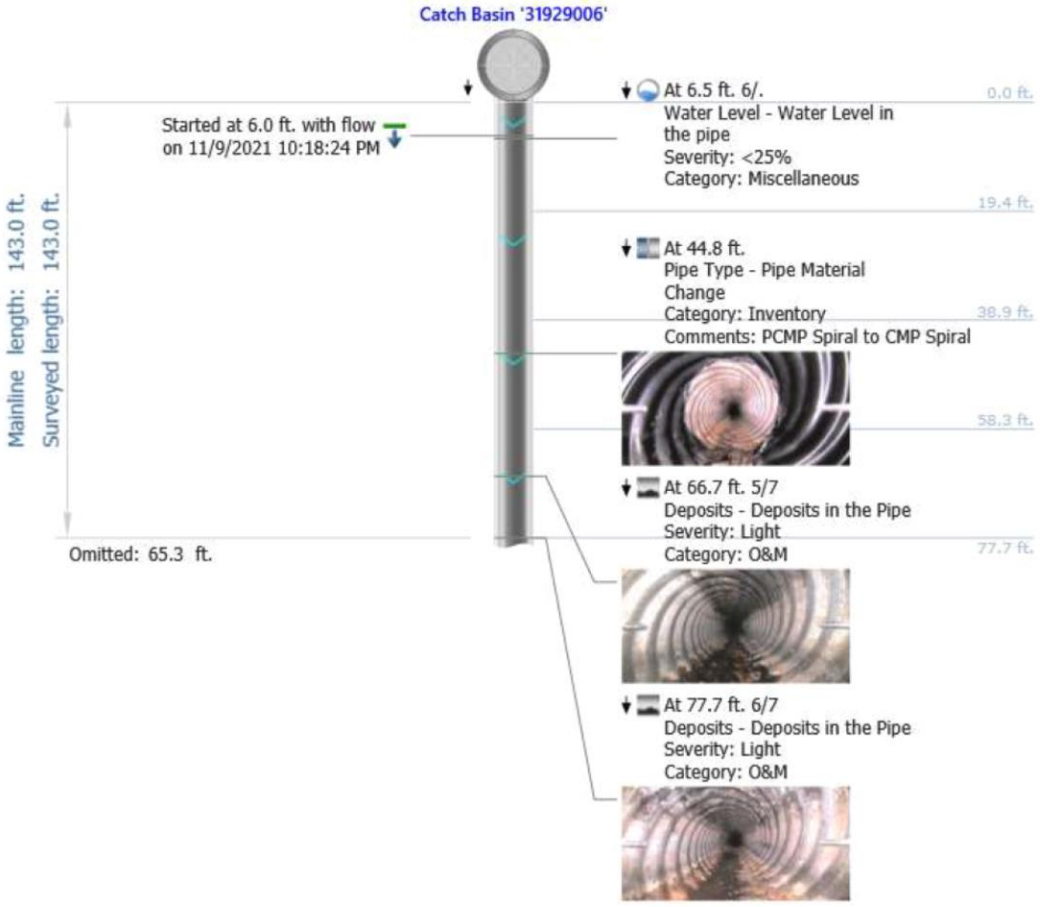
medium to severe deposits in the pipe continuing to the end of pipe at the discharge point. We were able to verify the end of pipe was at 143' according to our footage counter and the end of pipe was free and clear of obstructions. The issue we noticed was that the pipe outlet flowline grade is impeding flow beyond the outlet due to the grade at the embankment being overgrown and above the outlet grade. A open channel dig from pipe outlet to embankment ~20' and potentially rip-rap or a pipe extension to prevent ground erosion may correct the issue. This should be further assessed from surface to determine appropriate corrective action.



Street Maintenance
Deptartment
5701 Northwood Drive
Anchorage, AK 99507

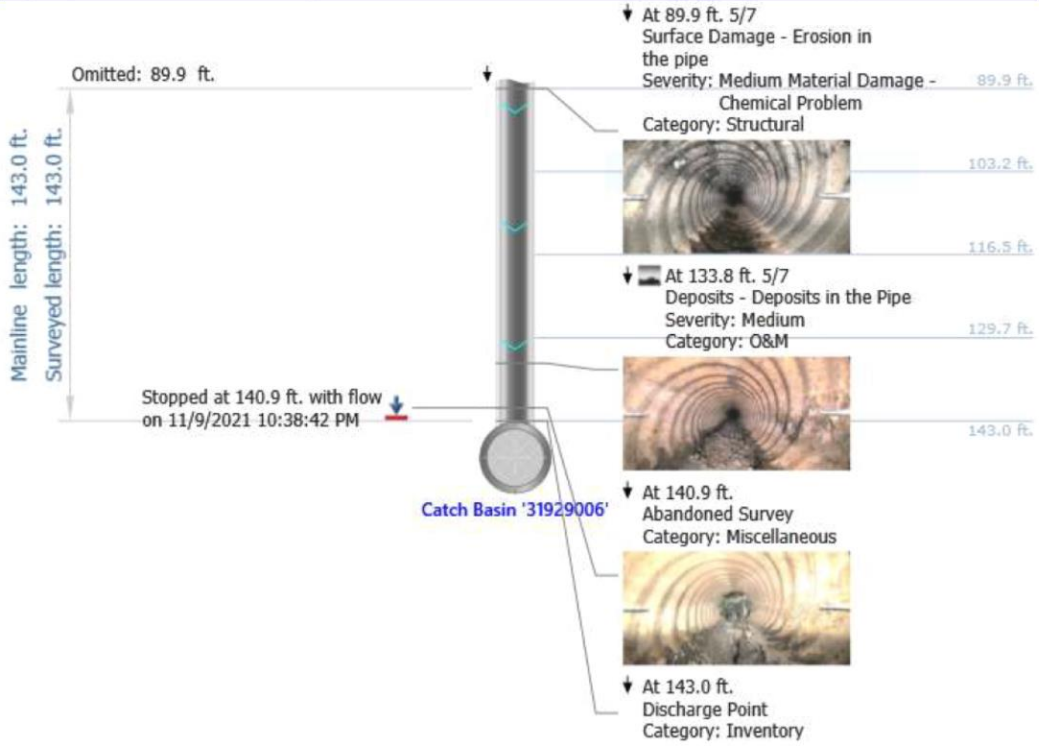
Main Inspections Pipe Run with Images

Project name:	Mainline ID:	City:	Address:
2532	**32996**	**Anchorage**	**Cope St.**
Start date/time:	Direction:	Weather:	Surface condition:
11/9/2021 10:18 PM	**With the flow**	**Dry**	**Asphalt**
Pipe shape:	Pipe material:	Pipe height:	Pipe width:
Circular	**Corrugated**	**10.0 in.**	**10.0 in.**



Project name:	Mainline ID:	Start date/time:	Direction:
2532	**32996**	**11/9/2021 10:18 PM**	**With the flow**

Weather:
Dry



Additional Surface Media

System Walk Down: Visually inspecting the system at surface from inlet to outfall, the system starts from the Cope St & W 58th Ave Dogleg Corner and runs two pipe segments to the outfall on the embankment beyond the backlot line adjacent from the Alaska Railroad. The last 10' of the outfall segment seem to be surcharging with sediment due to a partial blockage at the outlet.

After visually locating and identifying the outfall outlet in the embankment we were able to verify that the pipe had been buried under overgrowth and from settling. The outlet of the outfall was a good 20' from where the embankment drop off started with inadequate fall from where the current outlet is to where the correct flowline grade should be. Attached are some visuals on the outlet from surface.

Memorandum

Date:	October 15, 2021
To:	Nichole Rehm, P.E. – Professional & Technical Services, Inc.
Thru:	Justin Keene, P.E. – CRW Engineering Group, LLC
From:	Joey Hegna, P.E. – CRW Engineering Group, LLC
Project:	Norann Subdivision Area Road Reconstruction
Project No:	PM&E #20-14 (CRW #10149)
Subject:	Storm Drain Condition Assessment

This memorandum presents the findings of the storm drain condition assessment performed by CRW Engineering Group, LLC (CRW) on July 1, 2021 for the Norann Subdivision Area Road Reconstruction project.

1. Project Background & Purpose

The Municipality of Anchorage Project Management & Engineering Department (MOA PM&E) plans on reconstructing approximately 1,600 feet of local roadways. The project roadways include W. 57th Avenue and W. 58th Avenue (from Cope Street to Arctic Boulevard) and Cope Street (from W. 57th Avenue to W. 58th Avenue). The purpose of the project is to reconstruct the roadways and improve drainage. Improvements may include adjusting the horizontal and vertical alignment, new surfacing, new roadway structural section, storm drainage upgrades, and new lighting. Refer to *Figure 1, Appendix A* for a project vicinity map and project limits.

The purpose of this memorandum is to describe the condition of the existing storm drain structures located at the intersections of Arctic Boulevard and W. 57th Avenue W. 58th Avenue and the connecting storm drain pipe. This existing storm drain infrastructure is critical to the project as the proposed storm drainage piping is likely to connect into this system.

2. Structure & Pipe Information

The structure and pipe identification numbers used throughout this memo and the appendices are based on the naming convention provided in MOA's online GIS Stormwater Asset Map and associated grid maps. The inspected structures and pipes are all located on MOA Storm Drain Grids SW1929 & SW1930 included in *Appendix A*. In some cases the structure IDs referenced were abbreviated (e.g. Structure 31930039 = 039). The pipe and structures inspected for this effort are highlighted on *Figure 2, Appendix A*.

No record or design drawings were available for the storm drain system along Arctic Boulevard. Therefore, the age of the structures and pipe are unknown at this time. CRW will continue to work with MOA to track down any drawings related to this system.

3. Structure Inspection – Procedure

An inspection was performed on two storm drain manholes (034 & 039) within the project area. The inspection was conducted by removing the manhole cover to view the interior of the structure. Each structure is assessed from the ground surface; no structures were entered for this effort. Any notable characteristics, irregularities, and/or defects were documented and photographed and are presented on the *Storm Drain Structure Inspection Forms, Appendix B*. The overall condition of the components of each structure (e.g. cover, grade rings, barrel, ladder rungs, etc.) are scored between 1 and 4 (poor to good, respectively).

4. Structure Inspection – Condition Summary

The two inspected manholes were in overall good condition. Both structures are relatively deep with approximately 9 to 10 feet of cover over the main line storm drain pipe running north to south along Arctic Boulevard. Several minor issues were identified during the inspection process including cracking in grade rings, non-standard ladder rungs and covers, and offsets between frames, grade rings and cones.

Below is a list of some of the defects and irregularities observed in the structures:

Structure 034 (Arctic Blvd. & 57th Ave.)

- Non-standard ladder rungs
- Frame offset from grade rings
- Non-standard manhole cover

Structure 039 (Arctic Blvd. & 58th Ave.)

- Vertical cracking in grade rings
- Non-standard ladder rungs
- 1 ladder rung cut off at catch basin lead
- Grade rings and frame offset from cone

A comprehensive description of the condition of each manhole is provided in *Appendix B*.

5. Pipe Inspection – Procedure

CRW utilized a Quickview airHD Camera to perform the pipe inspection work. The camera is pole-mounted and uses a high-powered zoom optic and lighting system to take high definition photos and video of the pipe interior. Unlike conventional closed circuit TV (CCTV) pipe inspection, the Quickview camera does not enter and travel down the pipe. The camera is lowered into the manhole and positioned at one end of the pipe and uses its zoom capabilities and intense light to 'travel' the length of the pipe and record images. The camera is capable of observing pipe lengths up to 300 feet long depending on the pipe alignment/straightness, condition of pipe (e.g. blockages), and pipe diameter. The camera communicates wirelessly by Wi-Fi network and is operated by the inspector using a tablet or laptop from the ground surface.

Photo 1 - Quickview Camera in Manhole 039

6. Pipe Inspection – Condition Summary

The condition assessment effort for this memo included inspecting a total of eight storm drain pipe segments. The pipes range in size from 10 inch to 30 inch in diameter. All inspected pipes were constructed of corrugate metal pipe (CMP). As noted above, the main line pipe running north to south along Arctic Boulevard was installed relatively deep with approximately 9 to 10 feet of cover. The catch basin leads that connect to Manholes 034 & 039 were installed shallower with approximately 3 to 6 feet of cover.

The condition of the storm drain pipe inspected ranged widely from poor to good. Some of the issues identified included sediment deposited in inverts, blockages/buildup, mineralization, horizontal & vertical deflections, joint offsets, and root intrusion. No ovality ('out of roundness') issues were identified in the inspected pipes.

Below is a list of some of the more notable pipe defects observed from the Quickview camera inspection work:

<u>Pipe 24946 (Arctic Blvd. & 57th Ave.)</u>

- Sediment/mineralization blockage
- Potential grade issue – stagnant flow

<u>Pipe 13899 (Arctic Blvd. & 57th Ave.)</u>

- Sediment buildup at multiple locations
- Vertical deflections

<u>Pipe 23630 (Arctic Blvd. & 57th Ave.)</u>

- Horizontal deflections
- Joint offsets
- Sediment/mineralization blockage

<u>Pipe 28092 (Arctic Blvd. & 58th Ave.)</u>

- Sediment buildup

A comprehensive description of the condition of each pipe is provided in *Appendix C*.

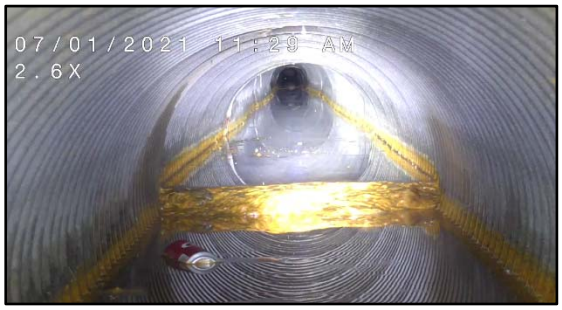


Photo 2 - Pipe 24946 (Blockage)

Photo 3 - Pipe 28092 (Sediment Buildup)

- End of Memorandum -