
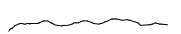
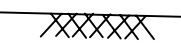
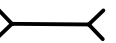
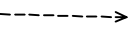

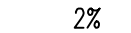
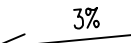


Legend

E – east coordinate
 N – north coordinate
 elv – elevation
 CL – centerline of street
 13+00 – stationing in feet
 PC – point of curvature of centerline
 PI – point of intersection of centerline tangents
 Delta – deflection angle between centerline tangents

Symbol

————— lot line and edge of right-of-way
 - - - - - centerline
 major contour line and elevation in feet
 minor contour line (2 foot interval)
 - - - - - toe of street section
 ground surface (tundra vegetation)
 culvert
 drainage path and flow direction
 stop sign location and number
 street centerline grade [rise/run]
 street surface crown downward direction

Sheet List	
Sheet Number	Sheet Title
1	Legend and Street List
2	Geotechnical and Specifications
3	Subdivision Layout
4	Plan and Profile A Street 10+00 to 17+20
5	Plan and Profile A Street 17+20 to 22+50
6	Plan and Profile B Street 8+10.39 to 14+10.09
7	Plan and Profile B Street 14+10.99 to 24+10.09
8	Plan and Profile Qaluk Street 10+00 to 18+25.02
9	Plan and Profile C Street 10+00 to 14+69.61
10	Street Profile Typical
11	Street Profile B Street 12+51.17 to 13+61.93
12	Streets, Drainage Paths and Culverts
13	Stop Sign Plan



Crowther Associates
 Civil Engineering Services

Job No. 035.016

File No. 035016 Legend

Date August 2022

Stebbins Housing Authority	Ararsauyaq Subdivision 2022 Streets	Stebbins Alaska	Legend and Sheet List	xx
Client	Project Title	Location	Sheet Title	Stationing
Sheet Number	Total Sheets			
1	13			

Geotechnical

As shown on the subdivision layout, Plate 3, the Arrsauyaq Subdivision 2022 is north of the Corporate Office and Tribal Office Buildings. It is in a well-drained area with tundra vegetation.

Each year during summer the upper soil thaws (thermal active layer) and its underlying soil stays frozen. During winter, the thermal active layer refreezes. Soil under the thermal active layer, which does not thaw during summer, is permanently frozen (permafrost). On September 3, 2002 we explored subsurface conditions at the then proposed Tribal Office Building by excavating backhoe test pits to a 2 foot depth. We encountered 2 feet of non-frozen silt with organics over ice-rich silt. The upper 2 feet of non-frozen silt is the thermal active layer, and the underlying ice-rich silt is permafrost. Organics in the non-frozen silt are decomposing tundra vegetation, which accumulated in it during the Holocene (past 11,000 years). The silt with organics immediately becomes compressible as it thaws. It consolidates rapidly. The silt with organics is a strong soil after it consolidates.

Roads for the Arrsauyaq Subdivision 2008 Street project were constructed by placing 3 or more feet of sand and gravel fill on a woven fabric that was placed over the tundra. These roads have performed well. So, we recommend the same design for the Arrsauyaq Subdivision 2022 street project. The street section should therefore be 3 or more feet of sand and gravel fill placed on a woven fabric, which is placed over the tundra. Their subgrade should be the existing ground surface. There should be no excavation into the tundra and permafrost silt. The fill should be placed in 1 foot or thinner lifts. Each lift should be compacted by truck and other construction equipment traffic as the fill is delivered and placed. Final grades for the roads are shown on the plan and profile sheets, Plates 4 through 9.

The sand and gravel fill will absorb more of the sun's ultra-violet radiation than tundra vegetation. Energy absorbed will be conducted through the fill, thawed silt, and then into the underlying ice-rich permafrost silt. During the first two summers after these roads are constructed, we expect 1 foot of ice-rich permafrost silt will thaw. And during the subsequent 10 summers after the roads are constructed, we expect that another 1 to 2 feet of ice-rich permafrost silt will thaw. The ice-rich silt will strain between 30 and 60 percent as it thaws. We therefore expect these roads will settle about 0.5 feet during the first two summers, and 1 or more feet during the subsequent 10 years after they are constructed.

Road surfaces in Stebbins that have a southern exposure receive more of the sun's ultra-violet radiation than surfaces with a northern exposure. Where the road surface has a southern exposure, we anticipate the fill will settle uniformly. Where the road surface has a northern exposure, we anticipate the fill will settle less. Differential settlement between the two exposure surfaces is expected. Several years after their construction, regrading of the road surface might be needed.

Specifications

Structural fill should be sand and gravel that is free of ice and other deleterious material, contain no particles larger than 3 inches, and has less than 16 percent of its particles passing the number 200-sieve size. Fill should be placed in 12-inch or thinner lifts and be compacted by driving construction equipment over all of each lift at least 4 times. This compaction effort is like a 95 percent relative compaction per ASTM D 1557 effort. The Stevens Point Pit has a suitable source of fill for the project.

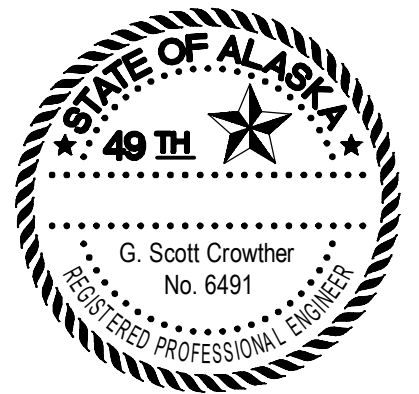
Estimated quantity: 14,000 cy of fill

Woven fabric should have a tensile strength of 250 x 250 pounds (ASTM D4632), elongation of 15% x 15% (ASTM D4532), and a CBR puncture of 750 pounds (ASTM D6241). WINFAB 250W meets these requirements.

Estimated quantity: 35 rolls of 12.5' wide by 360' long woven fabric

Culverts should be 18-inch diameter plastic pipe that meets the requirements of AASHTO M-294. Pacific Corrugated Pipe, dual-wall, Type S, bell and spigot style pipe meets these requirements.

Estimated quantity: 22 lengths of 20' long by 18" diameter culvert pipes



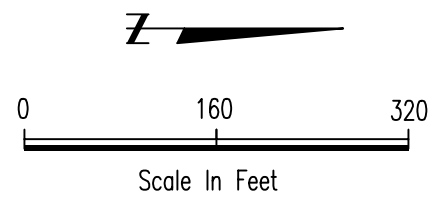
Crowther Associates
Civil Engineering Services

Job No. 035.016

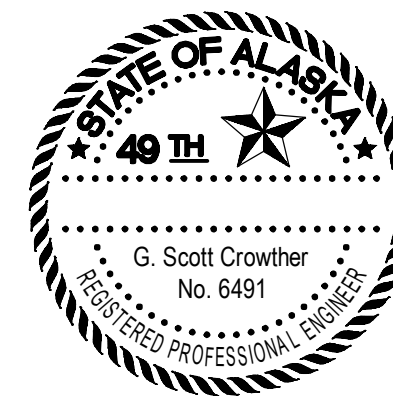
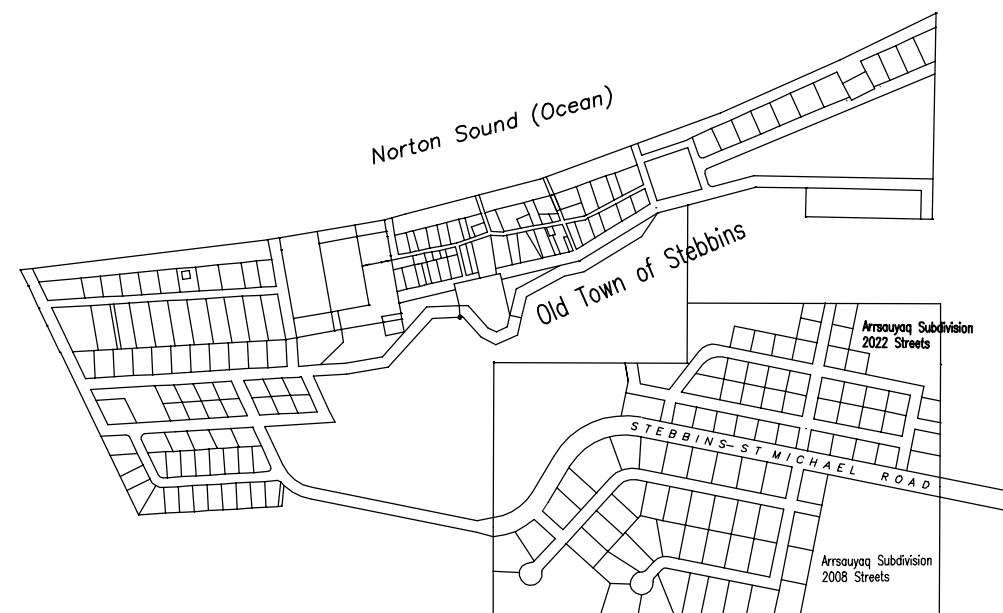
File No. 035016 Engineering

Date August 2022

Client	Project Title	Location	Sheet Title	Stationing
Stebbins Housing Authority	Arrsauyaq Subdivision 2022 Streets	Stebbins Alaska	Geotechnical and Specifications	xx
Sheet Number		Total Sheets		
2		13		



Tribal Office Building



Crowther Associates
Civil Engineering Services

Job No. 035.016

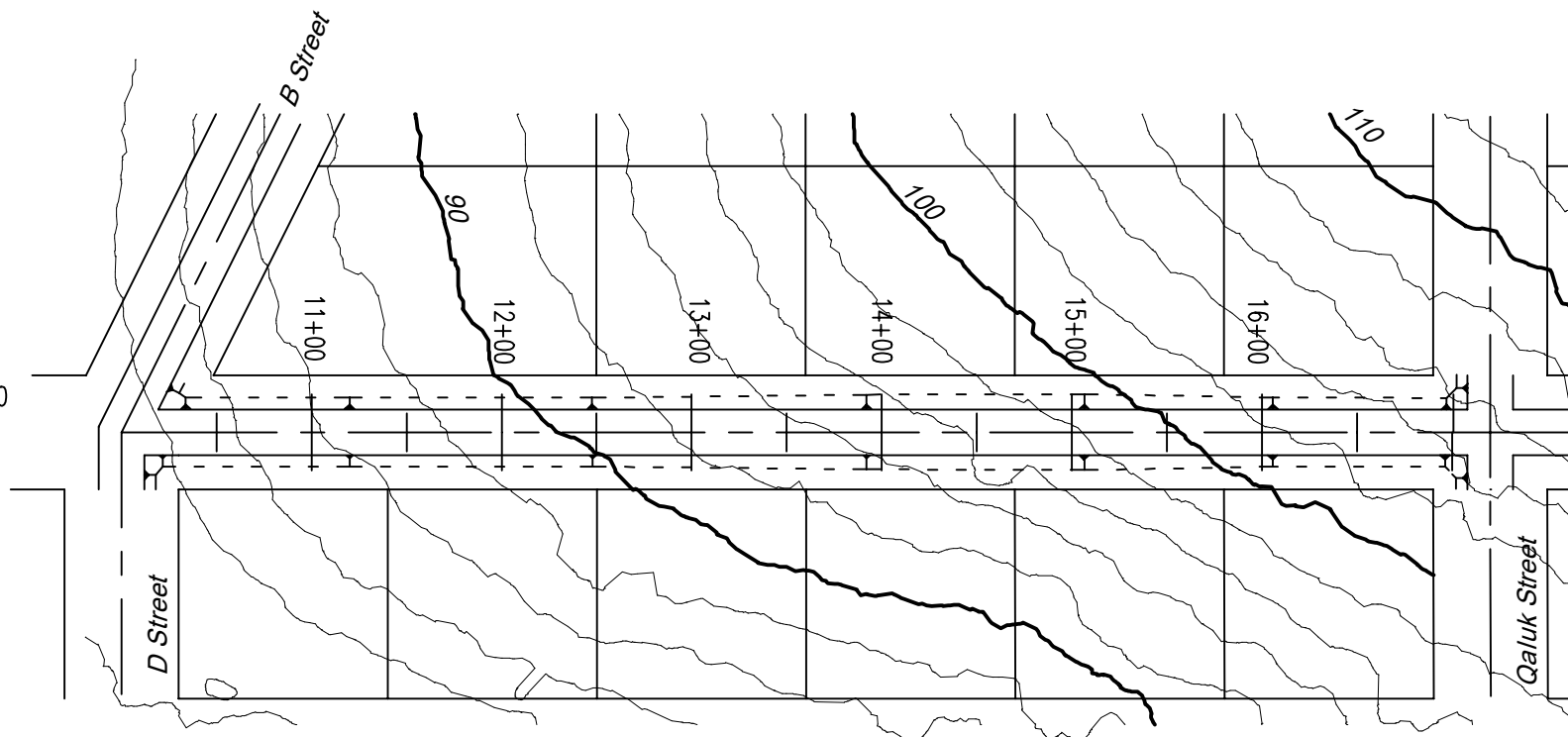
File No. 035016 Layout

Date August 2022

Client	Stebbins Housing Authority
Project Title	Arasuyaq Subdivision 2022 Streets
Location	Stebbins Alaska
Sheet Title	Subdivision Layout
Stationing	xx

Sheet Number	Total Sheets
3	13

PI at B Street 10+00
 E 1593955.84 feet
 N 3480456.00 feet



PI at Qaluk Street 17+20
 E 1594097.94 feet
 N 3481161.84 feet

A Street
 N11°21'32"E



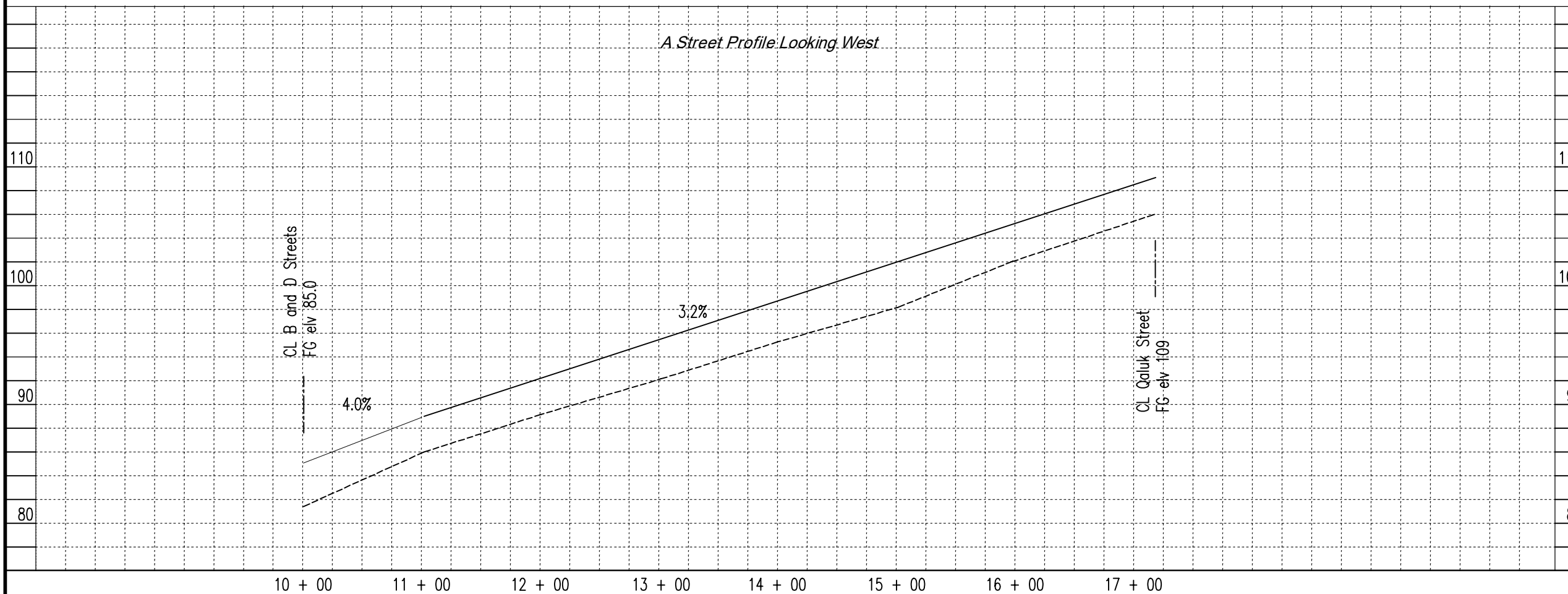
Crowther Associates
 Civil Engineering Services

Job No. 035.016

File No. 035016 Street A1 pp

Date August 2022

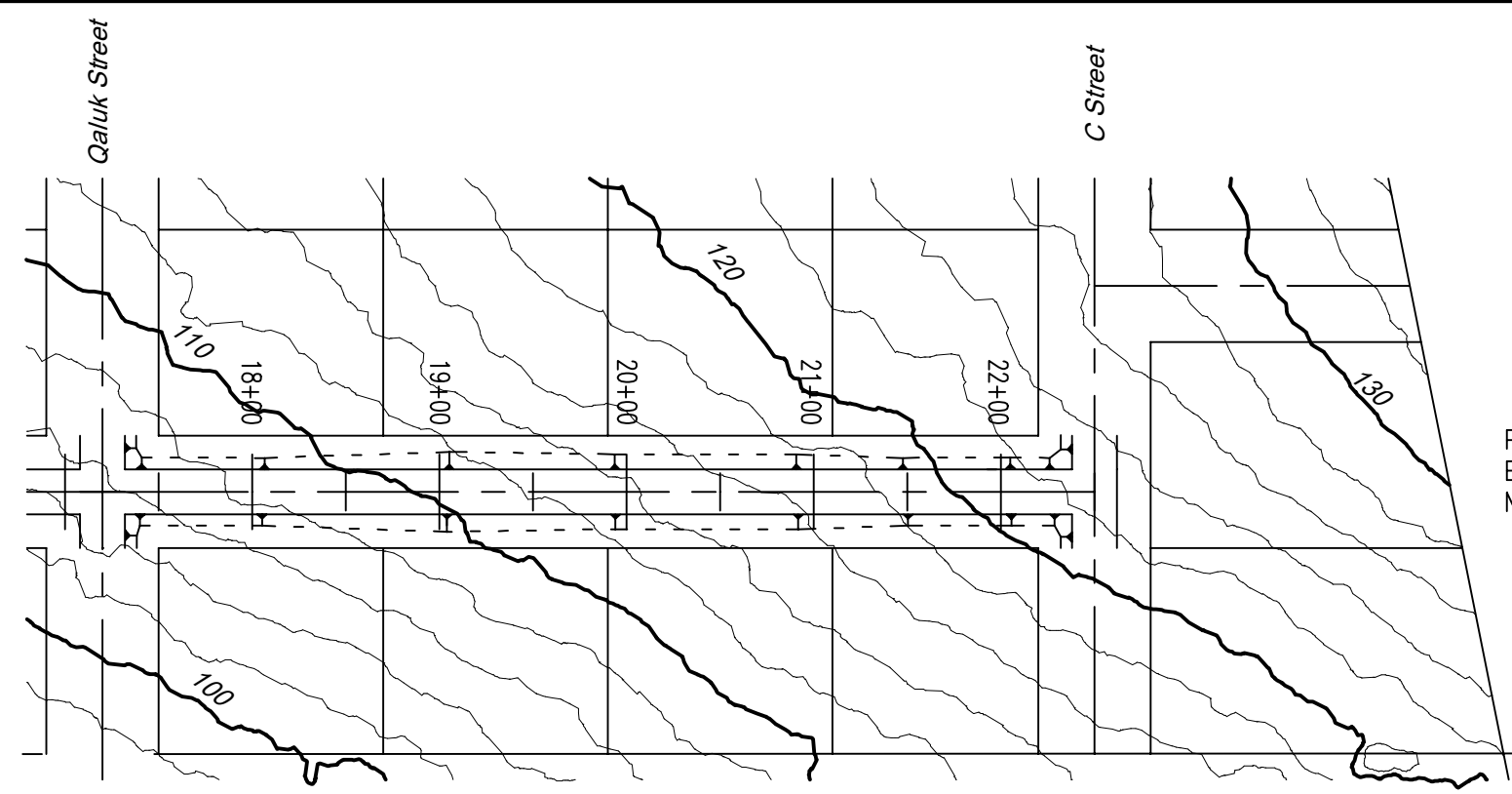
A Street Profile Looking West



Client	Stebbins Housing Authority
Project Title	Arrsauyaq Subdivision 2022 Streets
Location	Stebbins Alaska
Sheet Title	A1 Street Plan and Profile
Stationing	10+00 to 17+20
Sheet Number	4
Total Sheets	13

PI at Qaluk Street 17+20
 E 1594097.94 feet
 N 3481161.84 feet

A Street
 N11°21'32"E



PI at C Street 22+50
 E 1594202.54 feet
 N 3481681.42 feet



Crowther Associates
 Civil Engineering Services

Job No. 035.016

File No. 035016 Street A2 pp

Date August 2022

A Street Profile Looking West



Client	Stebbins Housing Authority
Project Title	Arrsauyaq Subdivision 2022 Streets
Location	Stebbins Alaska
Sheet Title	A2 Street Plan and Profile
Stationing	17+20 to 22+50

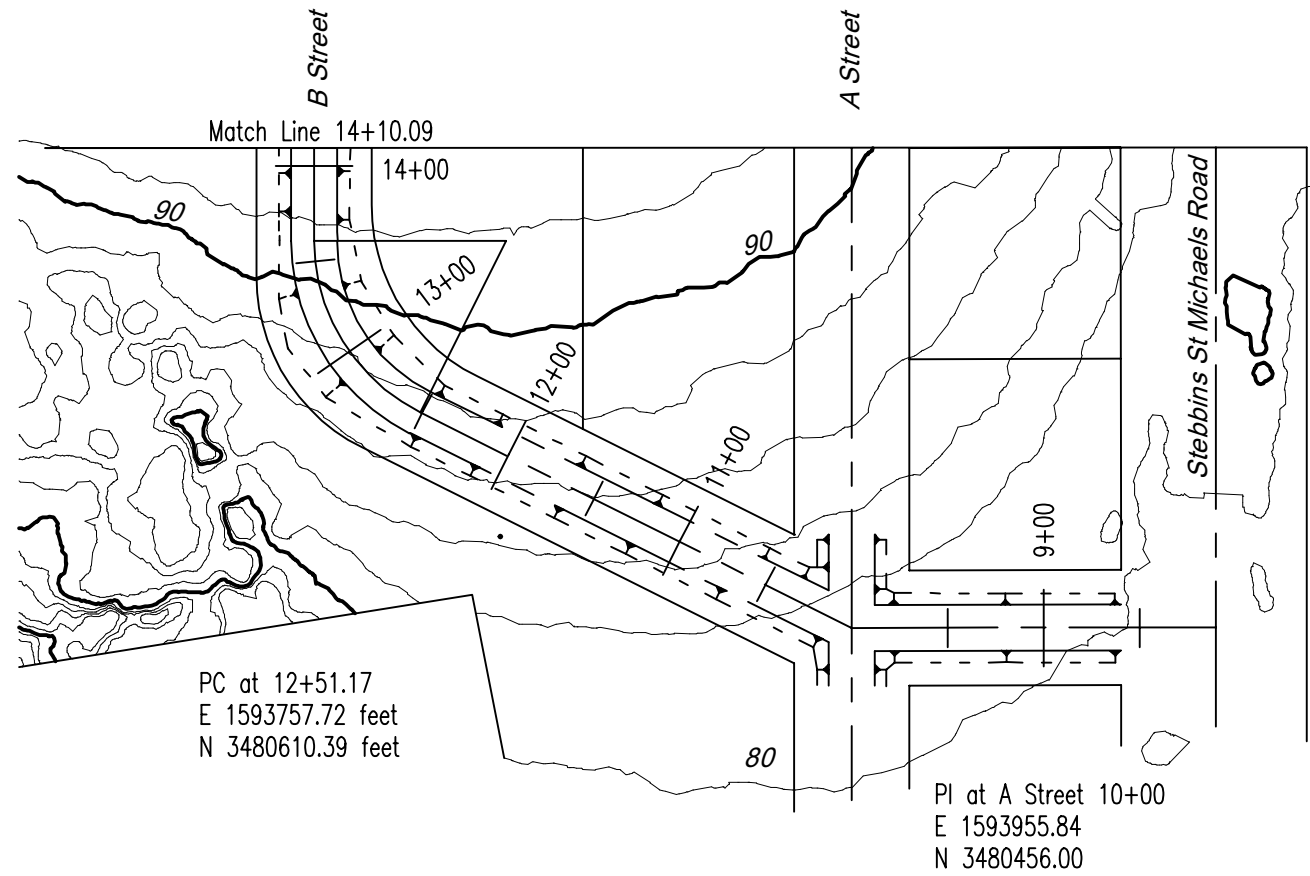
Sheet Number	5	Total Sheets	13
--------------	---	--------------	----

PC at 13+61.93
 E 1593721.14 feet
 N 3480709.01 feet

Curve Data
 delta = 63°59'10"
 radius = 100.05 feet
 arc length = 110.76 feet
 tangent = 61.83 feet

Center
 E 1593757.72 feet
 N 3480610.39 feet

PI
 E 1593708.96 feet
 N 3480648.40 feet



PI at Road CL 8+10.39
 E 1594141.57 feet
 N 3480418.41 feet

D Street
 N78°38'28"E

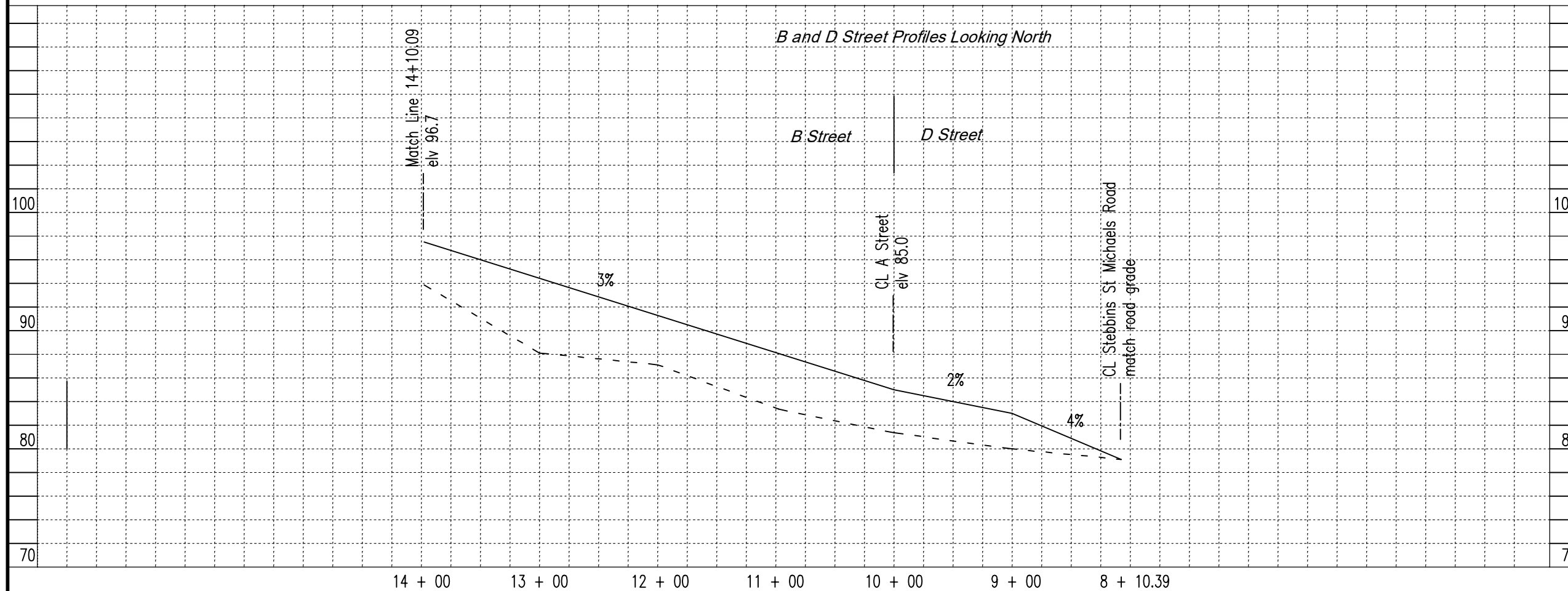


Crowther Associates
 Civil Engineering Services

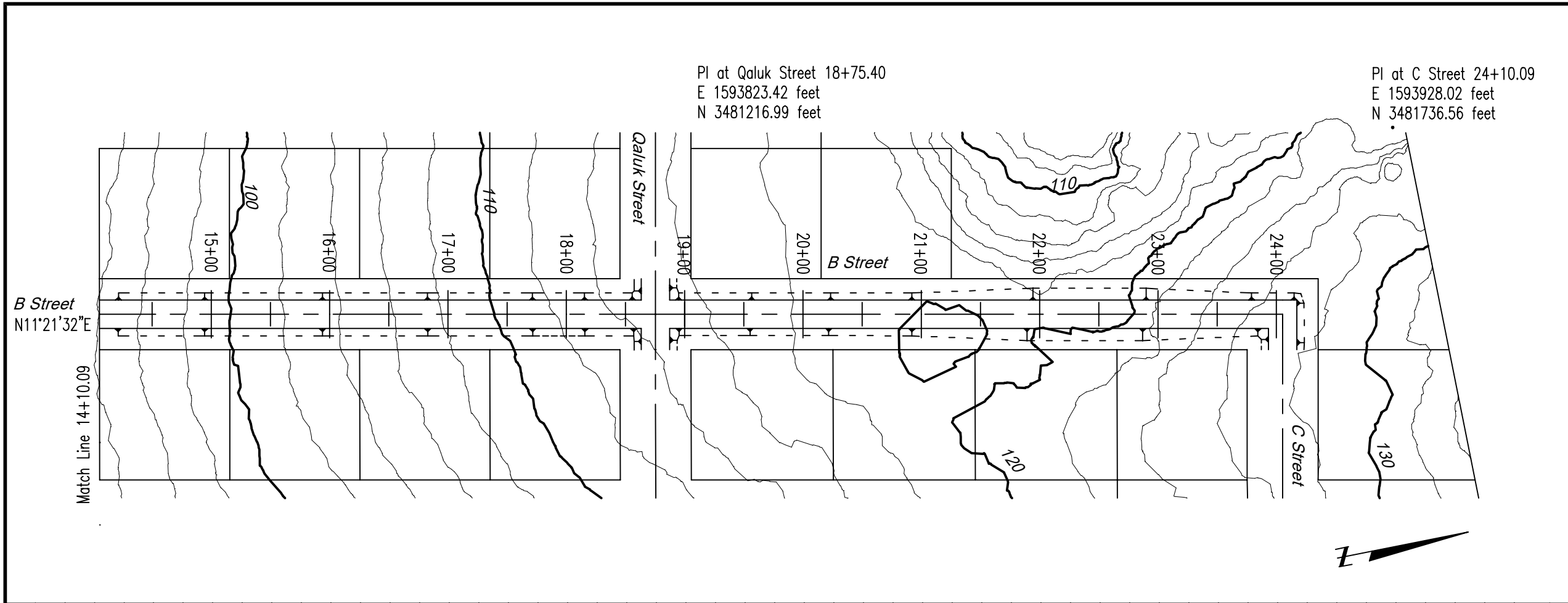
Job No. 035.016

File No. 035016 Street B1 pp

Date August 2022



Client	Stebbins Housing Authority
Project Title	Arrsauyaq Subdivision 2022 Streets
Location	Stebbins Alaska
Sheet Title	B1 Street Plan and Profile
Stationing	8+10.39 to 14+10.09
Sheet Number	6
Total Sheets	13

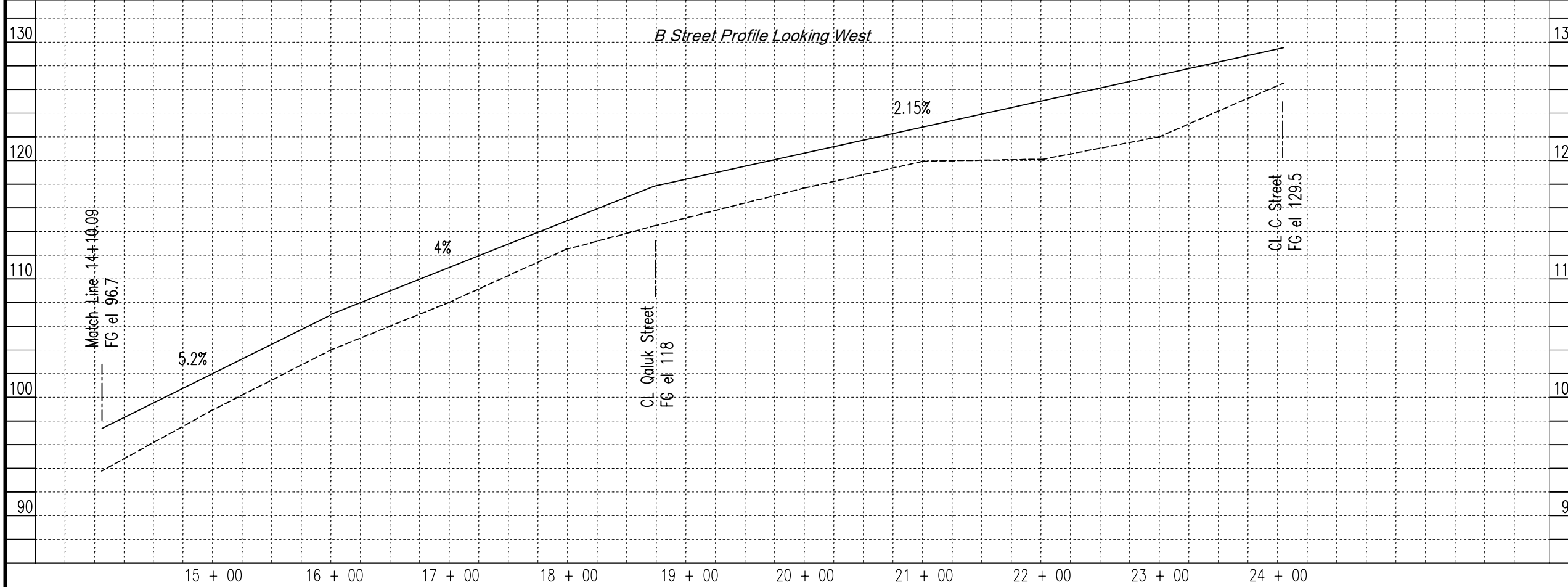


Crowther Associates
Civil Engineering Services

Job No. 035.016

File No. 035016 Street B2 pp

Date August 2022



Client	Stebbins Housing Authority
Project Title	Arrsauyaq Subdivision 2022 Streets
Location	Stebbins Alaska
Sheet Title	B2 Street Plan and Profile
Stationing	14+10.09 to 24+10.09
Sheet Number	7
Total Sheets	13



Crowther Associates
Civil Engineering Services

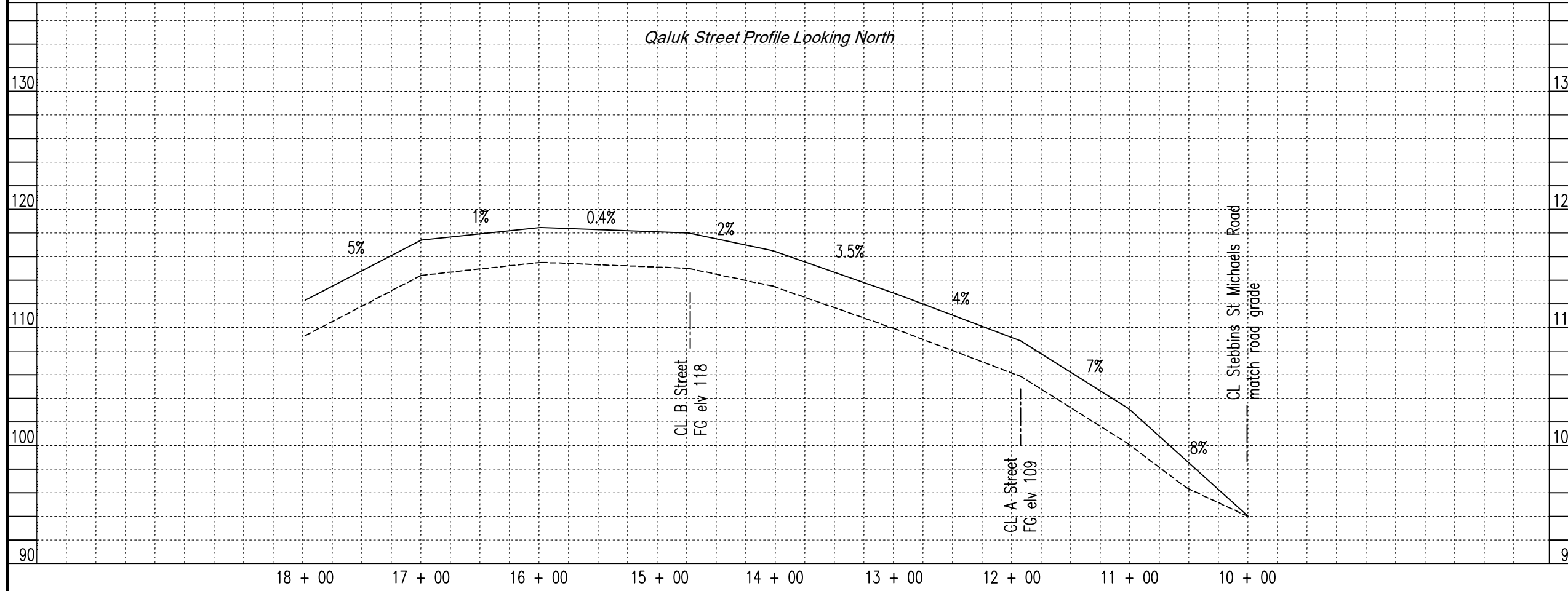
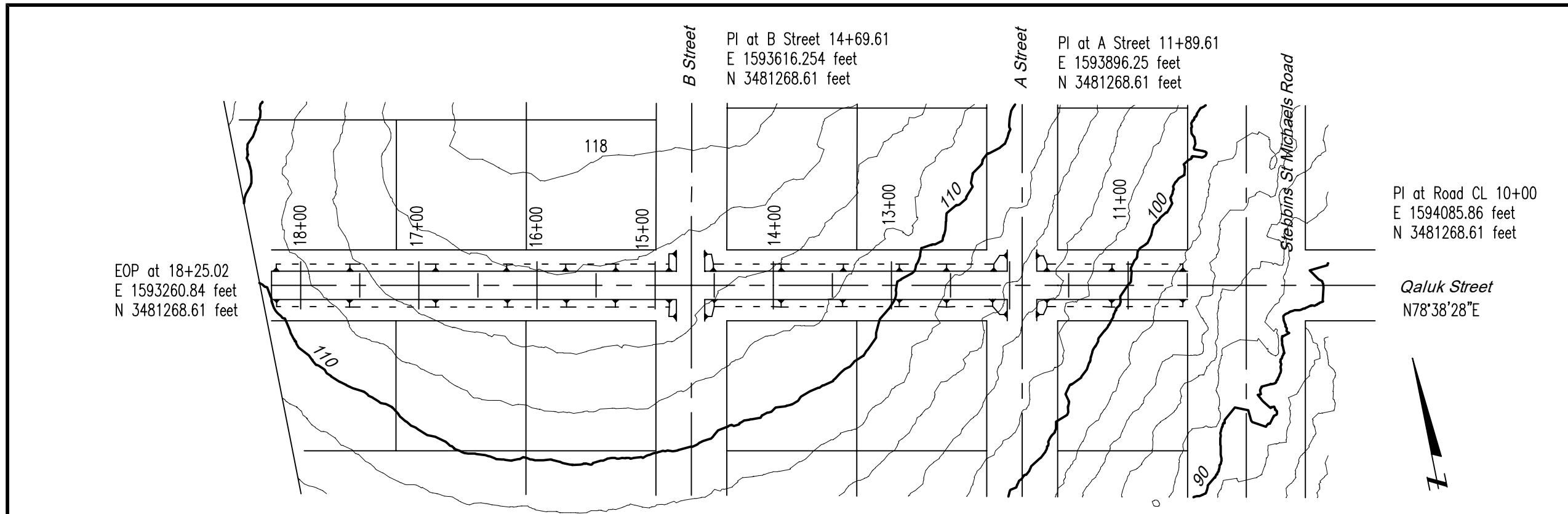
Job No. 035.016

File No. 035016 Street Qaluk pp

Date August 2022

Client	Stebbins Housing Authority
Project Title	Arrsauyaq Subdivision 2022 Streets
Location	Stebbins Alaska
Sheet Title	Qaluk Street
Stationing	10+00 to 18+25.02

Sheet Number	8	Total Sheets	13
--------------	---	--------------	----

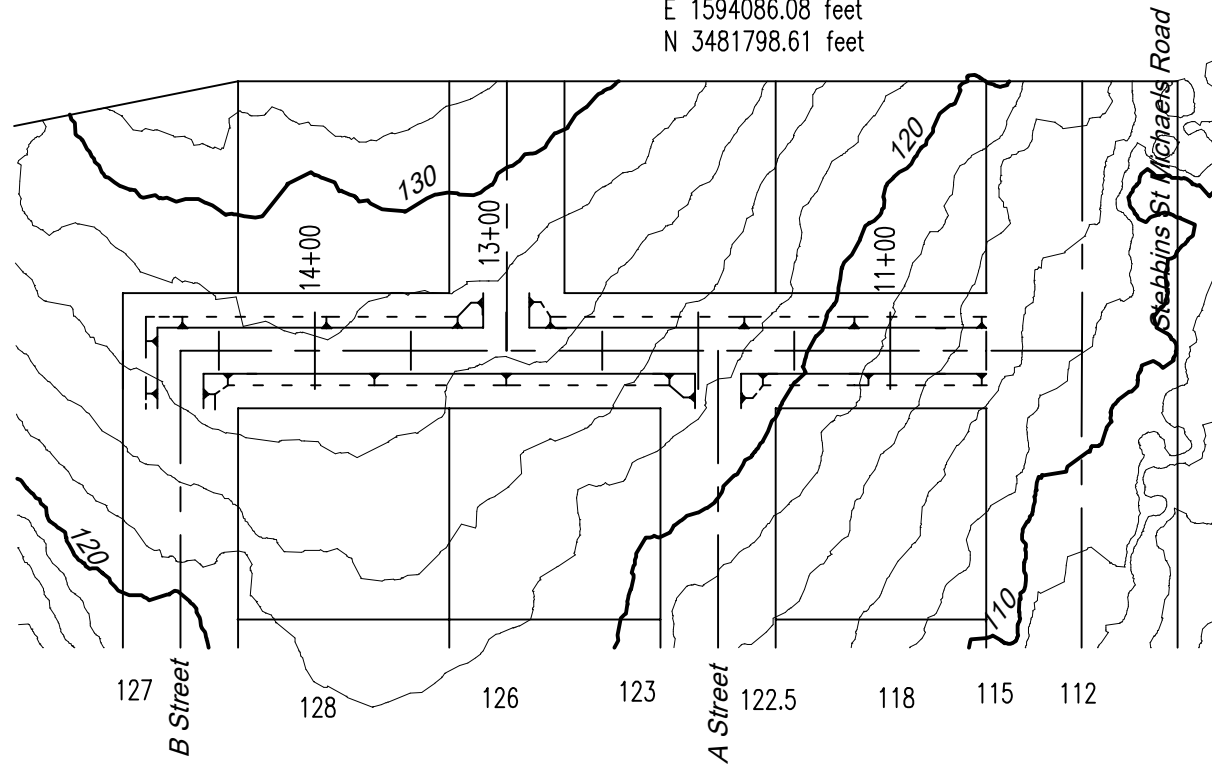


PI at B Street 14+69.61
 E 1593616.47 feet
 N 3481798.61 feet

PI at A Street 11+89.61
 E 1594086.08 feet
 N 3481798.61 feet

PI at Road CL 10+00
 E 1594086.08 feet
 N 3481798.61 feet

C Street
 N78°38'28"E

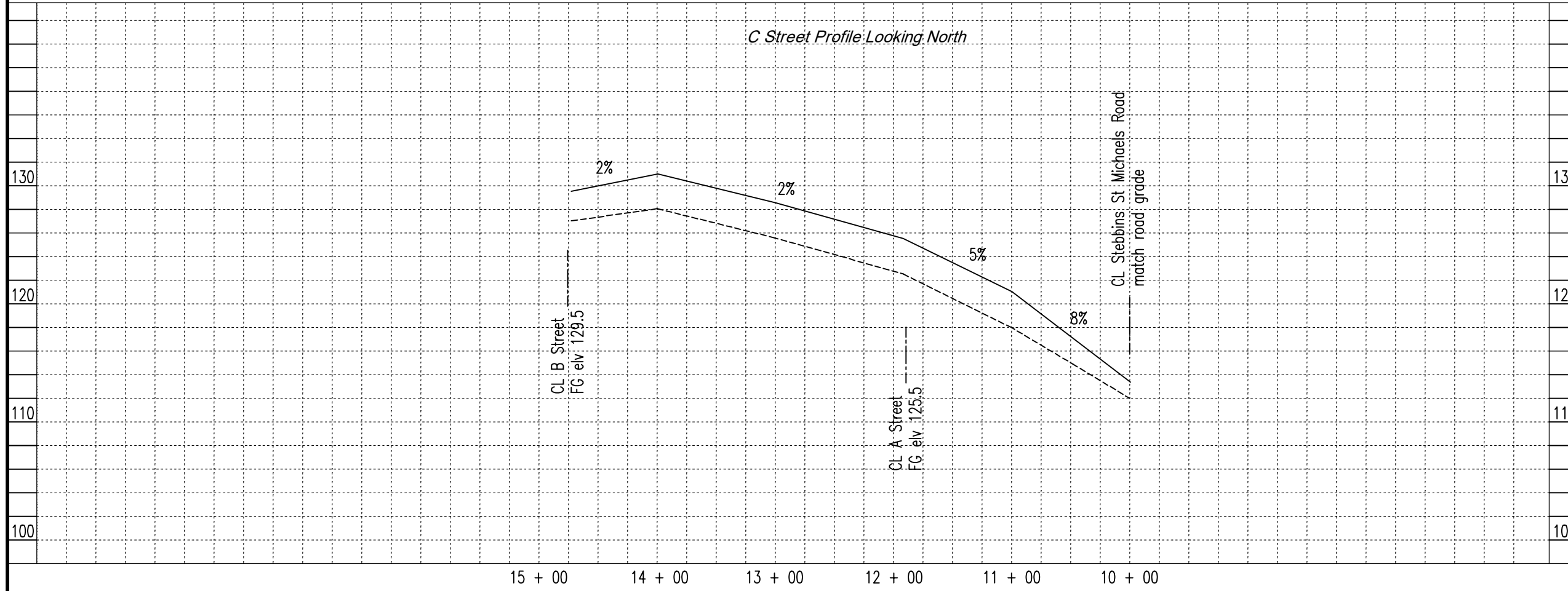


Crowther Associates
 Civil Engineering Services

Job No. 035.016

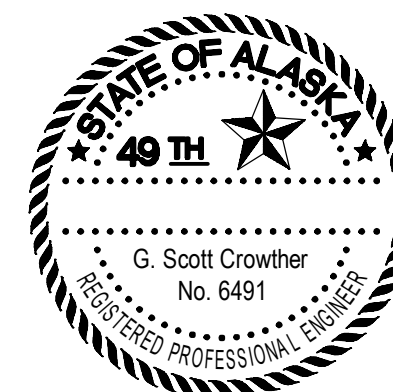
File No. 035016 Street C pp

Date August 2022



Client	Stebbins Housing Authority
Project Title	Arrsauyaq Subdivision 2022 Streets
Location	Stebbins Alaska
Sheet Title	C Street
Stationing	10+00 to 14+69.61

Sheet Number	9	Total Sheets	13
--------------	---	--------------	----

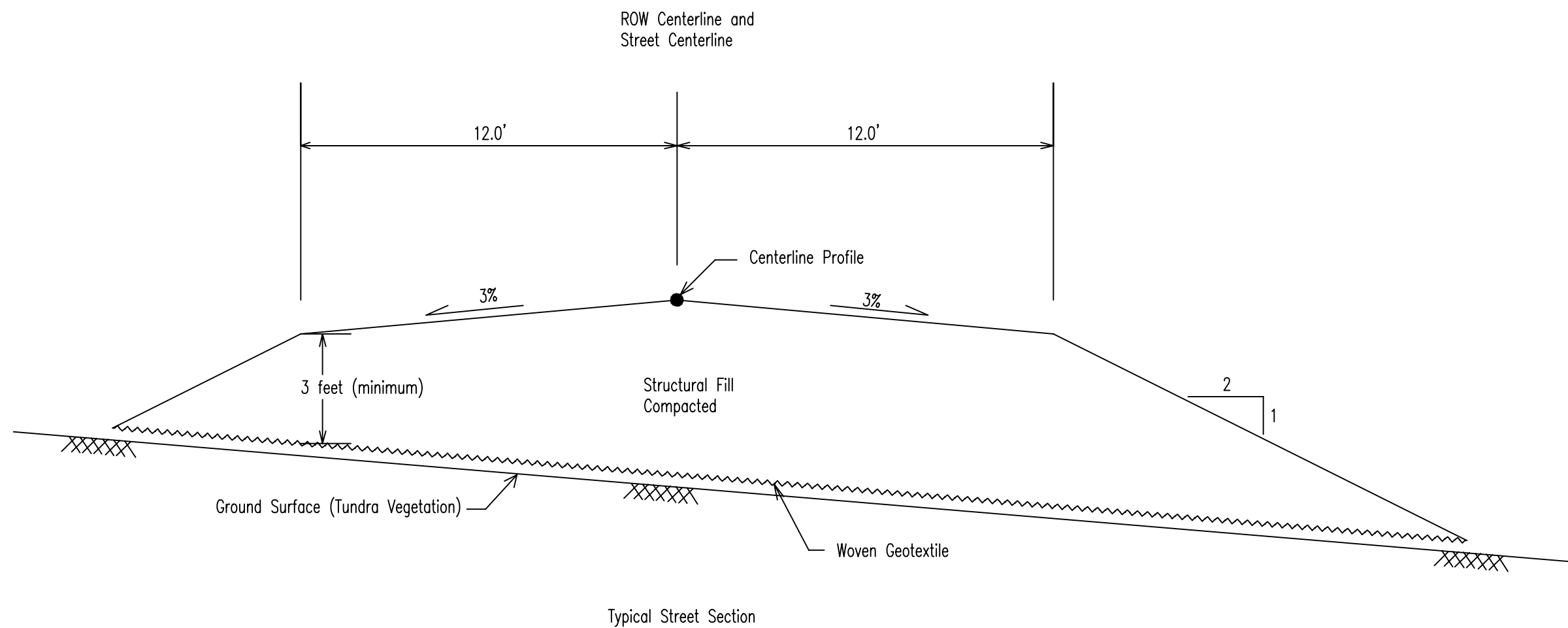


Crowther Associates
Civil Engineering Services

Job No. 035.016

File No. 035016 Cross Section a

Date August 2022



Typical Street Section

Client	Stebbins Housing Authority
Project Title	Arrsauyaaq Subdivision 2022 Streets
Location	Stebbins Alaska
Sheet Title	xx Street
Stationing	xx

Sheet Number	Total Sheets
10	13

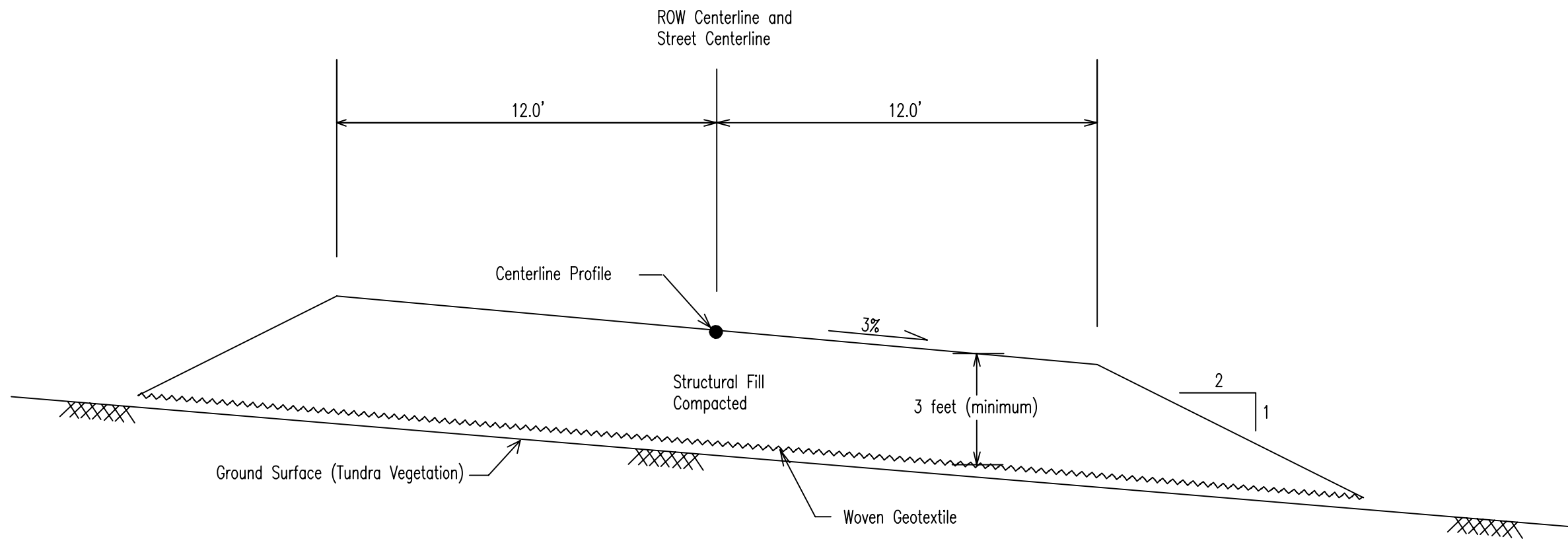


Crowther Associates
Civil Engineering Services

Job No. 035.016

File No. 035016 Cross Section b

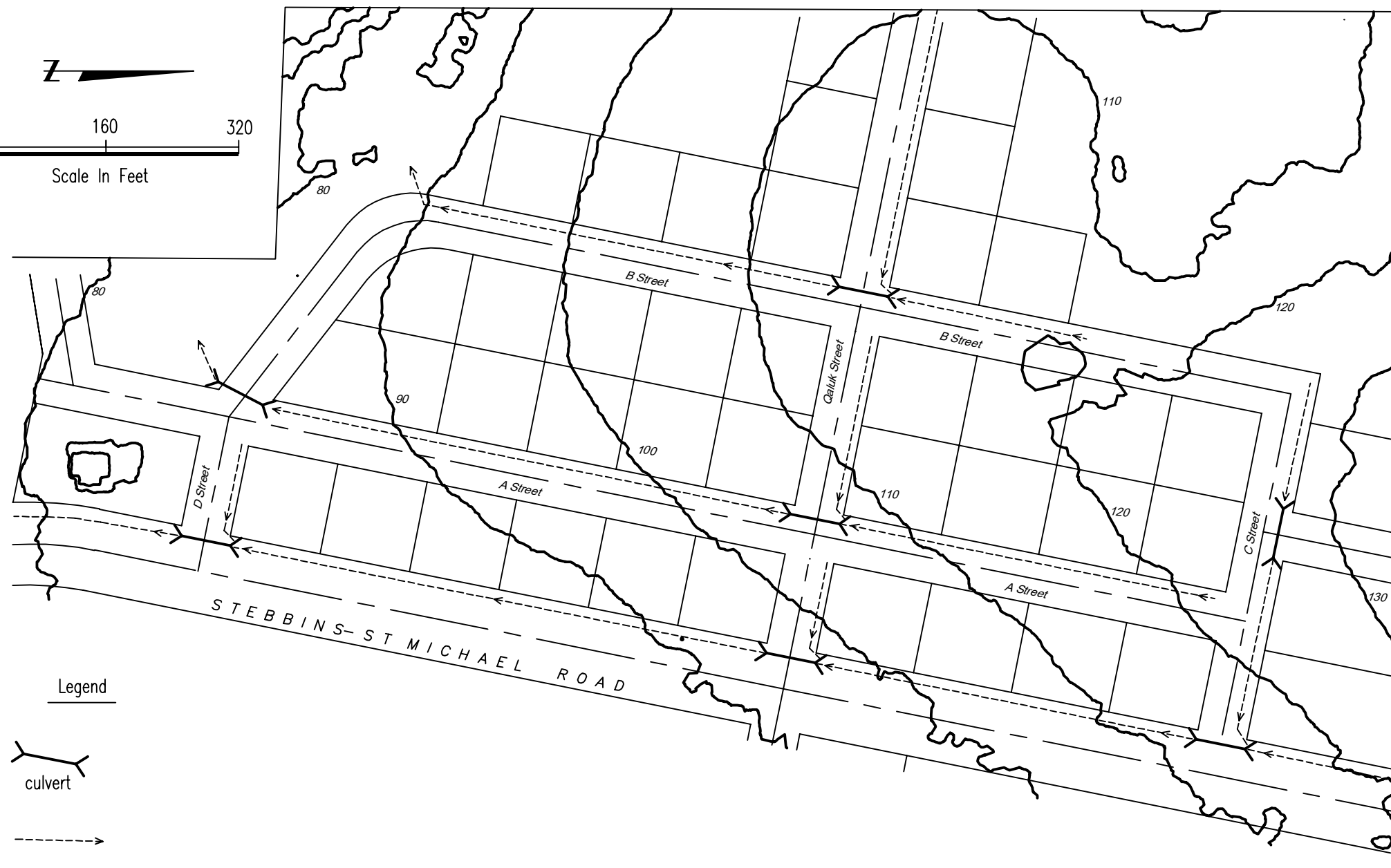
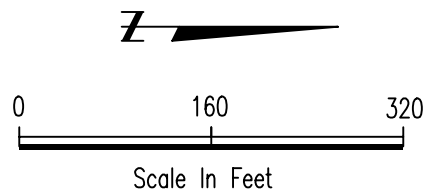
Date August 2022



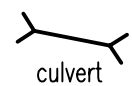
Street Section
STA 12+51.17 to 13+61.93 B Street

Client	Stebbins Housing Authority
Project Title	Arrsauyaaq Subdivision 2022 Streets
Location	Stebbins Alaska
Sheet Title	Street Cross Section b
Stationing	B Street 12+51.17 to 13+61.93

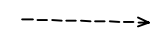
Sheet Number	Total Sheets
11	13



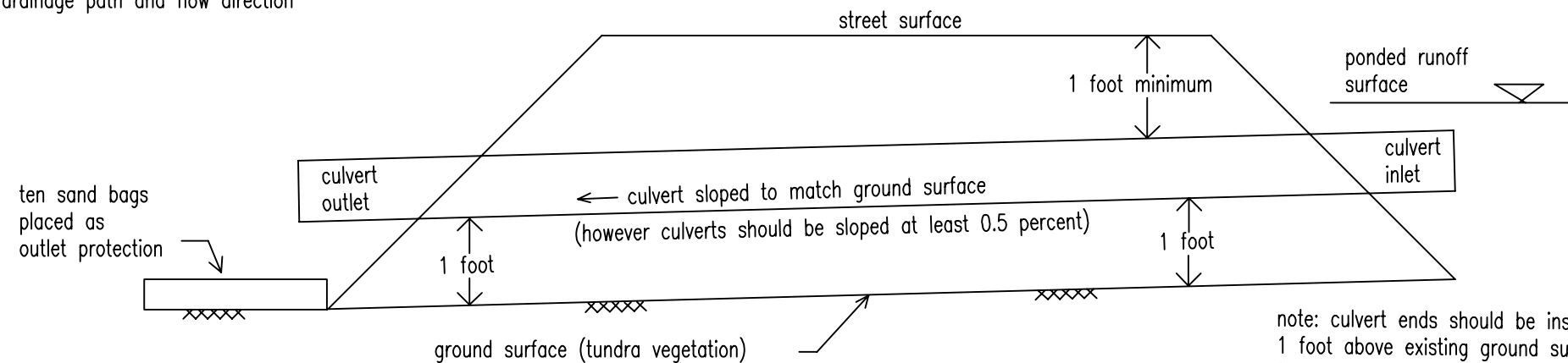
Legend



culvert



drainage path and flow direction



note: culvert ends should be installed at least 1 foot above existing ground surface to allow for thaw-strain settlement



Crowther Associates
Civil Engineering Services

Job No. 035.016

File No. 035016 Drainage

Date August 2022

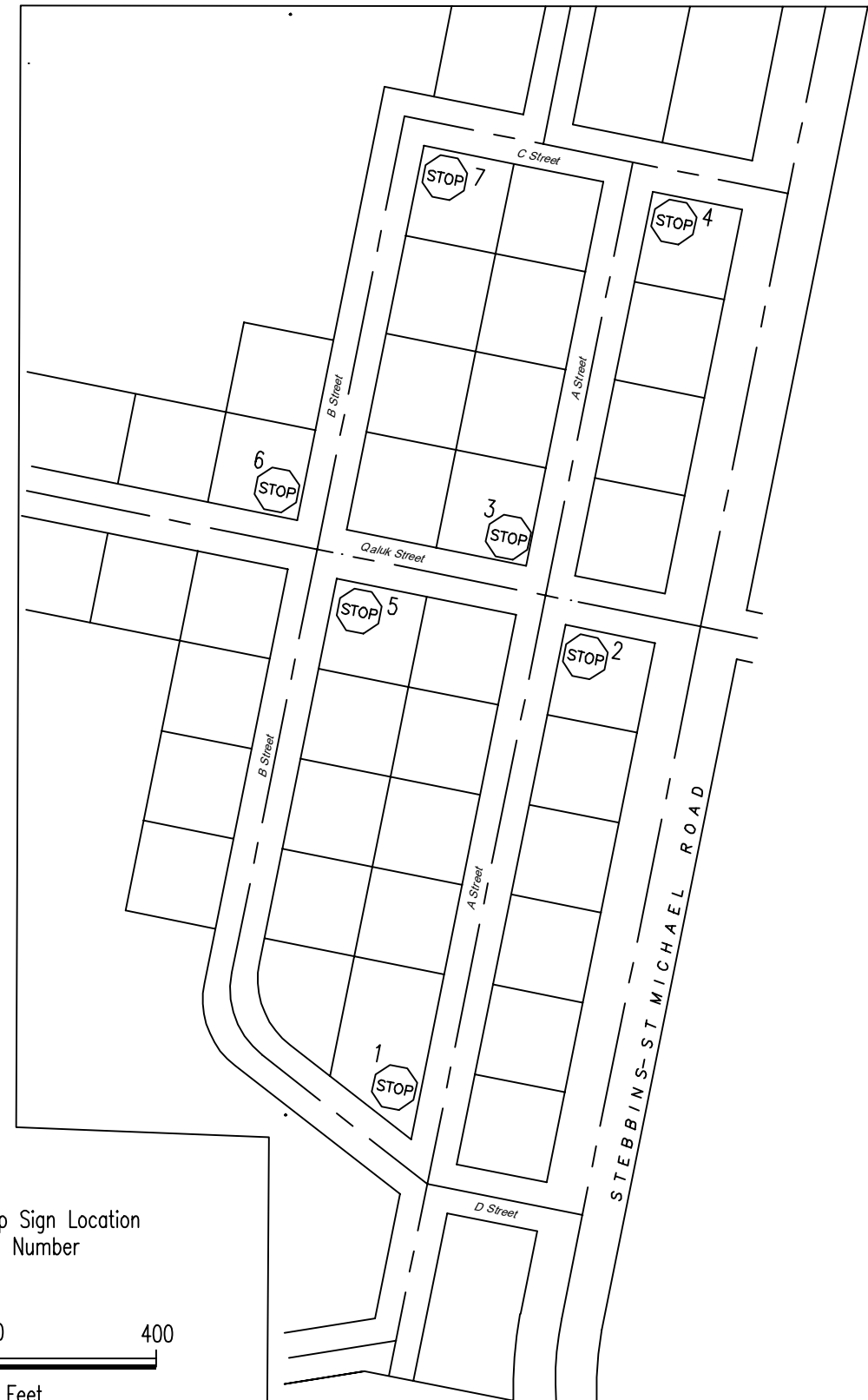
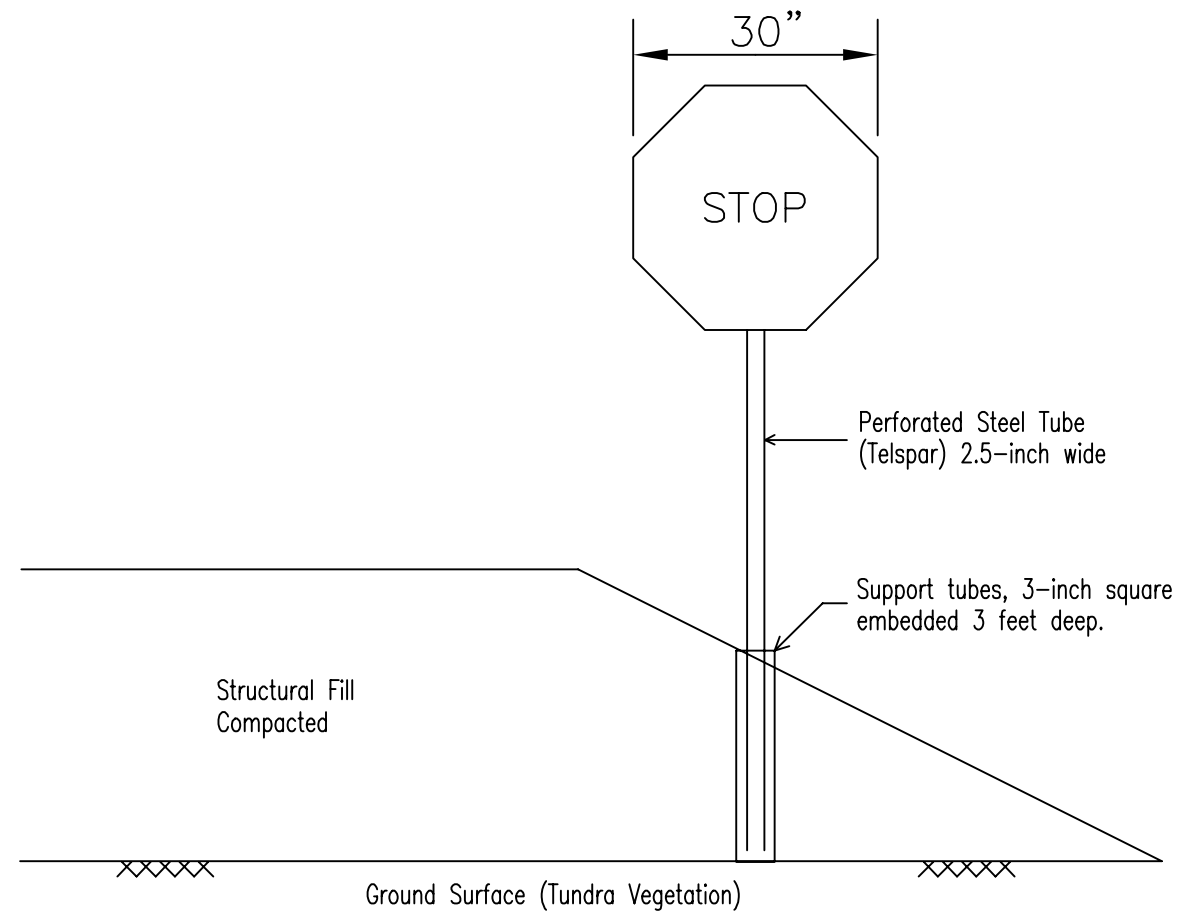
Client	Project Title	Location	Sheet Title	Stationing
Stebbins Housing Authority	Arrsauyaaq Subdivision 2022 Streets	Stebbins Alaska	Streets, Drainage Paths and Culverts	xx

Sheet Number

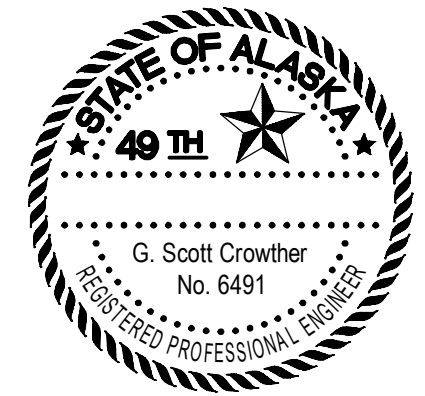
12

Total Sheets

13



Sign No.	Street	Station	Lane	Direction Faced
1	A Street	0+60	Left	North
2	A Street	16+75	Right	South
3	A Street	17+60	Left	North
4	A Street	22+00	Right	South
5	B Street	18+30	Right	South
6	B Street	19+30	Left	North
7	B Street	23+50	Right	South



Crowther Associates
Civil Engineering Services

Job No. 035.016

File No. 035016 Stop Signs

Date August 2022

Client	Project Title	Location	Sheet Title	Stationing
Stebbins Housing Authority	Arrsauyaaq Subdivision 2022 Streets	Stebbins Alaska	Street Stop Signs	xx

Sheet Number

13

Total Sheets

13