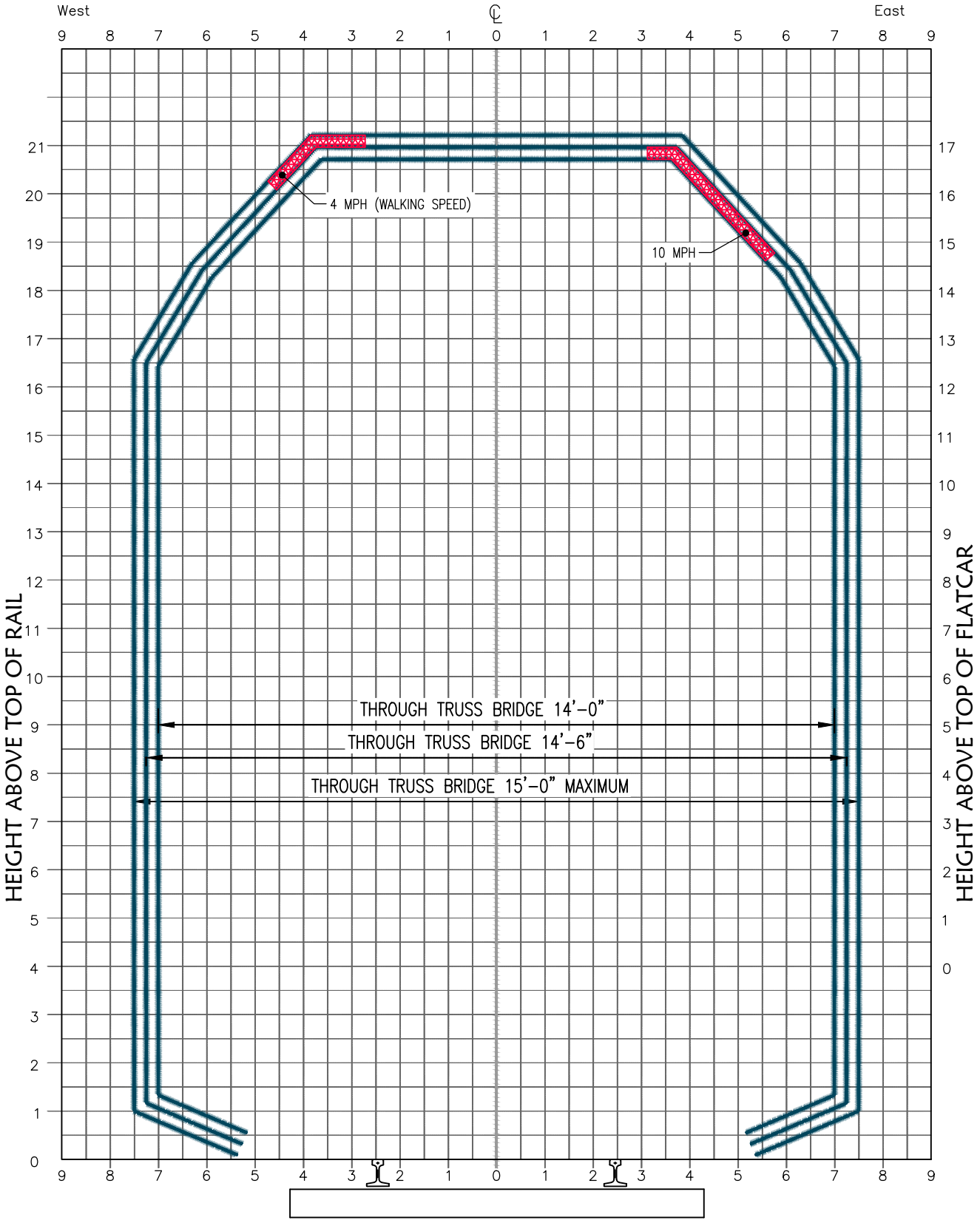


CLEARANCE: PORTAGE TO TUNNEL

THRU TRUSS BRIDGE 54.1

For close clearances from November to April, contact the District 1 Road Master to check on ice conditions within the tunnels

LOADED DIMENSIONS RULE

P:\Engineering\ACAD\CLEARANCE\Clearance Grids AREA 52.dwg

Project Memo

Michael Baker INTERNATIONAL

Subject:	**MP 52.14 Retaining Wall – Rock Anchor Testing**		
To:	Alaska Railroad Corporation		From: William Brooks, P.E.
Project:	Rock Anchor Testing at MP 52.14		
Date:	9/29/2020	Doc. No. 179034-MBI-SR-MMO-001	Project No. 179034

Date	*Version*	*Description*
9/29/2020	Rev 0	For Client Use

1. Project Overview

Michael Baker International (Michael Baker) is designing two new retaining wall structures between the tunnels at MP 52 for the Alaska Railroad Corporation (ARRC). As part of the proposed scope of work, Michael Baker has subcontracted Advanced Blasting Services to drill and test rock anchors to support design.

The project site is located at MP 52, south of the Portage siding near the Spencer Glacier and adjacent to the Placer River.

1.1 Geology and Rock Properties

The MP 52 retaining wall will be constructed in the marine sedimentary rock of the Valdez Group in an extension of the Chugach Mountains on the Kenai Peninsula as shown in Figure 1.1. The Valdez Group includes medium- and thin-bedded graywacke turbidites, black argillite, and minor pebble to cobble conglomerate (Bradley, 2006). Turbidites describes a sediment or rock deposited by a turbidity current, suggesting that the grain structure is well mixed with little differentiation in layers or laminations. An argillite is a sedimentary rock that does not split easily; however, rock fall at the site is observed to split into thin to thick plate-like shapes. Based on these descriptions of geologic origin, the rock type at the MP 52 site most closely resembles greywacke.

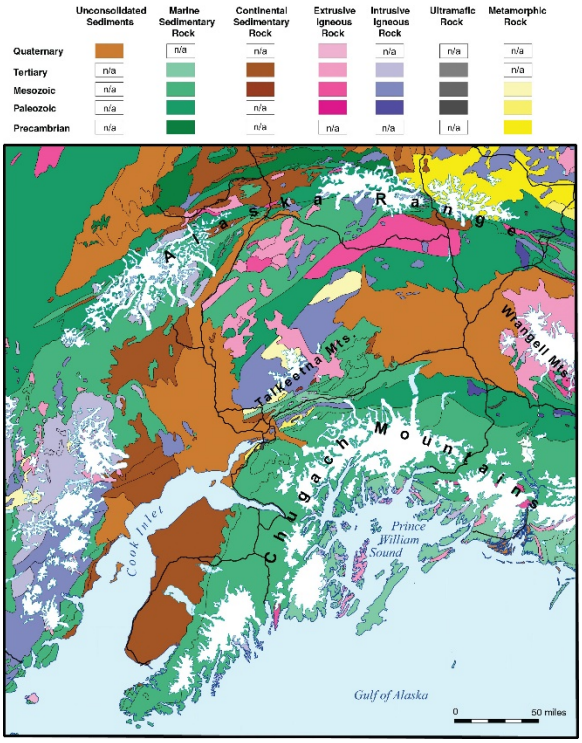


Figure 1.1 - Bedrock of Southcentral Alaska

Intact greywacke rock properties vary according to load application on or across the grain structure. Tested uniaxial compressive strengths for New Zealand greywacke varied from 24,000 to 44,000 pounds per square inch (psi) and tensile strengths varied from 2,900 to 5,000 psi (McNamara, Faulkner, & McCarney, 2014). Triaxial compression testing in this study resulted in an internal angle of friction of 43 to 44 degrees and 7,100 to 7,400 psi cohesion. Considering that these test results are not from the local Alaska rock, the strengths should be applied cautiously for design; they are presented here to establish that the intact greywacke is a high strength material.

The MP 52 rock formation has near vertical bedding with bedding planes oriented close to perpendicular to the track and wall alignment. Although rock fall from the face of the vertical and overhanging rock appears to coincide with separation along the bedding planes (evidently exacerbated by surface water drainage and freeze/thaw cycles), structural control along joints and fractures is not apparent.

2. Anchor Testing

Anchor testing required the drilling, installation and grouting, and proof tests to confirm the adequacy of the rock to support design loads, provide design information, and confirm competent rock was present at the site.

2.1 Anchor Installation

Michael Baker Geotechnical Engineer Bill Burgess mobilized to the MP 52 site with equipment and crew from Advanced Blasting Services, LLC (ABS) on Wednesday June 10, 2020 to drill investigative holes for rock anchor tests. The ARRC provided a Hytracker low-bed rail equipment mover with operator to mobilize the drill and associated anchor bars and grouting equipment. The ARRC also provided Hi-Rail pickup trucks with operators to mobilize the field team to the site. Advanced Blasting provided an Atlas Copco ECM 660 rock drill (3.5-inch button bit), #8 and #9 threaded bars with fasteners, and high-flow, non-aggregate, non-shrink NA Grout to complete the rock anchors. The product sheets for the installed bars is included as Attachment 1.

Following mobilization to the site, anchor work commenced with drilling Bolt 1 below the south end of the south retaining wall. Drilling progressed from south to north with eight total holes completed as shown in Table 2.1.

Table 2.1: Rock Anchor Installation Records

Hole ID	Depth (ft)	Wet/ Dry?	Bars	Bearing[1]	Dip[2]	Orientation to bedding	Drilling Remarks
Bolt 1	30	Wet	30 ft, #9	258	44		Abundant seepage at shallow depth
Bolt 2	30.5	Dry	30 ft, #8	295	15		8-in soft zone at about 8 ft depth
Bolt 3	30.5 to 31	Wet	30 ft, #8	250	22		Fast drilling 13-19 ft, possible seepage zone
Bolt 4	30	Dry	30 ft, #9	275	19	¼ across bedding	
Bolt 5	30	Wet	30 ft, #9	264	16	About parallel	
Bolt 6	30	Wet	30 ft, #9	280	26	About parallel	
Bolt 7	30	Damp	30 ft, #9	264	31	¼ across bedding	
Bolt 8	31.5	Dry	30 ft, #9	315	24	Perpendicular to track/wall	

Notes: 1. Bearing measured in degrees from magnetic north
2. Dip measured in degrees down from horizontal

With few exceptions noted in Table 2.1, drilling was consistent, smooth, and steady with only short breaks to add drill steel. Total time to drill ranged from 20 to 35 minutes per hole including occasional breaks for rig maintenance or to coordinate with the crew assembling anchor bars. The drilling action (pressure on the drill string, penetration rate, sound, dust or chip production, etc.) was consistent from hole to hole even though drill locations were chosen to sample the varied surficial conditions at the site.

2.2 Grouting

Anchor grouting was performed on Thursday, June 11, 2020 by ABS (Figure 2.1). Grouting results and conditions are shown in Table 2.2. The grout used was NA Grout, a blend of specialty cements and admixtures, with 7- and 28-day compressive strengths of 11,000 and 15,000 psi, respectively. Figure 2.2 shows the grout consistency prior to placement. The grout product sheet is included as Attachment 2.

Figure 2.1: Drilling Bolt 3 near drainage behind south wall

Table 2.2: Grouting Notes

Bolt	Wet or Dry?	Clean Out Method	Grout Take (gal)	Remarks
1	Wet	None	7	Very high water height, water displaced by grout
2	Wet	Air, Blow out	7	None
3	Wet	None	6	Water displaced by grout
4	Dry	None	6	Checked grout level, 6 gallons right around 10 ft
5	Wet	None	6	Water displaced by grout
6	Wet	None	6	Water displaced by grout
7	Wet	None	6	Water displaced by grout
8	Dry	None	6	Checked grout level, same as hole #4, 6 gallons puts grout at 10 ft

Figure 2.2: Grout consistency prior to installation

2.3 Anchor Testing

Michael Baker Geotechnical Engineer Bill Brooks was on-site for anchor testing on Thursday, June 18, 2020 along with ABS and a representative from ARRC who coordinated site access via hi-rail. An excavator was onsite to position the testing equipment, a 200-8 hydraulic jack.

Testing was conducted on each anchor and consisted of a proof test with three steps with loads relative to the steel properties of the bar. The three steps included a 10-minute test at 80% of the minimum yield strength of the steel; an increase in load to the minimum yield strength; and a final increase in load to the ultimate yield strength of the steel. A summary of the testing is presented in Table 2.3 below.

Table 2.3: Testing Summary

Anchor Bar	Bar Size	10 Min. Test at 80% of Minimum Yield Strength	Minimum Yield Strength	Ultimate Yield Strength
1	#9	60k	75k	100k
2	#8	48k	60k	80k
3	#8	48k	60k	80k
4	#9	60k	75k	100k
5	#9	60k	75k	100k
6	#9	60k	75k	100k
7	#9	60k	75k	100k
8	#9	60k	75k	100k

None of the tests appeared to yield the rock/grout bond. There was no apparent difference in tensile capacity or deformation for anchors roughly aligned with bedding, versus anchors installed across the bedding planes. Therefore, rock mass properties do not appear to control anchor performance at least to the extent tested. Deformations measured during testing closely aligned with the expected elongation associated with the steel properties and a grouted bond zone of approximately 10 feet.

3. Recommendations

The primary goal of the anchor testing was to characterize the quality of the rock mass at the site. The results indicate a competent rock mass. Elongation measurements of the anchor bar during testing matched the expected deformation associated with the steel properties and strengths of the #8 and #9 rebar, indicating the anchor testing failed to yield the rock/grout bond.

Given the loads tested in the field, a minimum rock/grout bond strength is estimated to be 120 psi for scaling to different bar sizes if desired.

Anchor orientation for design should be perpendicular to the face of the wall and at a dip angle of 15 to 20 degrees down from horizontal.

4. References

Southcentral Alaska Geology. https://sites.google.com/a/piceageographics.com/alaskageography/home.

McNamara, Faulkner, McCarney, 2014, Rock Properties of Greywacke Basement Hosting Geothermal Reservoirs, New Zealand: Preliminary Results, PROCEEDINGS, Thirty-Ninth Workshop on Geothermal Reservoir Engineering Stanford University, Stanford, California, February 24-26, 2014 SGP-TR-202

Bradley, 2006, Field Guide to South-Central Alaska's Accretionary Complex, Anchorage to Seward, Alaska Geological Society

5. Attachments

Attachment 1 – Grade 75/80 All Thread Rebar Product Sheet

Attachment 2 – NA Grout Product Sheet

Grade 75/80 All-Thread Rebar

Threads

Williams All-Thread Rebar has a cold rolled, continuous, rounded course thread form. Williams special thread (deformation) pattern projects ultra high relative rib area at 3 times that of conventional rebar. This provides for superior bond performance in concrete. Because of the high thread pitch and the full 360 degree concentric thread form, Williams All-Thread Rebar should only bent under special provisions using larger bend diameters than typical ACI minimums. As an alternative to bending, Williams recommends use of a steel plate or a threaded terminator disc to reduce development length. Threads are available in both right and left hand. Grades up to 100 are available upon request.

Sizes

All-Thread Rebar is available in 11 diameters from #6 (20 mm) through #28 (89 mm). All diameters are available in continuous lengths up to 50' (15.2 m).

Welding

Welding of All-Thread Rebar should be approached with caution since no specific provisions have been included to enhance its weldability. Refer to ANSI/AWS D1.4 for proper selections and procedures.

R61 Grade 75/80 All-Thread Rebar

ASTM A615*

Bar Designation & Pitch	Minimum Net Area Thru Threads	Grade 75		Grade 80		Nominal Weight	Approx. Thread Major Diameter	Part Number
		Minimum Ultimate Strength	Minimum Yield Strength	Minimum Ultimate Strength	Minimum Yield Strength			
#6 - 5 (19 mm)	0.44 in² (284 mm²)	44 kips (196 kN)	33 kips (147 kN)	46 kips (205 kN)	35 kips (156 kN)	1.5 lbs/ft (2.4 kg/m)	7/8" (22 mm)	R61-06
#7 - 5 (22 mm)	0.60 in² (387 mm²)	60 kips (267 kN)	45 kips (200 kN)	63 kips (280 kN)	48 kips (214 kN)	2.0 lbs/ft (3.0 kg/m)	1" (25 mm)	R61-07
#8 - 3-1/2 (25 mm)	0.79 in² (510 mm²)	79 kips (351 kN)	59 kips (264 kN)	83 kips (369 kN)	63 kips (280 kN)	2.7 lbs/ft (3.9 kg/m)	1-1/8" (29 mm)	R61-08
#9 - 3-1/2 (29 mm)	1.00 in² (645 mm²)	100 kips (445 kN)	75 kips (334 kN)	105 kips (467 kN)	80 kips (356 kN)	3.4 lbs/ft (5.1 kg/m)	1-1/4" (32 mm)	R61-09
#10 - 3 (32 mm)	1.27 in² (819 mm²)	127 kips (565 kN)	95 kips (424 kN)	133 kips (592 kN)	102 kips (454 kN)	4.3 lbs/ft (5.5 kg/m)	1-3/8" (35 mm)	R61-10
#11 - 3 (36 mm)	1.56 in² (1006 mm²)	156 kips (694 kN)	117 kips (521 kN)	164 kips (730 kN)	125 kips (556 kN)	5.3 lbs/ft (7.9 kg/m)	1-1/2" (38 mm)	R61-11
#14 - 3 (43 mm)	2.25 in² (1452 mm²)	225 kips (1001 kN)	169 kips (750 kN)	236 kips (1050 kN)	180 kips (801 kN)	7.65 lbs/ft (11.8 kg/m)	1-7/8" (48 mm)	R61-14
#18 - 3 (57 mm)	4.00 in² (2581 mm²)	400 kips (1780 kN)	300 kips (1335 kN)	420 kips (1868 kN)	320 kips (1423 kN)	13.6 lbs/ft (19.6 kg/m)	2-7/16" (62 mm)	R61-18
#20 - 2-3/4 (64 mm)	4.91 in² (3168 mm²)	491 kips (2184 kN)	368 kips (1637 kN)	516 kips (2295 kN)	393 kips (1748 kN)	16.7 lbs/ft (24.8 kg/m)	2-3/4" (70 mm)	R61-20
#24 - 2-3/4 (76 mm) *	6.82 in² (4400 mm²)	682 kips (3034 kN)	512 kips (2277 kN)	716 kips (3185 kN)	546 kips (2429 kN)	24.0 lbs/ft (35.8 kg/m)	3-3/16" (81 mm)	R61-24
#28 - 2-3/4 (89 mm) *	9.61 in² (6200 mm²)	961 kips (4274 kN)	720 kips (3206 kN)	1009 kips (4488 kN)	769 kips (3421 kN)	32.7 lbs/ft (48.6 kg/m)	3-3/4" (95 mm)	R61-28

* The #24 and #28 diameter bars are not covered under ASTM A615.

All Couplings and Hex/Collar Nuts exceed 100% of the bar's published ultimate strength and meet ACI 318 Section 25.5.7.1 for mechanical rebar connections.

Hex Nut

Round Collar Nut

R62 Stop-Type Coupling

Bar Desig. & Nominal Dia.	Outside Diameter	Overall Length	Part Number
#6 - 3/4" (19 mm)	1-1/4" (32 mm)	3-1/2" (89 mm)	R62-06
#7 - 7/8" (22 mm)	1-3/8" (35 mm)	4" (102 mm)	R62-07
#8 - 1" (25 mm)	1-5/8" (41 mm)	4-1/2" (114 mm)	R62-08
#9 - 1-1/8" (29 mm)	1-7/8" (48 mm)	5" (127 mm)	R62-09
#10 - 1-1/4" (32 mm)	2" (51 mm)	5-1/2" (140 mm)	R62-10
#11 - 1-3/8" (36 mm)	2-1/4" (57 mm)	6" (152 mm)	R62-11
#14 - 1-3/4" (43 mm)	2-7/8" (73 mm)	6" (152 mm)	R62-14
#18 - 2-1/4" (57 mm)	3-1/2" (89 mm)	7-1/8" (181 mm)	R62-18
#20 - 2-1/2" (64 mm)	4" (102 mm)	8" (203 mm)	R62-20
#24 - 3" (76 mm)	5" (127 mm)	9-3/4" (248 mm)	R62-24
#28 - 3-1/2" (89 mm)	5-1/2" (140 mm)	12" (305 mm)	R62-28

R63 Hex Nut

Bar Desig. & Nominal Dia.	Across Flats	Across Corners	Thickness	Part Number
#6 - 3/4" (19 mm)	1-1/4" (32 mm)	1.44" (37 mm)	1-1/8" (29 mm)	R63-06
#7 - 7/8" (22 mm)	1-7/16" (37 mm)	1.66" (42 mm)	1-1/4" (32 mm)	R63-07
#8 - 1" (25 mm)	1-5/8" (41 mm)	1.88" (48 mm)	1-3/8" (35 mm)	R63-08
#9 - 1-1/8" (29 mm)	1-7/8" (48 mm)	2.17" (55 mm)	1-1/2" (38 mm)	R63-09
#10 - 1-1/4" (32 mm)	2" (51 mm)	2.31" (59 mm)	2" (51 mm)	R63-10
#11 - 1-3/8" (36 mm)	2-1/4" (57 mm)	2.60" (66 mm)	2-1/8" (54 mm)	R63-11
#14 - 1-3/4" (43 mm)	2-3/4" (70 mm)	3.18" (81 mm)	2-1/2" (64 mm)	R63-14
#18 - 2-1/4" (57 mm)	3-1/2" (89 mm)	4.04" (103 mm)	3-3/4" (95 mm)	R63-18
#20 - 2-1/2" (64 mm)	4" (102 mm)	4.62" (117 mm)	3-3/4" (95 mm)	R63-20
#24 - 3" (76 mm) *	4-1/2" (114 mm)	OD 5" (127 mm)	4-3/8" (111 mm)	R64-24
#28 - 3-1/2" (89 mm) *	5-1/2" (140 mm)	OD 6" (152 mm)	5-1/2" (140 mm)	R64-28

* Round Collar Nut

NA Grout

High Flow, Non-Aggregate, Non-Shrink Grout

DESCRIPTION
NA Grout is a blend of specialty cements and admixtures. This material is designed to provide maximum flow, shrinkage compensation and extended working times in an aggregate free formulation where clearances are minimal, such as the grouting of tendon cables. **NA Grout** is non-metallic and contains no compounds which will produce hydrogen gas, carbon dioxide or oxygen.

USES
NA Grout is ideal for a wide variety of applications that include but are not limited to:
- Grouting of tight clearances between precast segments, beam and columns in contact with stressed steel tendons or cables
- Anchor bolts, rock anchors, dowels and rods where sanded grouts restrict complete encapsulation
- Pumping applications in areas around tensioned cables and tendons to encapsulate and maximize anchorage

BENEFITS
- Extreme fluidity: Can be pumped into areas that are virtually inaccessible with standard non-shrink grouts
- Working time: Extended for maximum pumping range
- Strength: Attains high compressive strengths at specified water ratios
- Thixotropic: High flow restored by agitation
- Corrosion Protection: Encapsulates tendons, bolts or bars to protect from corrosion
- Consistent: Strict Quality Control testing and standards

STANDARDS
NA Grout has been specifically formulated to exceed the requirements of AASHTO LRFD Bridge Construction Specifications Table 10.9.3-2. **NA Grout** is a Class C Grout in accordance with the Post-Tensioning Institutes Guide Specification of Post-Tensioned Structures. **NA Grout** complies with ASTM C-1107.

SURFACE PREPARATION
All surfaces in contact with **NA Grout** shall be free of dirt, oil, grease, laitance and other contaminants that may act as bondbreakers. All unsound concrete should be removed to ensure a good bond. Smooth, dense surfaces need to be mechanically abraded to provide necessary bonding requirements. Mechanically prepare the substrate to a minimum CSP 5 following ICRI Guideline 03732 to allow proper bonding. ACI recommends that the area to be grouted should be saturated for 24 hours before placement. Remove any standing water. Substrate should be saturated, surface dry (SSD). Maintain contact areas between 40°F (4°C) and 90°F (32°C) prior to grouting and during initial curing period.

FORMING
Method of forming must provide for rapid, continuous grout placement. For pourable grout, construct forms to retain grout without leakage. Forms should be coated with **US SPEC Slickote** for easy removal. Post-tension ducts should be leak free.

MIXING
Post-Tensioning Applications: Use a high-shear colloidal mixer capable of achieving a homogenous mixture. Pre-wet mixer and empty excess water. Mix at a water ratio of 7.75 quarts of cool, clean, potable water per 50 lb bag of **NA Grout**. Mix at approximately 1,500 RPM for 3 to 5 minutes or until desired flow has been achieved and determined using the Modified Flow Cone Method. Mix only enough grout that can be pumped continuously within the working time for mixed grout. Do not blend excess water as this will cause bleeding leading to segregation and sedimentation. Do not use any other admixtures or additives.

PHYSICAL PROPERTIES*

Compressive Strength (ASTM C-942 per PTI GS 4.4.2**)

SET	1 DAY	7 DAYS	28 DAYS
A FLUID	4,500 psi (31.02 MPa)	11,000 psi (75.84 MPa)	15,000 psi (103.42 MPa)

See reverse side for additional test data information.

MIXING [Cont.]
Non Post-Tensioning Applications: Use a mechanical mixer with rotating blades. Pre-wet mixer and empty excess water. Place 7.75 quarts of cool, clean potable water per 50 lb bag in the mixer, then add dry material. Mix for a total of 3 to 5 minutes to achieve desired consistency. Mix only enough grout that can be placed within working time. For placements greater than 3" depth, **NA Grout** must be extended by up to 30%, by weight, with clean, washed and dried 3/8" (1 cm) pea gravel. Do not blend excess water as this will cause bleeding leading to segregation and sedimentation. Do not use any other admixtures or additives.

PLACING
Post-Tensioning Applications: Post-Tensioning grouting applications should commence following grout approval in accordance with governing specifications such as Post-Tensioning Institute Guide Specification, AASHTO LRFD Bridge Construction Specifications Section 10.11, USDOT FHWA Post-Tensioning Tendon Installation and Grouting Manual or other applicable governing specifications.

Non Post-Tensioning Applications: Grout should be placed using established procedures according to American Concrete Institute recommendations. **NA Grout** can be placed by pumping, pouring, rodding or strapping. Mechanical vibration may cause segregation. Place grout on one side of area. Let grout flow to opposite and adjacent sides to avoid entrapment of air and uneven bearing of the grouted surface. When necessary, provide vent holes. Grout should continue to be placed until it protrudes from the entire perimeter area. Grout "head" and excess grout may be removed after initial set. **NA Grout** must be 100% encapsulated to prevent cracking.

FINISHING & CURING
Follow standard ACI curing practices. Do not disturb formwork or grout for 24 hours. Use wet rags or burlap to cure for 6 hours after placement. After 6 hours, remove rags from exposed surfaces and cure with a membrane forming curing compound such as **US SPEC Maxcure Resin Clear**, **Hydrasheen 15%** or **CS-25-1315**. For best results, exposed grout should extend downward at a 45° angle from edge of base.

STORAGE
Normal cement storage and handling practices should be observed. Store material in an interior, cool, dry place. Shelf life is 9 months in original, unopened container.

LIMITATIONS
In addition to limitations already mentioned, please note the following. Do not apply when the surface or ambient temperature is below 40°F (4°C) or when the temperature is expected to fall below 40°F within 48 hours. When grouting at minimum temperatures, ensure surfaces in contact with grout do not fall below 40°F until final set has been achieved and grout has reached 3,000 PSI. Do not apply over surfaces that are frozen or contain frost. Do not apply over any active faults or cracks in the substrate without addressing any movement that may occur. Do not use as a patching or overlay mortar or in unconfined areas. Normal conditions working time is 30 minutes. Setting time will speed up in hot weather and slow in cold weather. For hot and cold weather applications, contact your US SPEC manufacturer's representative.

Packaging: 50 lb (22.7 kg) bag, 40 bags per pallet

NA Grout

High Flow, Non-Aggregate, Non-Shrink Grout

PHYSICAL PROPERTIES*

Rate of Set (ASTM C-953 per PTI GS 4.4.1**)

SET	INITIAL
A FLUID	9:00

Note: W/C ratio: Less than .45 (per PTI GS Table 3.1)

Volume Change (ASTM C-1090 per PTI GS 4.4.4**)

AGE	% CHANGE
1 DAY	0.02%
28 DAYS	0.03%

Accelerated Corrosion Test (PTI Specification Appendix B**)

NA GROUT	CONTROL
> 3000 hours	302 hours

Wick Induced Bleed (ASTM C-940 modified per PTI GS 4.4.6.1**)

AGE	PERCENT BLEED
4 HOURS	0.0%

Schupack Pressure Bleed (PTI GS 4.4.6.2, Table 4.1 (b)**)

GELMAN PRESSURE	PERCENT BLEED
20 psi	0.0%
30 psi	1.0%
50 psi	1.1%

Permeability (ASTM 1202 modified per PTI GS Specification 4.4.3**)

AGE	APPLIED VOLTAGE	CHARGE PASSED
28 DAYS	30V	< 2500 coulombs

Chloride Ion Content (ASTM C-1152**)

PERCENTAGE
.07%

Initial Fluidity**

TEST	EFFLUX TIME
Flow Cone (ASTM C-939*)	15-30 seconds
Mod. Flow Cone-PTI Spec 4.4.5	6-20 seconds

30 Minutes Fluidity**

TEST	EFFLUX TIME
Flow Cone (ASTM C-939*)	15-30 seconds
Mod. Flow Cone-PTI Spec 4.4.5	6-20 seconds

Inclined Tube Test (EN445 per PTI 4.4.9**)

AGE	% BLEEDING
Immediately After Mixing	0.0%
30 min after mixing w/ 30 sec. remix	0.0%

*Notes: 73°F (22.8°C) 55% humidity
A = 7.75 qts

**PTI M55.1-12

REGULATORY

Read and follow application information, precautions and Material Safety Data Information.

Right-to-know
This product contains Portland Cement (CAS#65997-15-1) and Crystalline Silica (CAS# 14808-60-7)

HMIS
Health 1, Fire 0, Reactivity 0

Prop 65
Warning! This product contains Crystalline Silica, a chemical known to the State of California to cause cancer or reproductive toxicity.

VOC Content
0 g/L

CAUTION

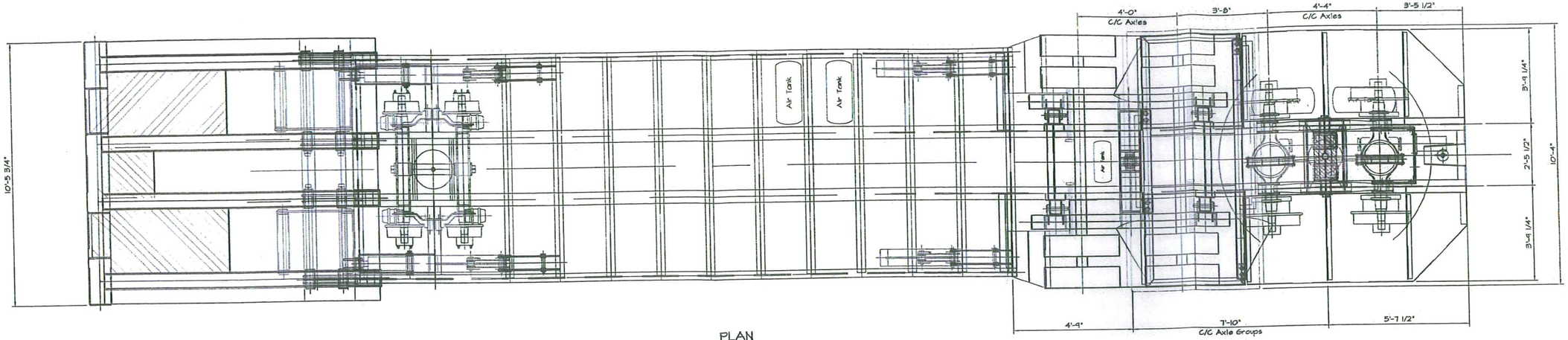
EYE AND SKIN IRRITANT
Contains Portland Cement (CAS# 65997-15-1) and Crystalline Silica (CAS# 14808-60-7). Do not allow contact with eyes or skin. Avoid breathing dust - silica may cause serious lung problems. There is limited evidence silica is a carcinogen. The use of gloves, goggles, dust masks and other protective clothing is recommended. If cement or sand particles get into eyes, rinse immediately with clean water and seek prompt medical attention.

TECHNICAL SERVICE

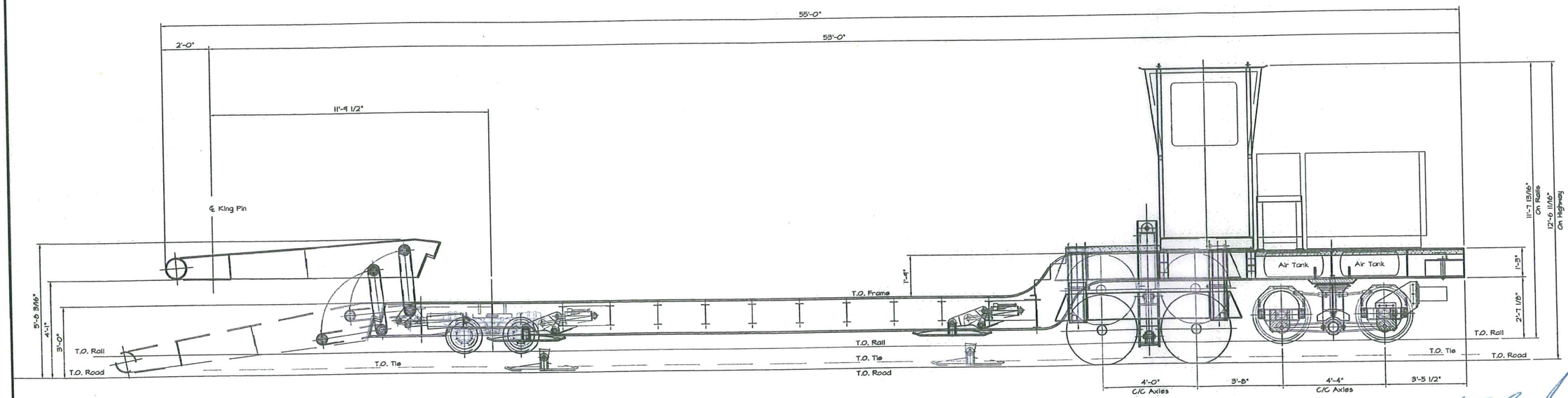
Contact your US SPEC manufacturer's representative for the most current product information.

US MIX Co.
112 South Santa Fe Drive
Denver, CO 80223
Tel: 303.778.7227 Fax: 303.722.8426
Web Site: www.usspec.com

Yield: 50 lbs (22.7 kg) will fill approximately 0.53 ft³ (0.015 m³) when 7.75 qts mixing water is used.



PLAN
1/2"=1'-0"



ELEVATION
1/2"=1'-0"

Reference Drawings

0697 - 11
017-2010-02-830-01
017-2010-08-830-01
017-2011-09-820-01
017-2012-01-820-01

VEHICLE CAPACITY

HIGHWAY:
Rear Axles 17,000 kg
King Pin 12,000 kg
Vehicle Payload 0 kg

ON RAILS:
GVW 91,000kg
Payload 61,000kg

PROFESSIONAL ENGINEER
G. J. SCHWAB
BRITISH COLUMBIA
MAR 16 2012

REV	BY	Chk	D	M	Y	DESCRIPTION
A	GS		16	03	12	Certified Drawing Issued to Client

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ENGINEERING FOR INDUSTRY
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Hytracker Manufacturing Ltd.
Railway Equipment Manufacturers

KAMLOOPS, BC
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VECHICLE CAPACITY

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REV A

DESTROY PRINTS BEARING PREVIOUS LETTER