TRAFFIC CONTROL DEVICES, INC.
710 Long Meadow Dr.
Salisbury, NC 28147

TRANSMITTAL NOTICE

Job No. 16014

Project C203635
Location Wake County
Work Signing, Lighting, ITS, Signals

Transmittal No. F-41
Sheet 1 Of 1
Date 6/20/2016

TO: Blythe Construction, Inc.
2911 North Graham Street
Charlotte, NC 28206
Attn: Matt Adams

Items listed are being sent:
[ ] Enclosed
[ ] Under Separate Cover
[X] E-Mail

Gentlemen:

We are transmittin
[ ] Plans
[X] Prints
[] _____
If these Items are

Item	Quan.	Dwg.
1		

Status Code:
A. Appro
B. Appro

Remarks: Please return at lea

[X] APPROVED [ ] RESUBMIT
[ ] APPROVED AS NOTED [ ] NOT APPROVED

REVIEW OF THIS SHOP DRAWING IS LIMITED TO CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND FOR COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT PLANS AND SPECIFICATIONS (INCLUDING SUPPLEMENTAL AND SPECIAL PROVISIONS), AND IS NOT INTENDED TO BE A VERIFICATION OF TOTAL MATERIAL REQUIRED OR THAT ALL ITEMS REQUIRED ARE SHOWN. REVIEW SHALL NOT RELIEVE THE CONTRACTOR FROM THE RESPONSIBILITY OF DETAILS OF DESIGN, DIMENSIONS, JOB CONDITIONS, CONSTRUCTION MEANS AND METHODS, COORDINATION WITH OTHER TRADES, OR ANY OTHER REQUIREMENTS OF THE PLANS, SPECIFICATIONS OR CONTRACT. ANY NOTATIONS ON THIS SHOP DRAWING MADE BY ATKINS NORTH AMERICA SHALL NOT BE CONSTRUED TO AUTHORIZE ADDITIONAL WORK OR COST.
REVIEW OF DESIGN CALCULATIONS AND DRAWINGS PREPARED BY SPECIALTY ENGINEERS IS LIMITED TO DESIGN INTENT AND DOES NOT CONSTITUTE A DETAILED CHECK OF CALCULATIONS, NOR DOES IT RELIEVE THE SPECIALTY ENGINEERS FROM THE RESPONSIBILITY OF THE DETAILING OF THE SPECIALTY COMPONENT OR SYSTEM.

BY: D.L. Jones , PE
DATE: 7/1/16
ATKINS

Technical Data
Quotation

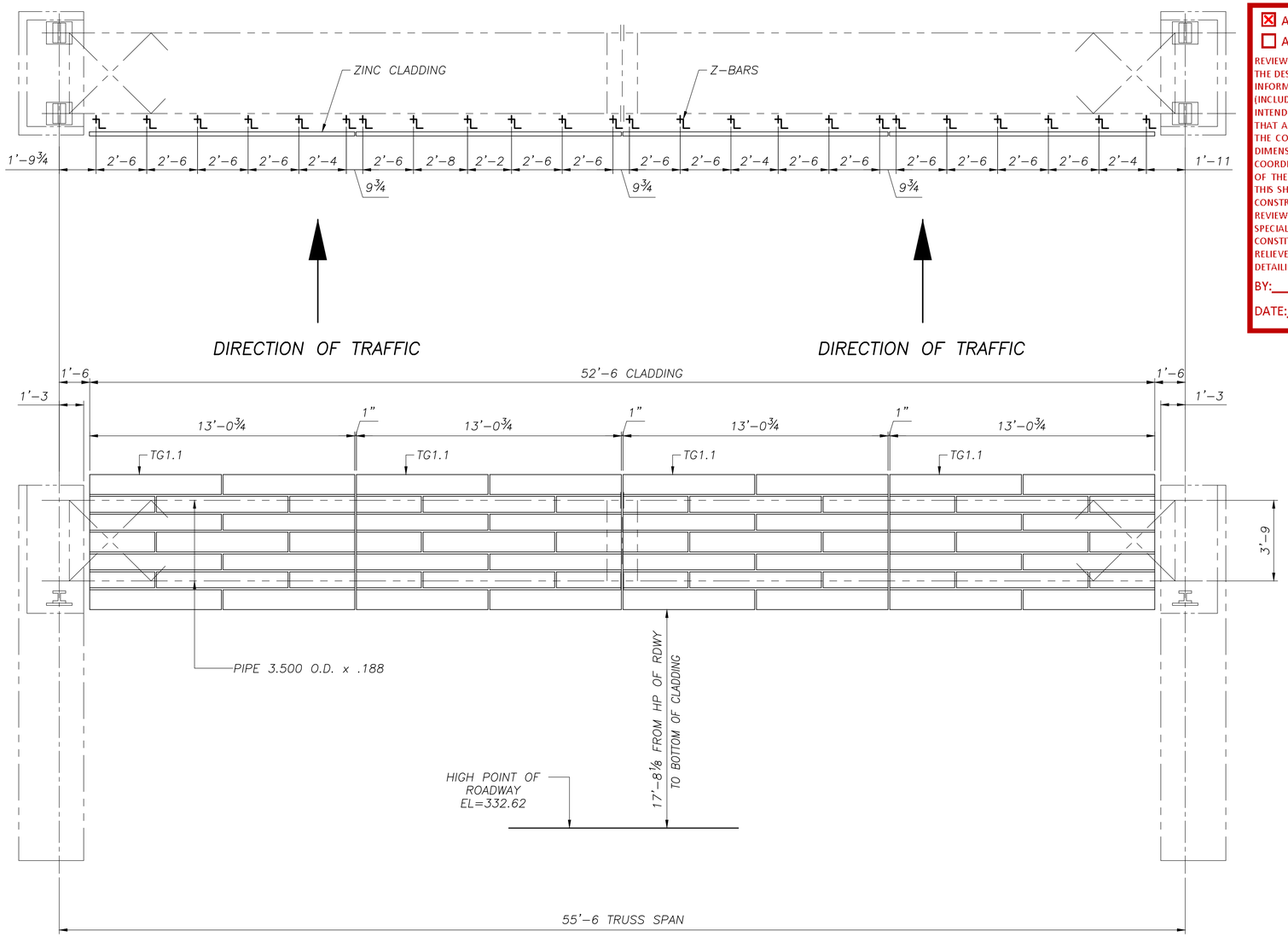
Status
C, F

es
marks

Reply to: Traffic Control Devices, Inc.
710 Long Meadow Drive
Salisbury, NC 28147

Sincerely,
Traffic Control Devices, Inc.
By: B.J. Robertson
B.J. Robertson

SHIPPING LIST		C1791–EC7
QTY	MARK	DESCRIPTION
4	TG1.1	CLADDING PANELS
48	17P1	BACKING PLATES
48	U3d	1/2" U-Bolts w/(4)HN/(2)LW/(2)FW (GALV)



ELEVATION

STR NO: TG1–1

STA NO: 19+53 –Y3LPA– (EB)

(LOOKING IN DIRECTION OF TRAFFIC FLOW)

☒ APPROVED ☐ RESUBMIT

☐ APPROVED AS NOTED ☐ NOT APPROVED

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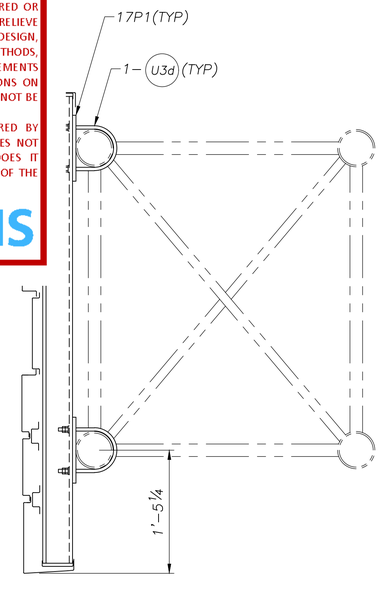
BY: D.L. Jones , PE

DATE: 7/1/16

ATKINS



TYP ATTACHMENT DETAIL

NORTH CAROLINA PROFESSIONAL SEAL 30182 ENGINEER BARBARA B CLEMENTS

06/20/16

Walpar, LLC

POST OFFICE BOX 28650
BIRMINGHAM ALABAMA 35228
4200 JEFFERSON AVENUE
BIRMINGHAM ALABAMA 35221
PHONE (205)–925–4990
FAX (205) 925–7273

0

STATE:	North Carolina
FED PROJ:	Design Build – 540 Toll Road
ST PROJ:	R–2635D / C203635
COUNTY:	Wake
ROUTE:	Toll NC–540 at SR–1153

SUBJECT: OVERHEAD BOX TRUSS STRUCTURE
CLADDING ERECTION DRAWING

FOR: Traffic Control Devices, Inc

DRAWN BY: JSD DATE: 5/25/16

CHECKED BY: JSD DATE: 5/25/16

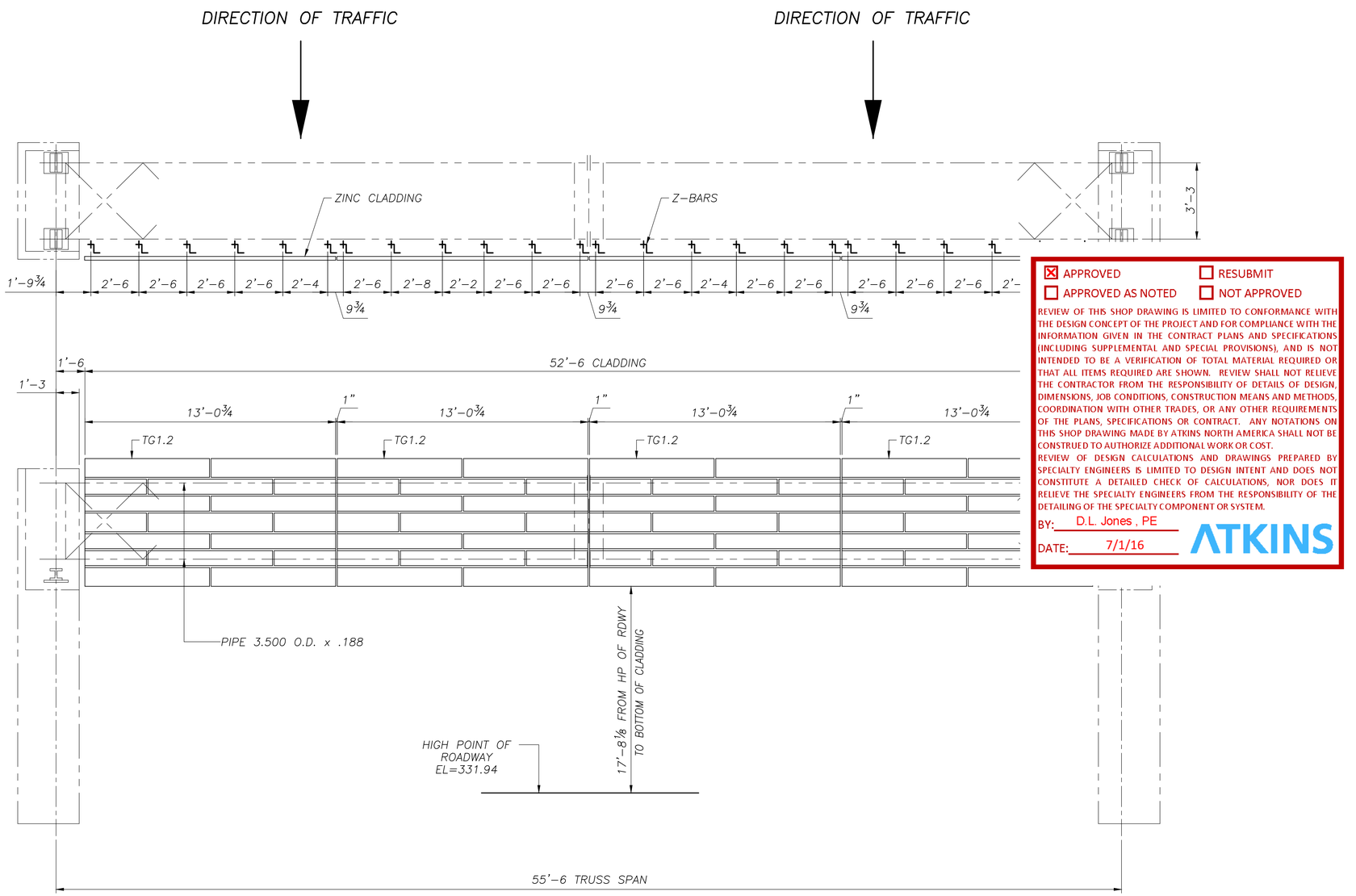
DWG NO: C1791–EC7

NO:	REVISIONS	DATE	MADE	CHECKED
0	FOR APPROVAL	5/25/16	---	JSD

BT–E

NAME: E:\acad\JobsNPrg\1791\1791–EC7.dwg DATE: MAY 25, 2016 TIME: 3:50 PM JEREMYD

SHIPPING LIST		C1791–EC8
QTY	MARK	DESCRIPTION
4	TG1.2	CLADDING PANELS
48	17P1	BACKING PLATES
48	U3d	1/2" U-Bolts w/(4)HN/(2)LW/(2)FW (GALV)



ELEVATION

STR NO: TG1–2

STA NO: 19+03 –Y3LPA– (WB)

(LOOKING IN OPP DIRECTION OF TRAFFIC FLOW)

☒ APPROVED ☐ RESUBMIT

☐ APPROVED AS NOTED ☐ NOT APPROVED

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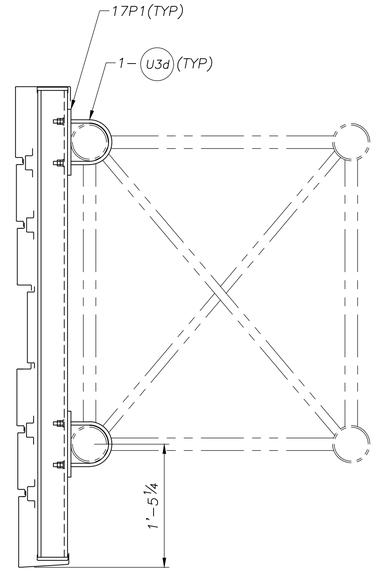
BY: D.L. Jones , PE

DATE: 7/1/16

ATKINS



TYP ATTACHMENT DETAIL

NORTH CAROLINA PROFESSIONAL SEAL 30182 ENGINEER BARBARA B CLEMENTS

06/20/16

Walpar, LLC

POST OFFICE BOX 28650
BIRMINGHAM ALABAMA 35228
4200 JEFFERSON AVENUE
BIRMINGHAM ALABAMA 35221
PHONE (205)–925–4990
FAX (205) 925–7273

0

STATE: North Carolina
FED PROJ: Design Build – 540 Toll Road
ST PROJ: R–2635D / C203635
COUNTY: Wake
ROUTE: Toll NC–540 at SR–1153

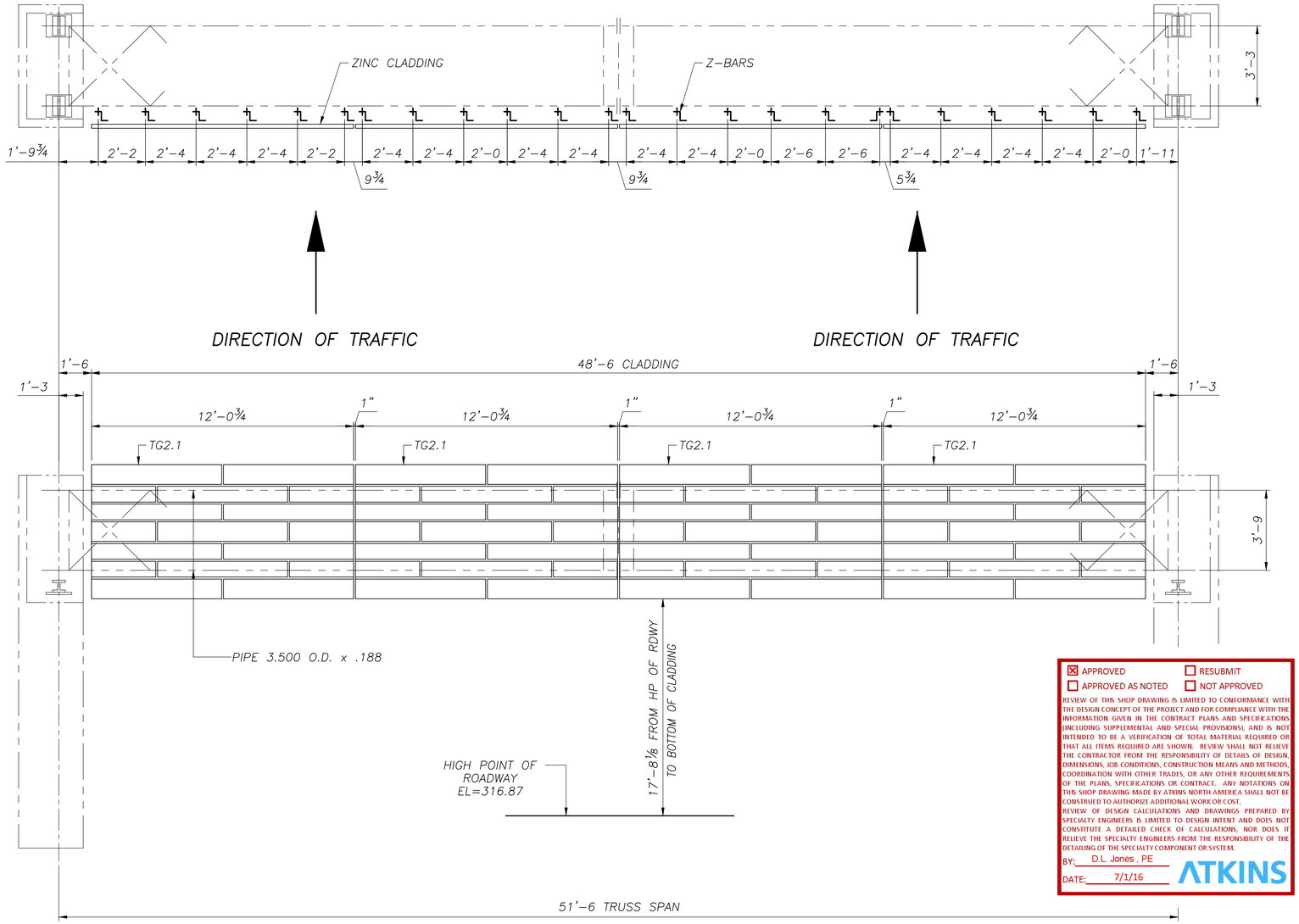
SUBJECT: OVERHEAD BOX TRUSS STRUCTURE
CLADDING ERECTION DRAWING
FOR: Traffic Control Devices, Inc

DRAWN BY: JSD DATE: 5/25/16
CHECKED BY: JSD DATE: 5/25/16
DWG NO: C1791–EC8

NO:	REVISIONS	DATE	MADE	CHECKED
0	FOR APPROVAL	5/25/16	---	JSD

BT–E

SHIPPING LIST		C1791–EC9
QTY	MARK	DESCRIPTION
4	TG2.1	CLADDING PANELS
48	17P1	BACKING PLATES
48	U3d	1/2" U-Bolts w/(4)HN/(2)LW/(2)FW (GALV)

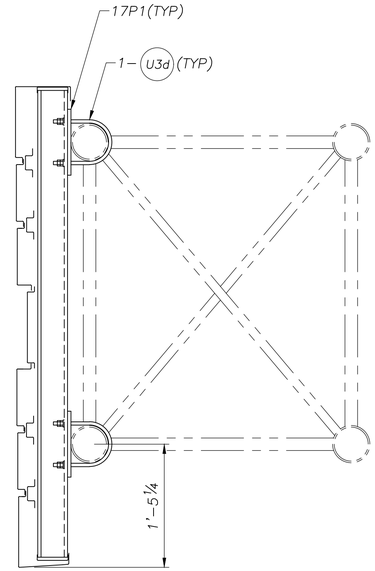


ELEVATION

STR NO: TG2–1

STA NO: 18+56 –Y3LPD– (EB)

(LOOKING IN DIRECTION OF TRAFFIC FLOW)



TYP ATTACHMENT DETAIL

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BY: D.L. Jones , PE

DATE: 7/1/16

ATKINS

NORTH CAROLINA PROFESSIONAL SEAL 30182 ENGINEER BARBARA B CLEMENTS

06/20/16

NO:	REVISIONS	DATE	MADE	CHECKED
0	FOR APPROVAL	5/25/16	---	JSD

NAME: E:\acad\JobsNPrg\1791\1791–EC9.dwg DATE: MAY 25, 2016 TIME: 3:50 PM JEREMYD

Walpar, LLC

POST OFFICE BOX 28650
BIRMINGHAM ALABAMA 35228
4200 JEFFERSON AVENUE
BIRMINGHAM ALABAMA 35221
PHONE (205)–925–4990
FAX (205) 925–7273

0

BT–E

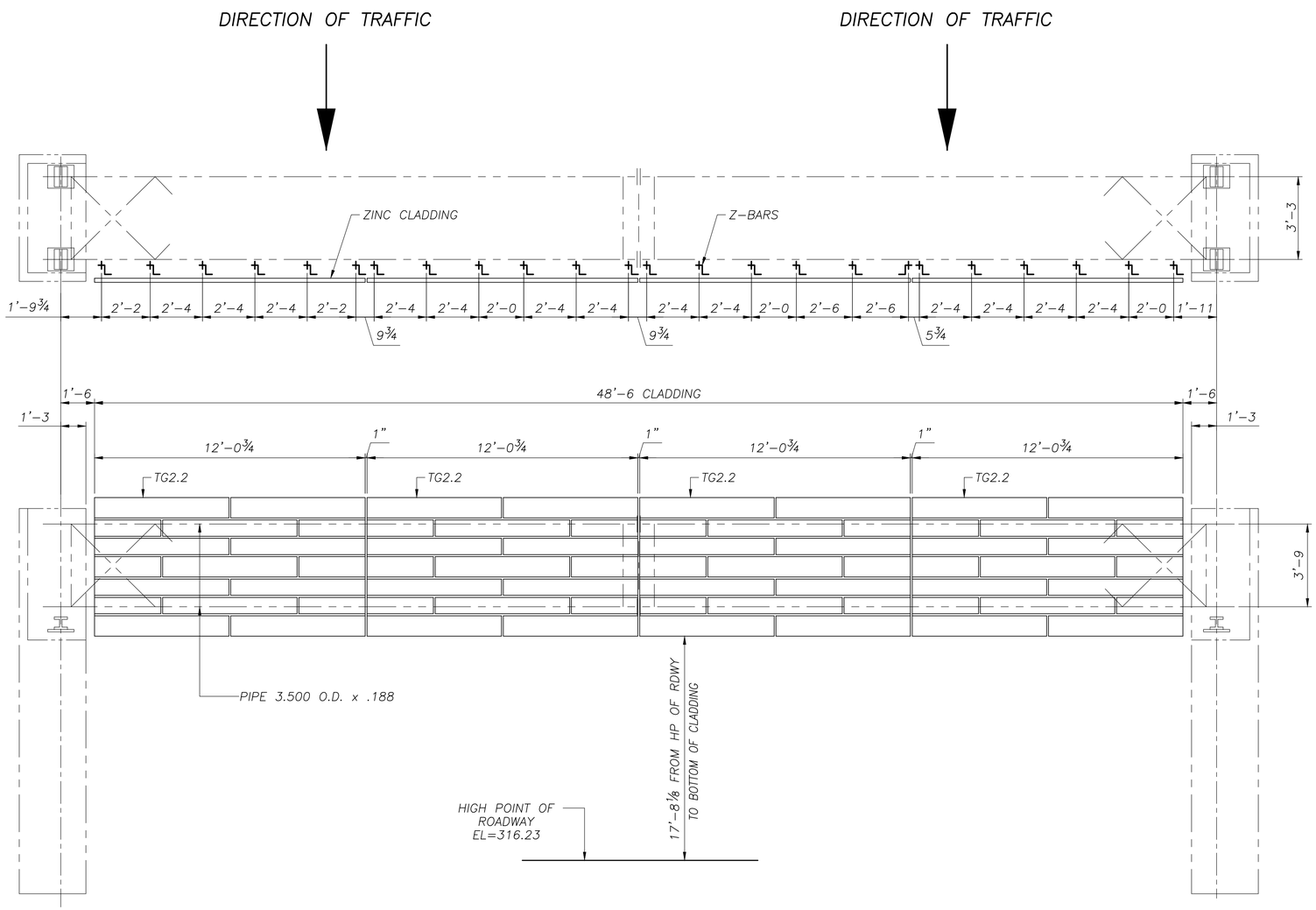
STATE: North Carolina
FED PROJ: Design Build – 540 Toll Road
ST PROJ: R–2635D / C203635
COUNTY: Wake
ROUTE: Toll NC–540 at SR–1153

SUBJECT: OVERHEAD BOX TRUSS STRUCTURE
CLADDING ERECTION DRAWING
FOR: Traffic Control Devices, Inc

DRAWN BY: JSD DATE: 5/25/16
CHECKED BY: JSD DATE: 5/25/16

DWG NO: C1791–EC9

SHIPPING LIST		C1791–EC10
QTY	MARK	DESCRIPTION
4	TG2.2	CLADDING PANELS
48	17P1	BACKING PLATES
48	U3d	1/2" U-Bolts w/(4)HN/(2)LW/(2)FW (GALV)

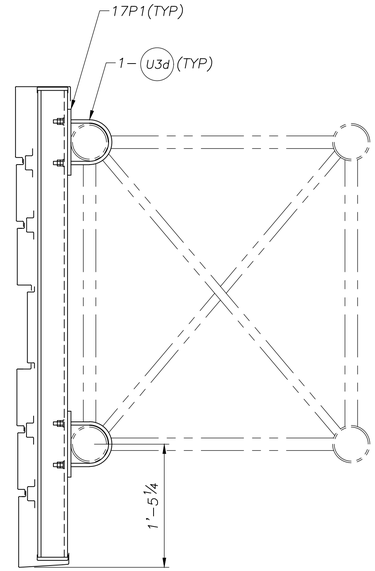


ELEVATION

STR NO: TG2–2

STA NO: 19+06 –Y3LPD– (WB)

(LOOKING IN OPP DIRECTION OF TRAFFIC FLOW)



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BY: D.L. Jones , PE

DATE: 7/1/16

ATKINS

NORTH CAROLINA PROFESSIONAL SEAL 30182 ENGINEER BARBARA B CLEMENTS

06/20/16

Walpar, LLC

POST OFFICE BOX 28650
BIRMINGHAM ALABAMA 35228
4200 JEFFERSON AVENUE
BIRMINGHAM ALABAMA 35221
PHONE (205)–925–4990
FAX (205) 925–7273

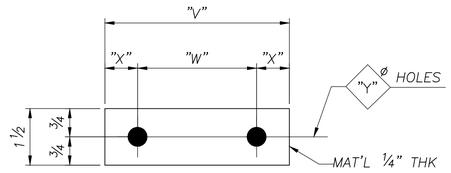
STATE:	North Carolina
FED PROJ:	Design Build – 540 Toll Road
ST PROJ:	R–2635D / C203635
COUNTY:	Wake
ROUTE:	Toll NC–540 at SR–1153
SUBJECT:	OVERHEAD BOX TRUSS STRUCTURE CLADDING ERECTION DRAWING
FOR:	Traffic Control Devices, Inc
DRAWN BY:	JSD DATE: 5/25/16
CHECKED BY:	JSD DATE: 5/25/16
DWG NO:	C1791–EC10

NO:	REVISIONS	DATE	MADE	CHECKED
0	FOR APPROVAL	5/25/16	---	JSD

BT–E

NAME: E:\acad\JobsNPrg\1791\1791–EC10.dwg DATE: MAY 25, 2016 TIME: 3:50 PM JEREMYD

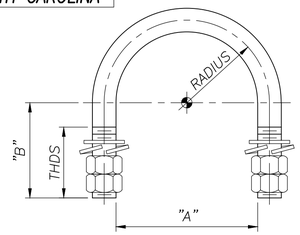
C1791–17								
PARTS PER CONT	PART MARK NO	NO OF PIECES REQ'D	SECTION SYM	DESCRIPTION OF MATERIAL	LENGTH FEET	LENGTH INCHES	PARTS FOR ONE UNIT	
	17P1	192		BACKING PLATES				
	a	192	PL	¼ x 1½	0	8		



~ SHIMS ~

MARK	QTY	"V"	"W"	"X"	"Y"
17P1	192	8	4⅛	1 15/16	11/16

C1791–17
NORTH CAROLINA



NOTE 1:
- UBOLT MATERIAL PROPERTIES TO MEET OR EXCEED A307
- GALV PER A153

~ U–BOLTS w/(4)HN/(2)LW/(2)FW ~

NUTS: ASTM A563,GR.DH OR ASTM A194,GR.2H
WASHERS: ASTM F436 & ANSI–B18.21.1

MARK	QTY	DIA	"A"	"B"	RADIUS	THDS	MATERIAL
U3d	192	½	3⅝	3¾	2 1/16	2	NOTE 1

NAME: E:\acad\JobsNPrg\1791\1791–17.dwg DATE: MAY 25, 2016 TIME: 3:51 PM JEREMYD

APPROVED
RESUBMIT
APPROVED AS NOTED
NOT APPROVED

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BY: D.L. Jones , PE
DATE: 7/1/16
ATKINS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 30182 BARBARA B CLEMENTS
06/20/16

MAT'L SPECS: AS NOTED
REF DWGS: EC7–EC10

NO:	REVISIONS	DATE	MADE	CHECKED
0	FOR APPROVAL	5/25/16	---	JSD

Walpar, LLC

POST OFFICE BOX 28650
BIRMINGHAM ALABAMA 35228
4200 JEFFERSON AVENUE
BIRMINGHAM ALABAMA 35221
PHONE (205)–925–4990
FAX (205) 925–7273

STATE: North Carolina
FED PROJ: Design Build – 540 Toll Road
ST PROJ: R–2635D / C203635
COUNTY: Wake
ROUTE: Toll NC–540 at SR–1153

SUBJECT: SIGN STRUCTURES
MISC DETAILS
FOR: Traffic Control Devices, Inc

DRAWN BY: JSD DATE: 5/25/16
CHECKED BY: JSD DATE: 5/25/16
DWG NO: C1791–17

KITDWG3

EXCEL ENGINEERING

• Structural Engineering
• Commercial/Residential Design & Inspection
• Forensic Investigations

PO Box 1264 • Carrboro, NC 27510-1264 • 919-542-7578 • Fax: 919-542-6757

CLADDING STRUCTURE CALCULATIONS

TRIANGLE EXPRESSWAY

☒ APPROVED ☐ RESUBMIT

☐ APPROVED AS NOTED ☐ NOT APPROVED

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BY: D.L. Jones , PE

DATE: 7/1/16

ATKINS

TRIA CANTY FASCIA PANEL

DESIGN LOADS

DL - NEGLIGIBLE (~ 30 PLF)
LL - NEGLIGIBLE

WIND LOAD ASCE 7-05

100 MPH, EXPOSURE C

SM C_f = 1.5 I = 1.0 h = 30'

q_z = .00256 $(100)^2$ × 1.0 = 26 PSF

G = 0.85

p = 26 PSF (.85)(1.5) = ~~33 PSF~~ **DESIGN FOR 50 PSF**

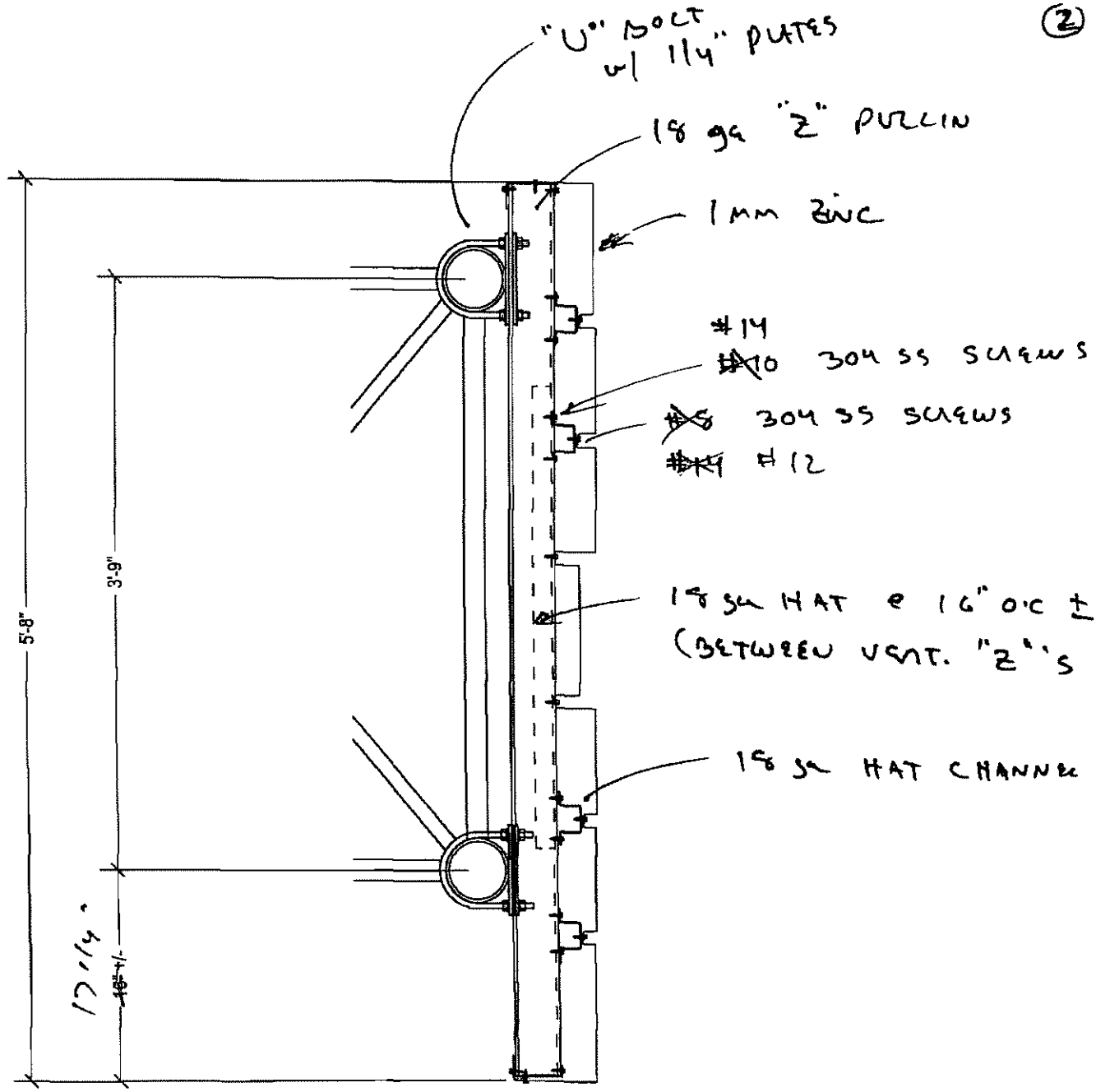
PER AASHTO SPEC FOR NATURAL WIND LOAD:

C_f - IMPORTANCE FOR FATIGUE CAT II

p = 5.2 PSF × 1.3 × 0.75 = 5 PSF

∴ DESIGN LOAD = 10 × AASHTO LOAD

(2)

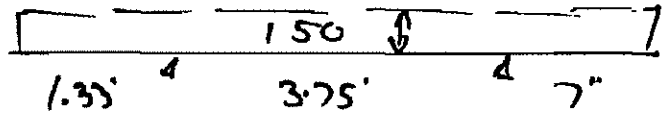


1 / S1 SECTION @ "Z" PURLIN (32" O.C. MAX.)

SCALE 1" = 1'-0"

CHECK Z PURLIN - 32" O.C (VS 36")

50 PSF WIND LOAD x 3' O.C = 150 PLF

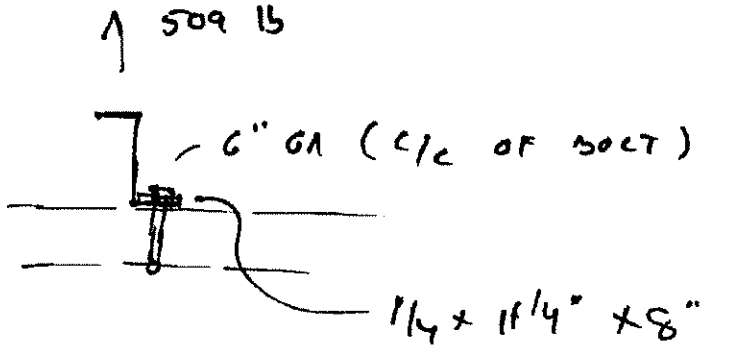


FOR 18 Ga, INTERACTION = 0.734 ≤ 1.0 ok

I_x = 0.385 in^3

δ = .04" → $\ell/1125$ ok

CHECK FLANGE BENDING ON "Z" PURLIN @ U-BOLT

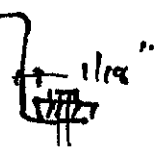


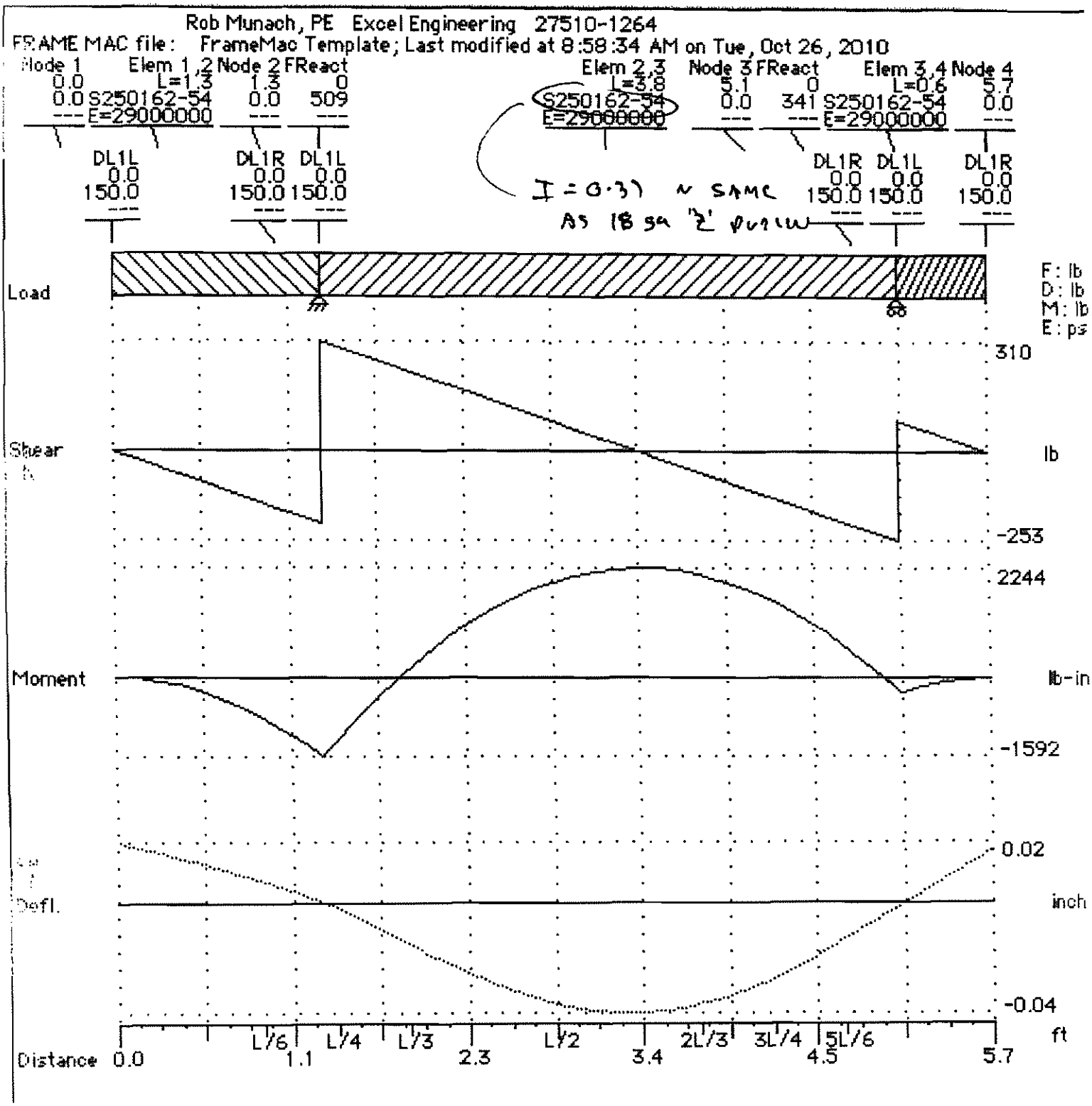
e = Say 1/4"

l = 8" M_c = 509 x 1/8" = ... → = 64 in-lb

S = $(.048)^2 \times \frac{8"}{2}$ = .0031 in^3 f_b = 20.6 KSI ok

↑ SECTION MODULUS OF Z-BAR LIP




Rob Munach, PE Excel Engineering 27510-1264
FRAME MAC file: FrameMac Template; Last modified at 8:58:34 AM on Tue, Oct 26, 2010
Node 1 Elem 1,2 Node 2 FReact Elem 2,3 Node 3 FReact Elem 3,4 Node 4
0.0 L=1.3 1.3 0 L=3.8 5.1 0 L=0.6 5.7
0.0 S250162-54 0.0 509 S250162-54 0.0 341 S250162-54 0.0
--- E=29000000 --- --- E=29000000 --- --- E=29000000 ---
DL1L DL1R DL1L DL1R DL1L DL1R
0.0 0.0 0.0 0.0 0.0 0.0
150.0 150.0 150.0 150.0 150.0 150.0
I = 0.37 ^ SAME AS 18 ga 'Z' purlin
Load
F: lb
D: lb
M: lb
E: ps
310
Shear
lb
-253
2244
Moment
lb-in
-1592
0.02
Defl.
inch
-0.04
ft
Distance 0.0 L/6 1.1 L/4 L/3 2.3 L/2 3.4 2L/3 3L/4 4.5 5L/6 5.7

(5)

Member Check - 2007 North American Specification - US (ASD)

Material Type: A653 SS Grade 33, Fy=33 ksi
Design Parameters:

Lx	3.7500 ft	Ly	3.7500 ft	Lt	3.7500 ft
Kx	1.0000	Ky	1.0000	Kt	1.0000
Cbx	1.0000	Cby	1.0000	ex	0.0000 in
Cmx	1.0000	Cmy	1.0000	ey	0.0000 in
Braced Flange: None		Red. Factor, R: 0		Stiffness, kϕ: 0 k	

Loads:	P (k)	Mx (k-in)	Vy (k)	My (k-in)	Vx (k)
Entered	0.0000	2.2400	0.0000	0.0000	0.0000
Applied	0.0000	2.2400	0.0000	0.0000	0.0000
Strength	1.9736	3.0500	1.5193	0.6905	1.5193

Effective section properties at applied loads:

Ae	0.25335 in^2	Ixe	0.35825 in^4	Iye	0.07983 in^4
		Sxe(t)	0.23103 in^3	Sye(l)	0.05582 in^3
		Sxe(b)	0.24718 in^3	Sye(r)	0.05236 in^3

Interaction Equations

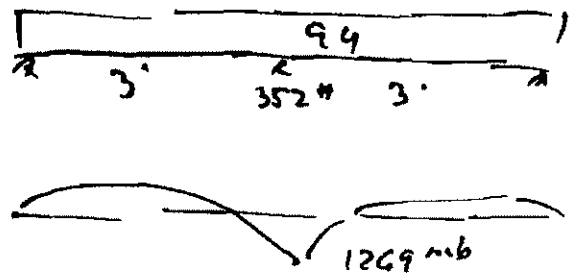
NAS Eq. C5.2.1-1	(P, Mx, My)	0.000 + 0.734 + 0.000 = 0.734 <= 1.0
NAS Eq. C5.2.1-2	(P, Mx, My)	0.000 + 0.734 + 0.000 = 0.734 <= 1.0
NAS Eq. C3.3.1-1	(Mx, Vy)	Sqrt(0.382 + 0.000)= 0.618 <= 1.0
NAS Eq. C3.3.1-1	(My, Vx)	Sqrt(0.000 + 0.000)= 0.000 <= 1.0

(1 1/2")

CHECK 18 ga HAT CHANNEL 150F 125

ℓ = 36" MAX (SPAN)

W: $\frac{3.75'}{2}$ @ 50 PSF = 94 PLF



INTERACTION = 0.723 ≤ 1.0 OK

CONNECTION OF HAT TO Z-PURLIN

FOR 3-4 SPAN CONDITION (ACTUAL)

$P = 352\# \times \frac{1.14}{1.25} = 321\#$

Try (2) #14 SCREWS, SHEET STEEL F_U = 85-90 KSI FOR 304 SS

PER 2001 AISI COLD FORMED STEEL SPEC,
#14 screw, 65 KSI yield BASE METAL, P_{ALL} = 221#

→ USE (2) #14 SCREWS

A = .045 IN² f_t = 3.6 KSI ≤ 7 KSI PER AASHTO OK

CHECK 2WC TO MAT CONNECTION

$P = \frac{1.8' \text{ TRIB}}{4} \times 2.67' \times 50 \text{ PSF} = 60\#$

USE FOR ~~#14~~ #12 SIGN

Member Check - 2007 North American Specification - US (ASD)

Material Type: A653 SS Grade 33, Fy=33 ksi
Design Parameters:

Lx	3.0000 ft	Ly	3.0000 ft	Lt	3.0000 ft
Kx	1.0000	Ky	1.0000	Kt	1.0000
Cbx	1.0000	Cby	1.0000	ex	0.0000 in
Cmx	1.0000	Cmy	1.0000	ey	0.0000 in

Braced Flange: None Red. Factor, R: 0 Stiffness, kϕ: 0 k

Loads:	P (k)	Mx (k-in)	Vy (k)	My (k-in)	Vx (k)
Entered	0.0000	1.2600	0.1760	0.0000	0.0000
Applied	0.0000	1.2600	0.1760	0.0000	0.0000
Strength	0.7411	1.7425	1.4094	1.5188	0.4712

Effective section properties at applied loads:

Ae	0.21413 in^2	Ixe	0.066135 in^4	Iye	0.093668 in^4
		Sxe(t)	0.088179 in^3	Sye(l)	0.076860 in^3
		Sxe(b)	0.088179 in^3	Sye(r)	0.076860 in^3

Interaction Equations

NAS Eq. C5.2.1-1	(P, Mx, My)	0.000 + 0.723 + 0.000 = 0.723 <= 1.0
NAS Eq. C5.2.1-2	(P, Mx, My)	0.000 + 0.723 + 0.000 = 0.723 <= 1.0
NAS Eq. C3.3.1-1	(Mx, Vy)	Sqrt(0.523 + 0.016)= 0.734 <= 1.0
NAS Eq. C3.3.1-1	(My, Vx)	Sqrt(0.000 + 0.000)= 0.000 <= 1.0

P R O D U C T D A T A S H E E T

304/304L STAINLESS STEEL

UNS S30400/UNS S30403

AK Steel

AK Steel Type 304 is a variation of the basic 18-8 grade, Type 302, with a higher chromium and lower carbon content. Lower carbon minimizes chromium carbide precipitation due to welding and its susceptibility to intergranular corrosion. In many instances, it can be used in the "as-welded" condition, while Type 302 must be annealed in order to reta adequate corrosion resistance.

Type 304L is an extra low-carbon var tion of Type 304 with a 0.03% maxim carbon content that eliminates carbi precipitation due to welding. As a resu this alloy can be used in the "as-welde condition, even in severe corrosive c ditions. It often eliminates the necess of annealing weldments except applications specifying stress relief has slightly lower mechanical propert than Type 304.

Typical uses include architectural mouldings and trim, kitchen equipment, welded components of chemical, textile, paper, pharmaceutical and chemical industry processing equipment.

AVAILABLE FORMS

AK Steel produces Type 304 Stainless

☒ APPROVED ☐ RESUBMIT
☐ APPROVED AS NOTED ☐ NOT APPROVED

REVIEW OF THIS SHOP DRAWING IS LIMITED TO CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND FOR COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT PLANS AND SPECIFICATIONS (INCLUDING SUPPLEMENTAL AND SPECIAL PROVISIONS), AND IS NOT INTENDED TO BE A VERIFICATION OF TOTAL MATERIAL REQUIRED OR THAT ALL ITEMS REQUIRED ARE SHOWN. REVIEW SHALL NOT RELIEVE THE CONTRACTOR FROM THE RESPONSIBILITY OF DETAILS OF DESIGN, DIMENSIONS, JOB CONDITIONS, CONSTRUCTION MEANS AND METHODS, COORDINATION WITH OTHER TRADES, OR ANY OTHER REQUIREMENTS OF THE PLANS, SPECIFICATIONS OR CONTRACT. ANY NOTATIONS ON THIS SHOP DRAWING MADE BY ATKINS NORTH AMERICA SHALL NOT BE CONSTRUED TO AUTHORIZE ADDITIONAL WORK OR COST.
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BY: D.L. Jones , PE

DATE: 7/1/16

ATKINS

COMPOSITION

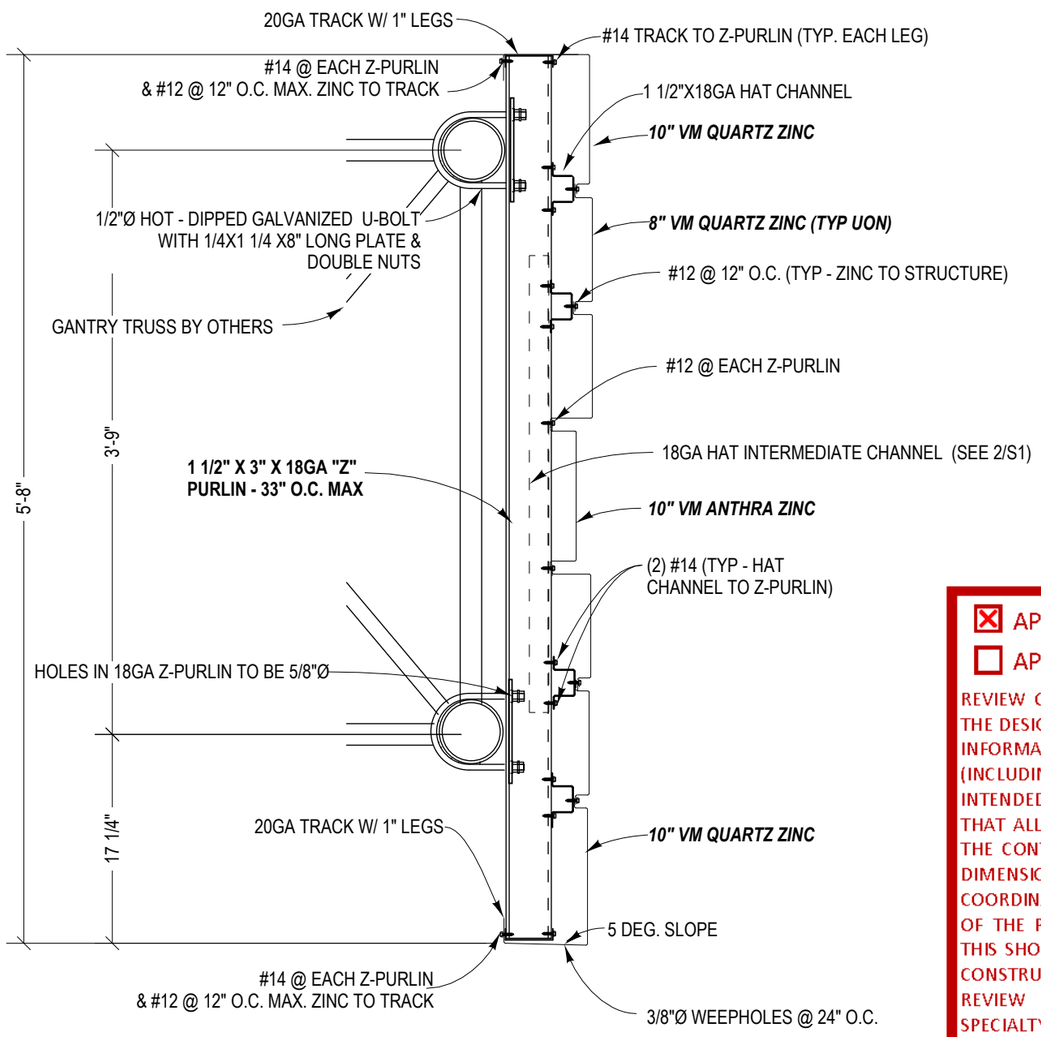
	Type 304 %	Type 304L %
Carbon	0.08 max.	0.03 max.
Manganese	2.00 max.	2.00 max.
Phosphorus	0.045 max.	0.045 max.
Sulfur	0.030 max.	0.030 max.
Silicon	0.75 max.	0.75 max.
Chromium	18.00-20.00	18.0-20.0
[illegible]	8.00-12.00	8.0-12.0
	0.10 max.	0.10 max.
	Balance	Balance

S

s 304 and 304L Stainless overed by the following :

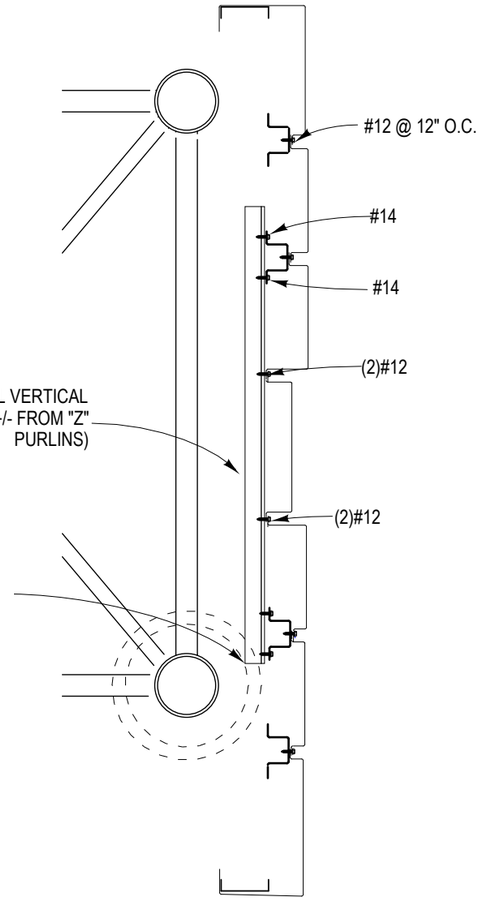
Type 304L
AMS 5511
ASTM A 240
ASTM A 666

longation % in 2" 50.8 mm)	Hardness Rockwell
55	B80
55	B82



1 / S1 SECTION @ "Z" PURLIN (33" O.C. MAX.)

SCALE: 1" = 1'-0"



2 / 1 SECTION BETWEEN "Z" PURLINS

SCALE: 1" = 1'-0"

☒ APPROVED ☐ RESUBMIT

☐ APPROVED AS NOTED ☐ NOT APPROVED

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BY: D.L. Jones , PE

DATE: 7/1/16

ATKINS

NOTES:
PANEL DEAD LOAD = 4.8 PSF (APPROX)
ALL SELF-DRILLING SCREWS TO BE TYPE 304 STAINLESS STEEL
ALL PURLINS, TRACK AND HAT CHANNEL TO BE 304 STAINLESS STEEL
ZINC TO BE 1MM

CONTACT ENGINEER IF DISCREPANCIES ARE NOTED
CONTRACTOR RESPONSIBLE FOR MEANS & METHODS OF CONSTRUCTION AND JOBSITE SAFETY
VERIFY ALL DIMENSIONS. DO NOT SCALE DRAWING

NORTH CAROLINA SEAL 19339 ENGINEER ROBERT LAWRENCE MUNACH

2 JUNE 2016

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OVERHEAD GANTRY CLADDING
TRIANGLE EXPRESSWAY EXTENSION

008-901E

Scale:1" = 1'-0"
Date: 06-02-16
Sheet: 1 of 1