

# CONTROL REPORT

D214386

New York State Thruway Authority  
Design Phase I-IV, Replacement of 8 Syracuse Division Bridges  
Judd Road Bridge over Mainline (BIN 5512790)  
Mile Post 240.48 in the Syracuse Division  
Oneida County



February 2017


Prepared for:

New York State Thruway Authority  
Syracuse Division

Prepared by:

Foit-Albert Associates  
Architecture, Engineering and Surveying, PC  
763 Main Street  
Buffalo, New York 14203

I, Michael J. Pohl, PLS hereby certify that this survey was performed to the standards set forth in the "State of New York Department of Transportation Surveying and Procedure Manual".

  
Michael J. Pohl, PLS  
NYS License No. 049978



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## **INTRODUCTION**

## **SITE LOCATION MAP**





[Print this map](#)

Map provided by TopoZone.com

## **PROJECT NARRATIVE**

D214386  
New York State Thruway Authority  
Design Phase I-IV, Replacement of 8 Syracuse Division Bridges  
Judd Road over Mainline Mile Post 240.48 in the Syracuse Division  
Oneida County

**PROJECT NARRATIVE**

This project involves providing preliminary design services to address corridor needs along and underneath Interstate 90, at MP 240.48 Judd Road over Mainline, within the Syracuse Division.

Foit-Albert Associates has been retained by Stantec Consulting Services Inc. to establish primary and secondary horizontal and vertical project control and provide topographic survey and mapping.

The field work was performed from October 28, 2016 through December 29, 2016. The weather conditions during the project were varied with temperatures ranging from highs in the 50's to lows in the 20's. Conditions also varied from snow and sleet to rain and sunshine.

**Field Crew Members:**

Crew Chief - Jeremy Smith  
Instrument Operators – Michael Matesic, Jay Maurer

**Field Equipment:**

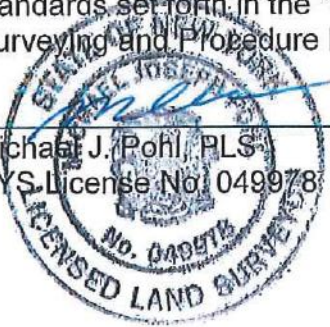
Leica DNA2003 Digital Level  
Trimble S6, 2" Digital Robotic Total Station with TSC-3 Data Collector with  
Trimble Access Data Collection  
Trimble R8 Model 3 GNSS GPS Rover and Base Receiver  
Trimble R8 Model 3 GNSS GPS Rover  
Trimble TSC-3 Data Collectors with Trimble Access Data Collection

**Software:**

Survey data was processed using Carlson software version 2016 with AutoCAD version 2014.  
The DTM, and field book files were processed and created using Bentley Microstation with InRoads version 08.11.09.655 software.  
The Base Map, Contour Map, Text Map and Points Map were created using Microstation V8i.

I, Michael J. Pohl, PLS hereby certify that this survey was performed to the standards set forth in the "State of New York Department of Transportation Surveying and Procedure Manual".

Michael J. Pohl, PLS  
NYS License No. 049978



## **HORIZONTAL CONTROL**



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Oneida County

**HORIZONTAL CONTROL NARRATIVE**

The Primary horizontal control for the site was established by utilizing 3 GPS control pairs set along the NYS Thruway corridor by Foit-Albert Associates.

Primary GPS Control pairs CBP 1 – CBP 2, CBP 4 – CBP 7 and CBP 6 – CBP 8 were established using utilizing static GPS methods. The GPS static files were post-processed using OPUS user solutions. The three sets of Primary GPS control pairs were swing-tied and sketched.

Two secondary horizontal traverses were also run to obtain topographic information along, underneath and in the surrounding project along the New York State Thruway (I-90). The first traverse was a closed leg traverse that began by occupying the Primary GPS pair CBP 1 – CBP 2. The traverse then proceeded in a westerly and northerly direction continuing through CBP 3 and closing on the Primary GPS pair CBP 4 – CBP 7. Spur points CBS 2A and CBS 3A were also set at the site to obtain topographic information. Using the formula  $4.5 \times \sqrt{N}$  where 4.5 is seconds of arc and  $N$  is the number of traverse segments, the first traverse had an allowable angular misclosure of 6.36" and had an actual angular misclosure of 1.53".

The second traverse was also a closed leg traverse that began by occupying the Primary GPS pair CBP 1 – CBP 2, the traverse then proceeded in a westerly and southerly direction continuing through CBP 5 and closing on the Primary GPS pair CBP 6 – CBP 8. Using the formula  $4.5 \times \sqrt{N}$  where 4.5 is seconds of arc and  $N$  is the number of traverse segments, the second traverse had an allowable angular misclosure of 6.36" and had an actual angular misclosure of 3.30".

The horizontal control traverse was run in accordance with the New York State Department of Transportation Surveying and Procedures Manual using a Trimble S6 electronic total station, serial number 93010506, having a direct reading of 2" and a least count accuracy of 0.1".

Prior to measuring angles and distances at each station, the field crew measured and recorded the temperature and atmospheric pressure and set the correction in the instrument. The vertical and horizontal index error was checked and set as

necessary. The correction for curvature was not set due to the small scale of the project site.

Two sets of direct and two sets of inverted angles were measured at each station. All angles were measured right and were rejected if the sum of a single set deviated from 360 degrees by more than 5 seconds.

Vertical angles and slope distances were measured from both ends of each control line. The slope distances were measured in U.S. Survey Feet at all pointings and reduced to horizontal distances. The slope distances were rejected if the forward and backward measurements differed by more than the EDM precision of  $\pm (2\text{mm} + 2\text{ppm})$ .

**Control Recovered:**

N/A

**Control Not Recovered:**

N/A

**Horizontal Datum:**

**New York State Plane Coordinate System, Central Zone, NAD 83**  
Established by Relative and Static GPS techniques.

**Combined Grid Scale Factor:**

A combined scale factor of 1.00004446 was used.

**Existing Control:**

N/A

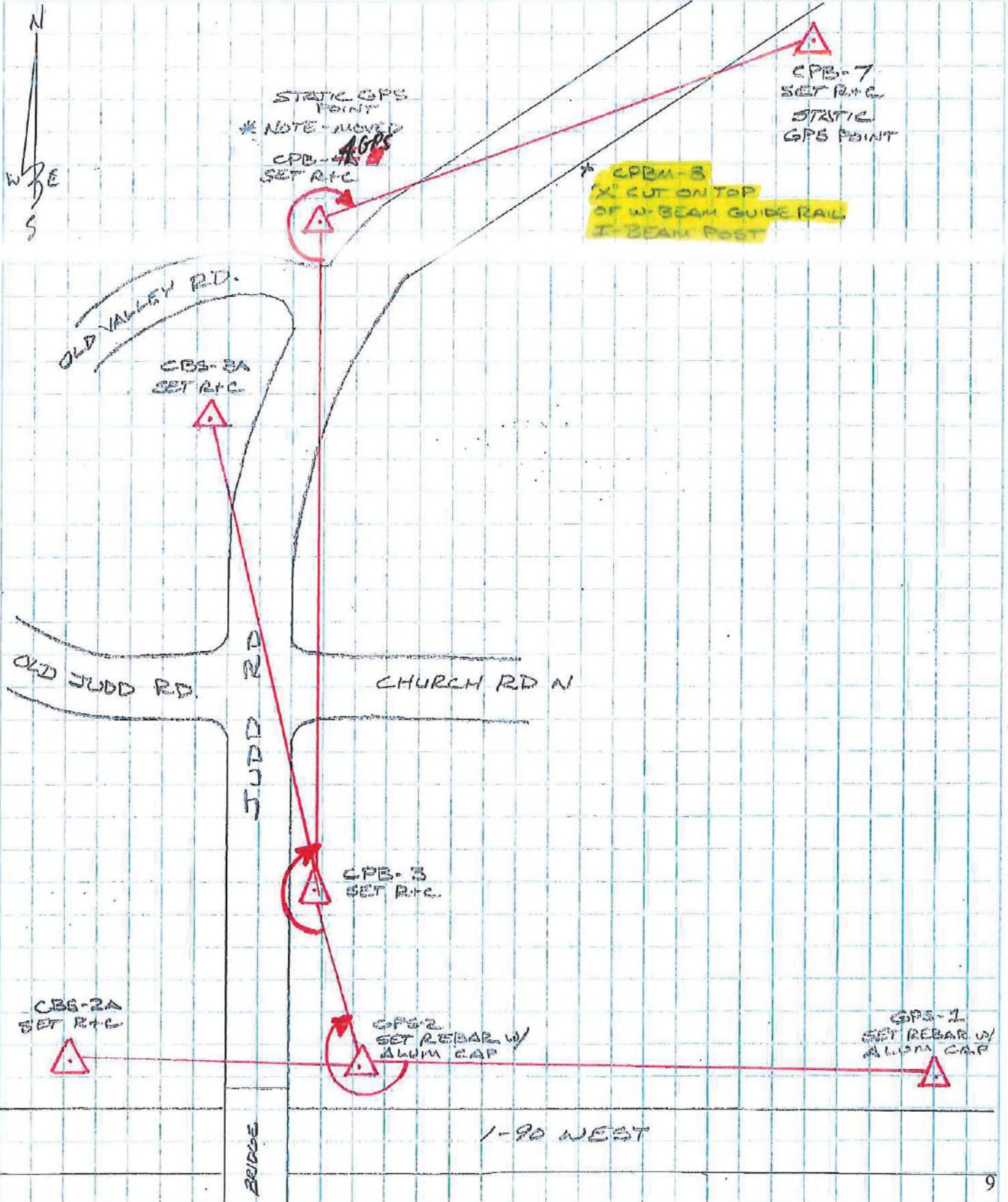
**Traverse Closure and Adjustment:**

The two closed leg traverses that were run for this project were adjusted by first balancing the angles to the GPS azimuth pairs, then by performing a Compass Rule Adjustment. Both traverses met the minimum traverse closure requirements in accordance with the New York State Department Of Transportation Land Surveying Standards and Procedures Manual.

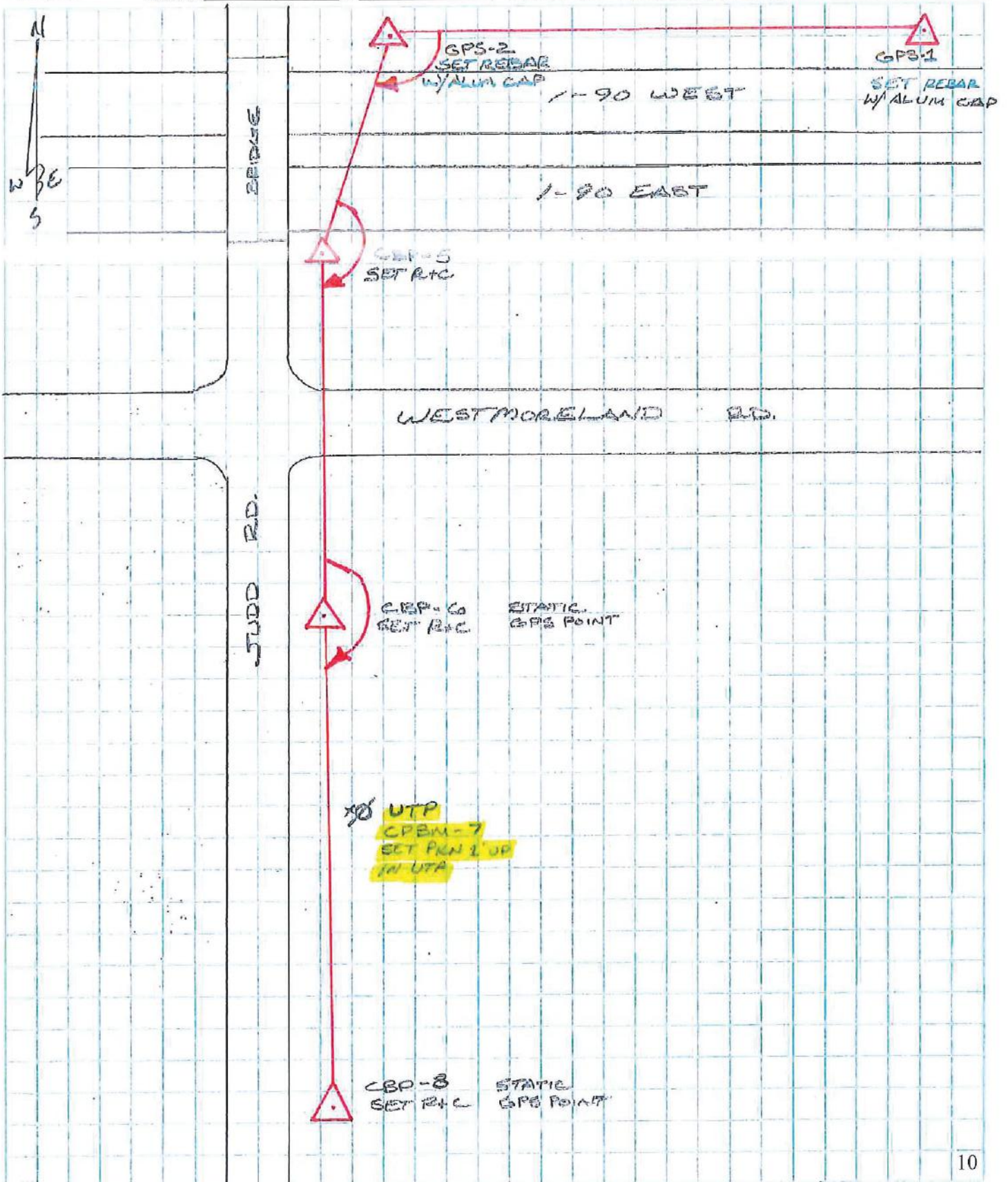
	<b><u>Raw Closure</u></b>	<b><u>Closure After Angle Balance</u></b>
Traverse 1	1 in 13112	1 in 13881
Traverse 2	1 in 22859	1 in 9999999

## TRAVERSE SKETCH









## **LIST OF BASELINE COORDINATES**

# Survey Fieldbook Coordinate List Report

Report Created: 2/21/2017  
Time: 8:28am

**Fieldbook:** 1600130 Site 1

**Slope Distance Scale Factor:** 1.000000000000

**Note:** All units in this report are in feet unless specified otherwise.

Number	Northing	Easting	Elevation	Code	Description	STA
<b>1GPS</b>	1142010.2460	1152143.5290	501.7608	CBP	REBAR ALUM CAP	ML STA 22+06.89
<b>2GPS</b>	1141975.0774	1150937.1494	483.0513	CBP	REBAR ALUM CAP	ML STA 10+00.00 J STA 32+26.20
<b>2A</b>	1141979.2509	1150760.5940	488.1228	CBS	REBAR AND CAP	
<b>3</b>	1142048.0880	1150809.1906	499.2507	CBP	REBAR AND CAP	J STA 33+73.52
<b>3A</b>	1142552.9085	1150690.6556	488.0586	CBS	REBAR AND CAP	
<b>4GPS</b>	1143047.6844	1150723.6303	483.8835	CBP	REBAR ALUM CAP	J STA 43+76.77
<b>5</b>	1141766.5477	1150867.0542	503.7375	CBP	REBAR AND CAP	J STA 30+06.20
<b>6GPS</b>	1140803.6370	1151057.0122	508.1434	CBP	REBAR ALUM CAP	J STA 20+24.73
<b>7GPS</b>	1143991.6359	1150986.1134	476.8522	CBP	REBAR AND CAP	J STA 53+56.54
<b>8GPS</b>	1139797.6351	1151252.0184	546.2161	CBP	REBAR AND CAP	J STA 10+00.00

## **CONTROL POINT TIE SHEETS**



# FOIT-ALBERT ASSOCIATES CONTROL SURVEY DATA

PROJECT - ASSIGNMENT NO. 9

P.I.N. D214386 SITE 1

PROJECTION NAD 83

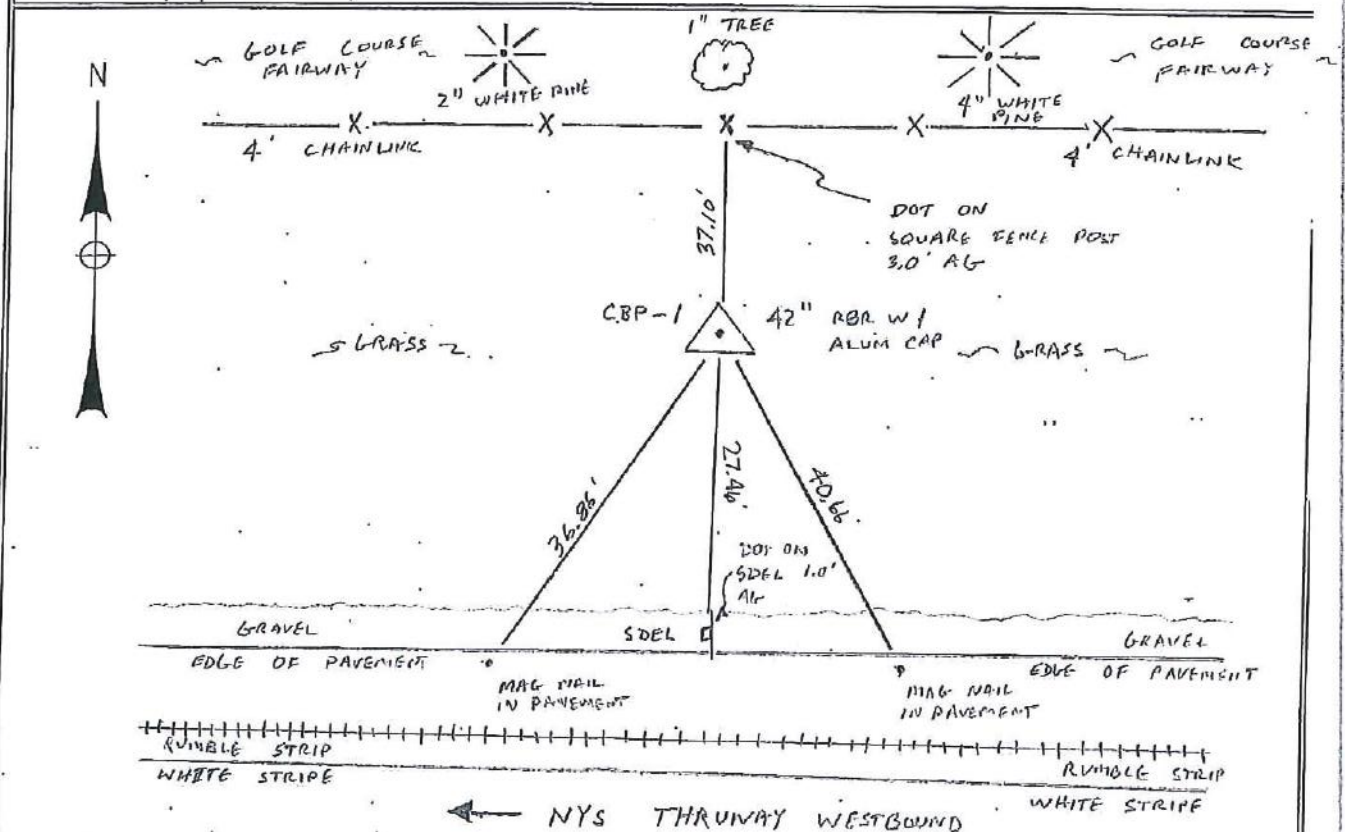
ORDER OF SURVEY: \_\_\_\_\_

NY CENTRAL ZONE, 3102

STATE PLANE COORDINATE SYSTEM

CITY OR TOWN, COUNTY	NAME OF STATION	YEAR
WHITESTOWN, ONEIDA	CP No. 1	2016
N(Y) = 1142010.2460 (GRID)	DISTANCES AND DIRECTIONS TO REFERENCE MARKS AND PROMINENT OBJECTS OBSERVED AT STATION	
E(X) = 1152143.5290 (GRID)	OBJECT	GRID DISTANCE (METER)
VERTICAL DATUM: <u>NAVD 88</u>		GRID BEARING
ELEVATION (METER): <u>501.7608</u>		
COMBINED FACTOR <u>1.00004446</u>		
ESTABLISHED BY: <u>JS</u> YEAR <u>2016</u>		
FOIT-ALBERT ASSOCIATES		

DESCRIPTION: SET REBAR AND ALUMINUM CAP ON NORTH SIDE OF  
NYS THRUWAY WESTBOUND. 1300' +/- EAST FROM EAST FACE OF JUDD  
ROAD BRIDGE 24' +/- NORTH OF THRUWAY EDGE OF PAVEMENT.



NOTE: ALL DISTANCES IN SKETCH ARE MEASURED PLUMB.

CHECKED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

# FOIT-ALBERT ASSOCIATES CONTROL SURVEY DATA

PROJECT - ASSIGNMENT No. 9

P.I.N. D214386 SITE 1

PROJECTION NAD 83

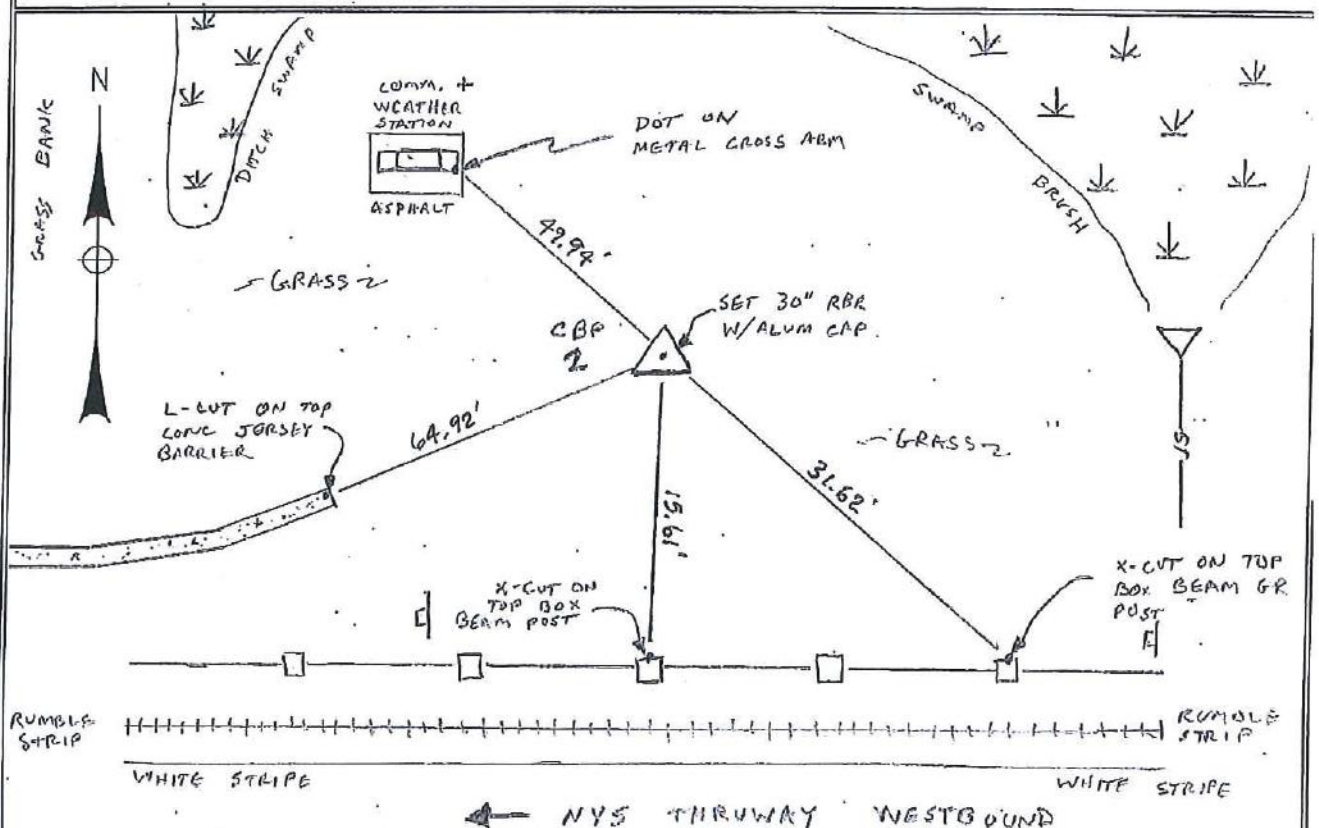
NY CENTRAL ZONE, 3102

ORDER OF SURVEY: \_\_\_\_\_

STATE PLANE COORDINATE SYSTEM

CITY OR TOWN, COUNTY	NAME OF STATION	YEAR
WHITESTOWN, ONEIDA	CP No. 2	2016
N(Y) = 1141975.0774 (GRID)	DISTANCES AND DIRECTIONS TO REFERENCE MARKS AND PROMINENT OBJECTS OBSERVED AT STATION	
E(X) = 1150937.1494 (GRID)	OBJECT	GRID DISTANCE (METER)
VERTICAL DATUM: NAVD 88		GRID BEARING
ELEVATION (MEER): 483.0513		
COMBINED FACTOR 1.00004446		
ESTABLISHED BY: JS YEAR 2016		
FOIT-ALBERT ASSOCIATES		

DESCRIPTION: SET REBAR AND ALUMINUM CAP ON NORTH SIDE OF NYS THRUWAY WESTBOUND, 109' +/- FROM EAST FACE OF JUDD ROAD BRIDGE 17' +/- NORTH OF THRUWAY EDGE OF PAVEMENT.



NOTE: ALL DISTANCES IN SKETCH ARE MEASURED PLUMB.

CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_



# FOIT-ALBERT ASSOCIATES CONTROL SURVEY DATA

PROJECT - 116001.30 ASSIGN. #9

P.I.N. D214386 SITE 2

PROJECTION NAD 83

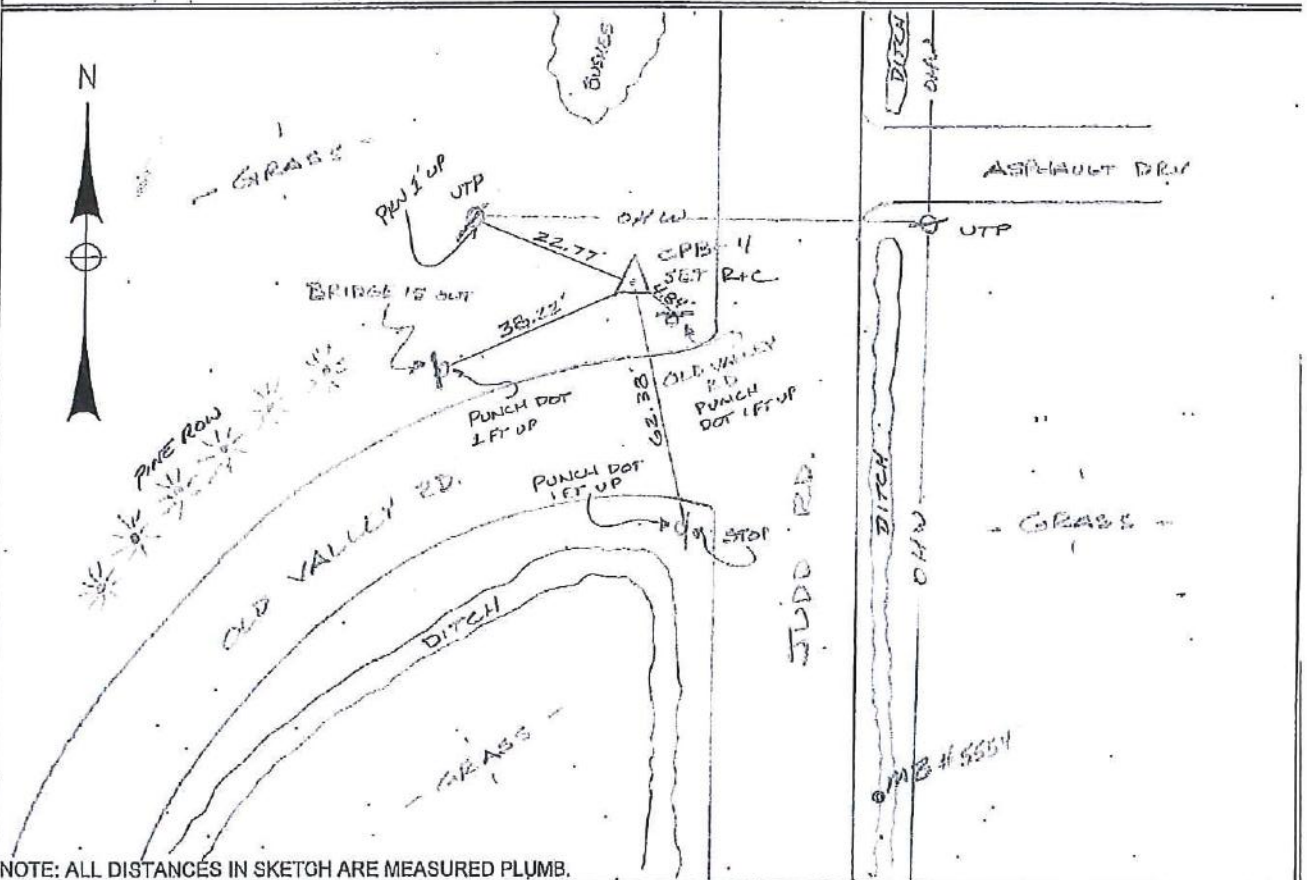
ORDER OF SURVEY: \_\_\_\_\_

NY CENTRAL ZONE, 3102

STATE PLANE COORDINATE SYSTEM

CITY OR TOWN, COUNTY	NAME OF STATION	YEAR
WHITESTOWN, ONEIDA	CP No. 4	2016
N(Y) = <u>1143047.6844</u> (GRID)	DISTANCES AND DIRECTIONS TO REFERENCE MARKS AND PROMINENT OBJECTS OBSERVED AT STATION	
E(X) = <u>1156723.6303</u> (GRID)	OBJECT	GRID DISTANCE (METER)
VERTICAL DATUM: <u>NAD 83</u>		GRID BEARING
ELEVATION (MEETER): <u>483.8835</u>		
COMBINED FACTOR <u>1.00004446</u>		
ESTABLISHED BY: <u>N/A</u> YEAR <u>2016</u>		
FOIT-ALBERT ASSOCIATES		

DESCRIPTION: SET R/LC WEST SIDE OF JUDG RD. 1000' +/- - NORTH OF 1-90  
BRIDGE. NORTH SIDE OF OLD VALLEY RD INTERSECTION OF JUDG RD.



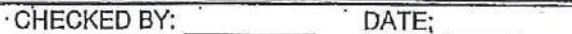
CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_



PROJECT - Assignment #9  
P.I.N. D214306 site #1

ORDER OF SURVEY: \_\_\_\_\_  
STATE PLANE COORDINATE SYSTEM

DESCRIPTION: SET R/C 'B' 100' OFF EAST SHOULDER OFF TURN BL. 1000' + OF - SOUTH OF 1-90 BRIDGE



# FOIT-ALBERT ASSOCIATES CONTROL SURVEY DATA

PROJECT - 16001.30 ASSIGN. #9

P.I.N. D214386 SITE 1

PROJECTION NAD 83

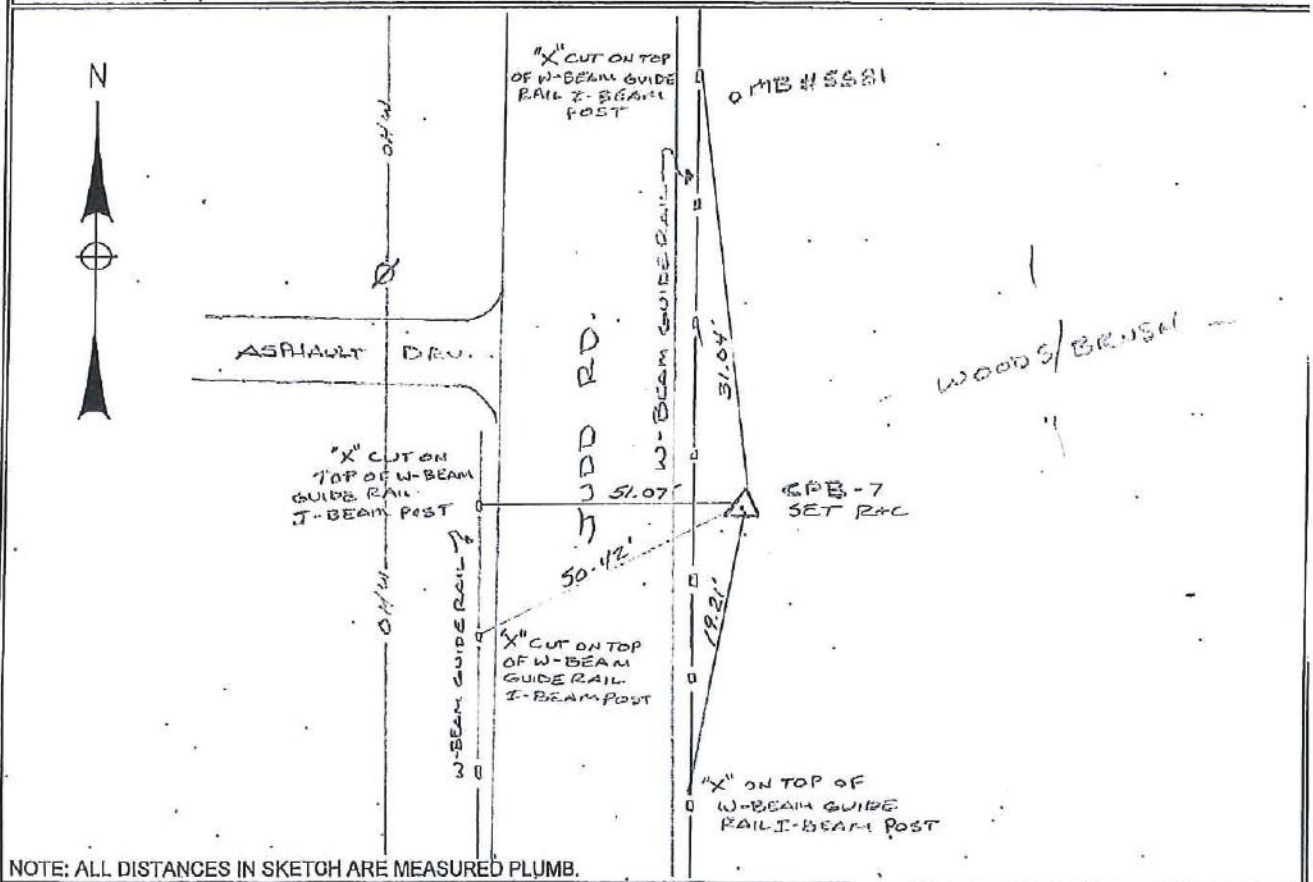
ORDER OF SURVEY: \_\_\_\_\_

NY CENTRAL ZONE, 3102

STATE PLANE COORDINATE SYSTEM

CITY OR TOWN, COUNTY	NAME OF STATION	YEAR
WHITESBORO, ONEIDA	CP No. 7	2016
N(Y) = <u>1143991.6359</u> (GRID)	DISTANCES AND DIRECTIONS TO REFERENCE MARKS AND PROMINENT OBJECTS OBSERVED AT STATION	
E(X) = <u>1150986.1134</u> (GRID)	OBJECT	GRID DISTANCE (METER)
VERTICAL DATUM: <u>NAD 83</u>		GRID BEARING
ELEVATION (MEAS.): <u>476.8522</u>		
COMBINED FACTOR <u>1.00004446</u>		
ESTABLISHED BY: <u>MAH</u> YEAR <u>2016</u>		
FOIT-ALBERT ASSOCIATES		

DESCRIPTION: SET P+C EAST SIDE OF JUDD RD. 2000' + OR - 1-90 BRIDGE  
ACROSS THE STREET FROM HSE # 5581



CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_



# FOIT-ALBERT ASSOCIATES CONTROL SURVEY DATA

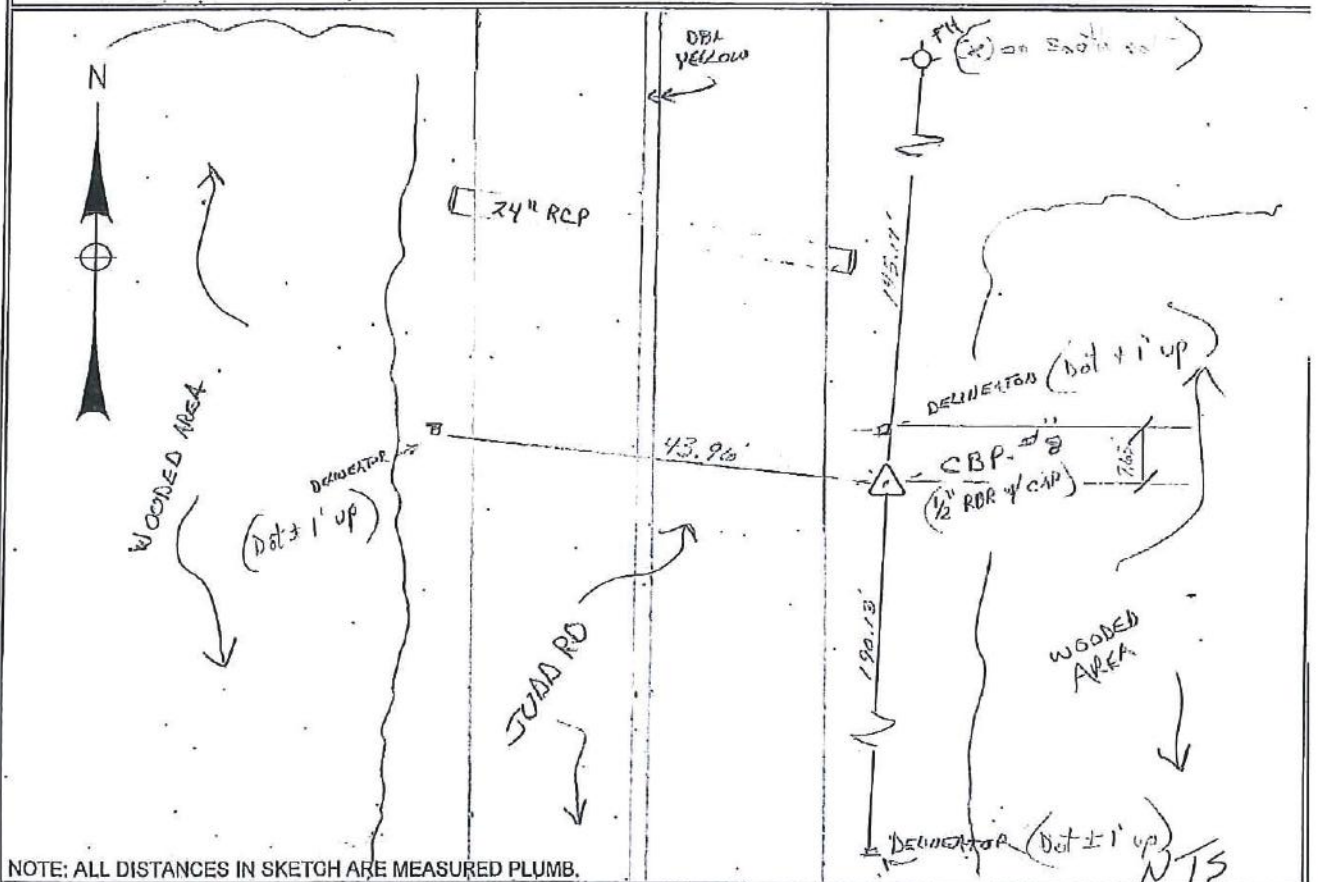
PROJECT - ASSIGNMENT #9  
P.I.N. \_\_\_\_\_

PROJECTION NAD 83  
NY CENTRAL ZONE, 3102

ORDER OF SURVEY: \_\_\_\_\_  
STATE PLANE COORDINATE SYSTEM

CITY OR TOWN, COUNTY	NAME OF STATION	YEAR
WHITESTOWN, ONEIDA	CP No. 8	2016
N(Y) = 1138797.6351 (GRID)	DISTANCES AND DIRECTIONS TO REFERENCE MARKS AND PROMINENT OBJECTS OBSERVED AT STATION	
E(X) = 1151252.0184 (GRID)	OBJECT	GRID DISTANCE (METER)
VERTICAL DATUM: <u>NAVD 88</u>		GRID BEARING
ELEVATION (METER): <u>546.2161</u>		
COMBINED FACTOR <u>1.00004446</u>		
ESTABLISHED BY: <u>JDM</u> YEAR <u>2016</u>		
FOIT-ALBERT ASSOCIATES		

DESCRIPTION: SET  $\frac{1}{2}$ "  $\phi$  RBC @  $\pm 3'$  OFF EAST EDGE PUNT  $\pm$  ' S. of Hydrant  
and  $\pm 2000'$  S. of Bridge



CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

## **TRAVERSE COMPUTATIONS**

## TRAVERSE 1

Process No Adjust Results

Thu Jan 05 09:41:49 2017

Raw File: I:\2016\16001.00 Engineering Survey\16001.30 NYSTA - Four Bridges\Drawings\Surv\Field Files\Site  
Coordinate File: I:\2016\16001.00 Engineering Survey\16001.30 NYSTA - Four Bridges\Drawings\Surv\CRD - Poin  
Scale Factor: 1.00004446  
Correct for Earth Curvature: OFF

#### Closure Results

Starting Point 2GPS: N 1141975.0774 E 1150937.1494 Z 483.0296  
Closing Reference Point 4GPS: N 1143047.6844 E 1150723.6303 Z 483.8835  
Ending Point 4GPS: N 1143047.6431 E 1150723.5529 Z 483.8551  
Azimuth Of Error: 241°54'29"  
North Error : -0.04132  
East Error : -0.07741  
Vertical Error : -0.02839  
Hz Dist Error : 0.08774  
Sl Dist Error : 0.09222  
Traverse Lines : 2  
SideShots : 3  
Store Points : 4  
Horiz Dist Traversed: 1150.5397  
Slope Dist Traversed: 1151.5003  
Closure Precision: 1 in 13112.4

Starting Point 2GPS: N 1141975.0774 E 1150937.1494 Z 483.0296  
Backsight Point 1GPS: N 1142010.2460 E 1152143.5290 Z 501.7608

Point No.	Horizontal Angle	Zenith Angle	Slope Dist	Inst HT	Rod HT	Northing	Easting	Elev
3	AR211.2241	83.5357	148.1560	5.215	4.740	1142048.088	1150809.190	499.2507
CPB ,R&C								
4GPS	AR235.2342	90.5330	1003.294	5.035	4.815	1143047.643	1150723.552	483.8551
CBP ,R&C								

#### Check Points

	Point No.	Northing	Easting	Elevation	Description
Reference	4GPS	1143047.684	1150723.630	483.8835	CBP ,REBAR ALUM CAP
Measure	4GPS	1143047.643	1150723.552	483.8551	CBP ,R&C
Delta		-0.0413	-0.0774	-0.0284	

Horizontal Distance: 0.0877

LN:210,OC:3,SD:1003.294,HA:235.2342,ZA:90.5331,HI:5.035,HR:4.815

	Point No.	Northing	Easting	Elevation	Description
Reference	7GPS	1143991.635	1150986.113	476.8522	CBP ,REBAR ALUM CAP
Measure	7GPS	1143991.560	1150986.164	476.7496	CBP ,R&C
Delta		-0.0755	0.0510	-0.1026	

Horizontal Distance: 0.0911

LN:270,OC:4GPS,SD:979.685,HA:200.2609,ZA:90.2436,HI:5.025,HR:5.150



Process Angle Balance Results

Thu Jan 05 09:43:15 2017

Raw File: I:\2016\16001.00 Engineering Survey\16001.30 NYSTA - Four Bridges\Drawings\Surv\Field Files\Site  
Coordinate File: I:\2016\16001.00 Engineering Survey\16001.30 NYSTA - Four Bridges\Drawings\Surv\CRD - Poin  
Scale Factor: 1.00004446  
Correct for Earth Curvature: OFF

Closure Results (Before Angle Balance)

Starting Point 2GPS: N 1141975.0774 E 1150937.1494 Z 483.0296  
Closing Reference Point 4GPS: N 1143047.6844 E 1150723.6303 Z 483.8835  
Ending Point 4GPS: N 1143047.6431 E 1150723.5529 Z 483.8551  
Azimuth Of Error: 241°54'29"  
North Error : -0.04132  
East Error : -0.07741  
Vertical Error : -0.02839  
Hz Dist Error : 0.08774  
Sl Dist Error : 0.09222  
Traverse Lines : 2  
SideShots : 3  
Store Points : 4  
Horiz Dist Traversed: 1150.5397  
Slope Dist Traversed: 1151.5003  
Closure Precision: 1 in 13112.4

Starting Point 2GPS: N 1141975.0774 E 1150937.1494 Z 483.0296  
Backsight Point 1GPS: N 1142010.2460 E 1152143.5290 Z 501.7608

Point No.	Horizontal Angle	Zenith Angle	Slope Dist	Inst HT	Rod HT	Northing	Easting	Elev
3	AR211.2241	83.5357	148.1560	5.215	4.740	1142048.088	1150809.190	499.2507
CPB ,R&C								
4GPS	AR235.2342	90.5330	1003.294	5.035	4.815	1143047.643	1150723.552	483.8551
CBP ,R&C								

Check Points

	Point No.	Northing	Easting	Elevation	Description
Reference	7GPS	1143991.635	1150986.113	476.8522	CBP ,REBAR ALUM CAP
Measure	7GPS	1143991.540	1150986.011	476.7212	CBP ,R&C
Delta		-0.0957	-0.1023	-0.1310	
Horizontal Distance:		0.1401			
LN:270,OC:4GPS,SD:979.685,HA:200.2609,ZA:90.2436,HI:5.025,HR:5.150					

Angle Balance

Angular Error: -0°00'01.53" for 3 traverse sides  
Adjusting Each Angle: -0°00'00.51"  
Closure Results (After Angle Balance)  
Starting Coordinates : N 1141975.0774 E 1150937.1494 Z 483.0296  
Closing Reference Point 4GPS: N 1143047.6844 E 1150723.6303 Z 483.8835  
Ending Coordinates : N 1143047.6438 E 1150723.5580 Z 483.8551

Azimuth Of Error: 240°41'19"

North Error : -0.04058  
East Error : -0.07227  
Vertical Error : -0.02839  
Hz Dist Error : 0.08288  
Sl Dist Error : 0.08761  
Traverse Lines : 2  
SideShots  
Total Hz Dist Traversed: 1150.53966

Total Sl Dist Traversed: 1151.50027

Closure Precision: 1 in 13881.4

Point No.	Horizontal Angle	Zenith Angle	Slope Dist	Inst HT	Rod HT	Northing	Easting	Elev
3	AR211.2241	83.5357	148.1560	5.215	4.740	1142048.088	1150809.190	499.2507
CPB ,R&C								
4GPS	AR235.2342	90.5330	1003.294	5.035	4.815	1143047.643	1150723.558	483.8551
CBP ,R&C								

#### Check Points

	Point No.	Northing	Easting	Elevation	Description
Reference	7GPS	1143991.635	1150986.113	476.8522	CBP ,REBAR ALUM CAP
Measure	7GPS	1143991.539	1150986.023	476.7212	CBP ,R&C
Delta		-0.0969	-0.0902	-0.1310	
Horizontal Distance: 0.1323					
LN:270,OC:4GPS,SD:979.685,HA:200.2610,ZA:90.2436,HI:5.025,HR:5.150					



Process Compass Results

Thu Jan 05 09:44:43 2017

Raw File: I:\2016\16001.00 Engineering Survey\16001.30 NYSTA - Four Bridges\Drawings\Surv\Field Files\Site  
Coordinate File: I:\2016\16001.00 Engineering Survey\16001.30 NYSTA - Four Bridges\Drawings\Surv\CRD - Poin  
Scale Factor: 1.00004446  
Correct for Earth Curvature: OFF  
Backsight Point 1GPS: N 1142010.2460 E 1152143.5290 Z 501.7608

Check Points

	Point No.	Northing	Easting	Elevation	Description
Reference	7GPS	1143991.635	1150986.113	476.8522	CBP ,REBAR ALUM CAP
Measure	7GPS	1143991.560	1150986.164	476.7496	CBP ,R&C
Delta		-0.0755	0.0510	-0.1026	
Horizontal Distance: 0.0911					
LN:270,OC:4GPS,SD:979.685,HA:200.2609,ZA:90.2436,HI:5.025,HR:5.150					

Adjusted Elevation Comparison

Point#	Original Z	Adjusted Z	Delta Z
3	499.251	499.251	0.000
4GPS	483.884	483.884	0.000

Compass Closure

Adjusted Point Comparison

Point#	Original		Adjusted		Dist	Bearing
	Northing	Easting	Northing	Easting		
3	1142048.088	1150809.191	1142048.088	1150809.191	0.000	N 90°00'00" E
4GPS	1143047.684	1150723.630	1143047.684	1150723.630	0.000	N 90°00'00" E

Point No.	Horizontal Angle	Zenith Angle	Slope Dist	Inst HT	Rod HT	Northing	Easting	Elev
3	AR211.2241	83.5357	148.1618	5.215	4.740	1142048.088	1150809.190	499.2507
CPB ,R&C								
4GPS	AR235.2358	90.5330	1003.372	5.035	4.815	1143047.684	1150723.630	483.8835
CBP ,R&C								

Check Points

	Point No.	Northing	Easting	Elevation	Description
Reference	7GPS	1143991.635	1150986.113	476.8522	CBP ,REBAR ALUM CAP
Measure	7GPS	1143991.560	1150986.164	476.7496	CBP ,R&C
Delta		-0.0755	0.0510	-0.1026	
Horizontal Distance: 0.0911					
LN:270,OC:4GPS,SD:979.685,HA:200.2609,ZA:90.2436,HI:5.025,HR:5.150					

## **TRAVERSE 2**

Process No Adjust Results

Thu Jan 05 10:04:56 2017

Raw File: I:\2016\16001.00 Engineering Survey\16001.30 NYSTA - Four Bridges\Drawings\Surv\Field Files\Site  
Coordinate File: I:\2016\16001.00 Engineering Survey\16001.30 NYSTA - Four Bridges\Drawings\Surv\CRD - Poin  
Scale Factor: 1.00004446  
Correct for Earth Curvature: OFF

Closure Results

Starting Point 2GPS: N 1141975.0774 E 1150937.1494 Z 483.0300  
Closing Reference Point 6GPS: N 1140803.6370 E 1151057.0122 Z 508.1434  
Ending Point 6GPS: N 1140803.5859 E 1151056.9999 Z 508.1120  
Azimuth Of Error: 193°33'11"  
North Error : -0.05110  
East Error : -0.01232  
Vertical Error : -0.03138  
Hz Dist Error : 0.05256  
Sl Dist Error : 0.06122  
Traverse Lines : 2  
SideShots : 1  
Store Points : 4  
Horiz Dist Traversed: 1201.5120  
Slope Dist Traversed: 1202.4509  
Closure Precision: 1 in 22859.3

Starting Point 2GPS: N 1141975.0774 E 1150937.1494 Z 483.0296  
Backsight Point 1GPS: N 1142010.2460 E 1152143.5290 Z 501.7608

Point No.	Horizontal Angle	Zenith Angle	Slope Dist	Inst HT	Rod HT	Northing	Easting	Elev
5	AR110.1458	84.4434	220.9130	5.285	4.820	1141766.547	1150867.054	503.7375
CBP ,R&C								
6GPS	AR150.1543	89.4451	981.4780	5.020	4.970	1140803.585	1151056.999	508.1120
CPB ,R&C								

Check Points

	Point No.	Northing	Easting	Elevation	Description
Reference	6GPS	1140803.637	1151057.012	508.1434	CBP,REBAR ALUM CAP
Measure	6GPS	1140803.585	1151056.999	508.1120	CPB ,R&C
Delta		-0.0511	-0.0123	-0.0314	

Horizontal Distance: 0.0526

LN:115,OC:5,SD:981.478,HA:150.1543,ZA:89.4451,HI:5.020,HR:4.970

Reference	8GPS	1139797.635	1151252.018	546.2161	CBP,REBAR ALUM CAP
Measure	8GPS	1139797.687	1151251.984	546.2298	CBP ,R&C
Delta		0.0527	-0.0335	0.0137	

Horizontal Distance: 0.0624

LN:175,OC:6GPS,SD:1025.360,HA:180.1121,ZA:87.5219,HI:5.110,HR:5.100



Process Angle Balance Results

Thu Jan 05 10:06:31 2017

Raw File: I:\2016\16001.00 Engineering Survey\16001.30 NYSTA - Four Bridges\Drawings\Surv\Field Files\Site  
Coordinate File: I:\2016\16001.00 Engineering Survey\16001.30 NYSTA - Four Bridges\Drawings\Surv\CRD - Poin  
Scale Factor: 1.00004446  
Correct for Earth Curvature: OFF

Closure Results (Before Angle Balance)

Starting Point 2GPS: N 1141975.0774 E 1150937.1494 Z 483.0300  
Closing Reference Point 6GPS: N 1140803.6370 E 1151057.0122 Z 508.1434  
Ending Point 6GPS: N 1140803.5859 E 1151056.9999 Z 508.1120  
Azimuth Of Error: 193°33'11"  
North Error : -0.05110  
East Error : -0.01232  
Vertical Error : -0.03138  
Hz Dist Error : 0.05256  
Sl Dist Error : 0.06122  
Traverse Lines : 2  
SideShots : 1  
Store Points : 4  
Horiz Dist Traversed: 1201.5120  
Slope Dist Traversed: 1202.4509  
Closure Precision: 1 in 22859.3

Starting Point 2GPS: N 1141975.0774 E 1150937.1494 Z 483.0296  
Backsight Point 1GPS: N 1142010.2460 E 1152143.5290 Z 501.7608

Point No.	Horizontal Angle	Zenith Angle	Slope Dist	Inst HT	Rod HT	Northing	Easting	Elev
5	AR110.1458	84.4434	220.9130	5.285	4.820	1141766.547	1150867.054	503.7375
CBP ,R&C								
6GPS	AR150.1543	89.4451	981.4780	5.020	4.970	1140803.585	1151056.999	508.1120
CPB ,R&C								

Check Points

	Point No.	Northing	Easting	Elevation	Description
Reference	8GPS	1139797.635	1151252.018	546.2161	CBP,REBAR ALUM CAP
Measure	8GPS	1139797.610	1151251.983	546.1984	CBP ,R&C
Delta		-0.0250	-0.0348	-0.0177	
Horizontal Distance: 0.0429					
LN:175,OC:6GPS,SD:1025.360,HA:180.1121,ZA:87.5219,HI:5.110,HR:5.100					

Angle Balance

Angular Error: 0°00'03.30" for 3 traverse sides  
Adjusting Each Angle: 0°00'01.10"  
Closure Results (After Angle Balance)  
Starting Coordinates : N 1141975.0774 E 1150937.1494 Z 483.0300  
Closing Reference Point 6GPS: N 1140803.6370 E 1151057.0122 Z 508.1434  
Ending Coordinates : N 1140803.6370 E 1151057.0122 Z 508.1434

Azimuth Of Error: 90°00'00"

North Error : 0.00000  
East Error : 0.00000  
Vertical Error : 0.00000  
Hz Dist Error : 0.00000  
Sl Dist Error : 0.00000  
Traverse Lines : 2  
SideShots  
Total Hz Dist Traversed: 1201.51199

Total Sl Dist Traversed: 1202.45088

Closure Precision: 1 in 9999999

Point No.	Horizontal Angle	Zenith Angle	Slope Dist	Inst HT	Rod HT	Northing	Easting	Elev
5	AR110.1457	84.4434	220.9130	5.285	4.820	1141766.547	1150867.055	503.7375
CBP ,R&C								
6GPS	AR150.1542	89.4451	981.4780	5.020	4.970	1140803.587	1151057.011	508.1120
CPB ,R&C								

#### Check Points

	Point No.	Northing	Easting	Elevation	Description
Reference	8GPS	1139797.635	1151252.018	546.2161	CBP,REBAR ALUM CAP
Measure	8GPS	1139797.666	1151252.022	546.2298	CBP ,R&C
Delta		0.0313	0.0043	0.0137	
Horizontal Distance: 0.0316					
LN:175,OC:6GPS,SD:1025.360,HA:180.1120,ZA:87.5219,HI:5.110,HR:5.100					

Process Compass Results

Thu Jan 05 10:07:12 2017

Raw File: I:\2016\16001.00 Engineering Survey\16001.30 NYSTA - Four Bridges\Drawings\Surv\Field Files\Site  
Coordinate File: I:\2016\16001.00 Engineering Survey\16001.30 NYSTA - Four Bridges\Drawings\Surv\CRD - Poin  
Scale Factor: 1.00004446  
Correct for Earth Curvature: OFF  
Backsight Point 1GPS: N 1142010.2460 E 1152143.5290 Z 501.7608

Check Points

	Point No.	Northing	Easting	Elevation	Description
Reference	8GPS	1139797.635	1151252.018	546.2161	CBP,REBAR ALUM CAP
Measure	8GPS	1139797.665	1151252.018	546.2298	CBP ,R&C
Delta		0.0304	0.0000	0.0137	

Horizontal Distance: 0.0304

LN:175,OC:6GPS,SD:1025.360,HA:180.1121,ZA:87.5219,HI:5.110,HR:5.100

Adjusted Elevation Comparison

Point#	Original Z	Adjusted Z	Delta Z
5	503.737	503.737	0.000
6GPS	508.143	508.143	0.000

Compass Closure

Adjusted Point Comparison

Point#	Original		Adjusted		Dist	Bearing
	Northing	Easting	Northing	Easting		
5	1141766.548	1150867.054	1141766.548	1150867.054	0.000	N 90°00'00" E
6GPS	1140803.637	1151057.012	1140803.637	1151057.012	0.000	N 90°00'00" E

Point No.	Horizontal Angle	Zenith Angle	Slope Dist	Inst HT	Rod HT	Northing	Easting	Elev
5	AR110.1458	84.4434	220.9247	5.285	4.820	1141766.547	1150867.054	503.7375
CBP ,R&C								
6GPS	AR150.1539	89.4451	981.4785	5.020	4.970	1140803.637	1151057.012	508.1434
CPB ,R&C								

Check Points

	Point No.	Northing	Easting	Elevation	Description
Reference	8GPS	1139797.635	1151252.018	546.2161	CBP,REBAR ALUM CAP
Measure	8GPS	1139797.665	1151252.018	546.2298	CBP ,R&C
Delta		0.0304	0.0000	0.0137	

Horizontal Distance: 0.0304

LN:175,OC:6GPS,SD:1025.360,HA:180.1121,ZA:87.5219,HI:5.110,HR:5.100

## **FIELD NOTES FOR TRAVERSE**



# FOIT-ALBERT ASSOCIATES

PROJECT 16001.30 SITE 1 P.C. MM WEATHER: 30°F  
 P.I.N. \_\_\_\_\_ CREW: INST. JD  
 DATE 12-28-16 ROD \_\_\_\_\_ SHEET: \_\_\_\_\_ OF \_\_\_\_\_  
12-29-16

V, H COLLIMATION  
 DONE 12-28-16  
 RAW DATA FILE: 1600130SITE1STF  
 CONTROL FILE: TRAV-1  
 START POINT: 3, 3A, 4, 7

POINT NO.	COMMENT
<u>ROBOT SURVEY</u>	
T: 28°F P: 30.09"	<div> <div> <i>TI @ GPS 2</i>  <i>HI = 5.215</i>  <i>ΔH = 0.006</i> </div> <div> <i>BS @ GPS 1</i>  <i>HT = 5.240</i>  <i>ΔV = 0.029</i> </div> </div>
CBP 3	HT = 4.740' 0.0 mm
CBP 2A	HT = 5.00' ±10 mm
12-29-16	
T: 30°F P: 30.09"	<div> <div> <i>TI @ CBP 3</i>  <i>HI = 5.035</i>  <i>ΔH = 0.003</i> </div> <div> <i>BS @ GPS 2</i>  <i>HT = 4.690</i>  <i>ΔV = 0.015</i> </div> </div>
GPS 4	HT = 4.815' 0.0 mm
T: 30°F P: 30.09"	<div> <div> <i>TI @ GPS 4</i>  <i>HI = 5.025</i>  <i>ΔH = 0.001</i> </div> <div> <i>BS @ CBP 3</i>  <i>HT = 4.800</i>  <i>ΔV = -0.054</i> </div> </div>
GPS 7	HT = 5.150' 0.0 mm



# FOIT-ALBERT ASSOCIATES

PROJECT 16001.30 SITE 1  
 P.I.N. \_\_\_\_\_  
 DATE 12-28-16  
12-29-16

P.C. MM WEATHER: 28° SNOW  
 CREW: INST. SD  
 ROD \_\_\_\_\_ SHEET: \_\_\_\_\_ OF \_\_\_\_\_

RAW DATA FILE: 1600130SITE1S76  
 CONTROL FILE: TRAV 2  
 START POINT: 5, 6, 8

POINT NO.	COMMENT
	<u>ROBOT SURVEY</u>
T: 28°F P: 30.09"	<div> <div>           T @ GPS 2            HI = 5.285'            ΔH = 0.073         </div> <div>           BS @ GPS 1            HT = 5.015'            ΔV = 0.005         </div> </div>
CBP 5	HT = 4.820' 0.0 mm
T: 28°F P: 30.09"	<div> <div>           T @ CBP 5            HI = 5.020            ΔH = -0.007         </div> <div>           BS @ GPS 2            HT = 5.115'            ΔV = -0.027'         </div> </div>
GPS 6	HT = 4.970' 0.0 mm
T: 26°F P: 30.09"	<div> <div>           T @ GPS 6            HI = 5.110'            ΔH = 0.006         </div> <div>           BS @ CBP 5            HT = 6.370'            ΔV = -0.073         </div> </div>
GPS 8	HT = 5.100' 0.0 mm

## VERTICAL CONTROL

D214386  
New York State Thruway Authority  
Design Phase I-IV, Replacement of 8 Syracuse Division Bridges  
Judd Road Bridge over Mainline (BIN 5512790)  
Mile Post 240.48 in the Syracuse Division  
Oneida County

**VERTICAL CONTROL NARRATIVE**

The primary vertical control for the project was established by static GPS methods and distributed throughout project by differential leveling methods. An elevation of 501.7608' on CBP 1 was used and applied to control points and benchmarks set around the project area. Benchmarks CPBM1 through CPBM4, CPBM7, CPBM8 were all set and leveled through using differential leveling methods.

**Control Recovered:**

N/A

**Control Not Recovered:**

N/A

**Vertical Datum:**

North American Vertical Datum 1988.

**Closure and Adjustment:**

The first level loop began at CBP 1, a set rebar and aluminum cap, and ran through CBP 2, set rebar and aluminum cap and CPBM 2, a set L-cut on a concrete jersey barrier corner then closing on CBP 1.

The total length of the first level run was 0.459 miles with a misclosure of -0.001 ft. Using the formula  $0.03 \times \text{the square root of } K$ , the allowable error was  $\pm 0.020$  ft and the actual misclosure was 0.001 ft. The misclosure was within tolerance and the level run was then adjusted by distributing the error equally to all the turning points.

The second level loop began at CPBM 2, a set L-cut on a concrete jersey barrier, and ran from CPBM 3, set L-cut on a concrete jersey barrier



through CPBM 1, a set L-cut on the northeast concrete bridge abutment wall then closing back on CPBM 2.

The total length of the second level run was 0.224 miles with a misclosure of -0.007 ft. Using the formula  $0.03 \times \text{the square root of } K$ , the allowable error was  $\pm 0.014$  ft and the actual misclosure was 0.007 ft. The misclosure was within tolerance and the level run was then adjusted by distributing the error equally to all the turning points.

The third level loop began at CPBM 1, a set L-cut on the northeast concrete bridge abutment wall, then ran through CBP 4, a set rebar and cap, then continuing through CPBM 7, a set X-cut in the top of a W-beam guide rail post to close back on CPBM 1.

The total length of the third level run was 0.588 miles with a misclosure of +0.008 ft. Using the formula  $0.03 \times \text{the square root of } K$ , the allowable error was  $\pm 0.023$  ft and the actual misclosure was 0.008 ft. The misclosure was within tolerance and the level run was then adjusted by distributing the error equally to all the turning points.

The fourth and final level loop began at CPBM 4, a set L-cut on the southeast concrete bridge abutment wall, then ran through CBP 6, a set rebar and cap continuing through CPBM 8, a set mag nail in a utility pole then continuing to close back on CPBM 4.

The total length of the fourth level run was 0.575 miles with a misclosure of -0.007 ft. Using the formula  $0.03 \times \text{the square root of } K$ , the allowable error was  $\pm 0.023$  ft and the actual misclosure was 0.007 ft. The misclosure was within tolerance and the level run was then adjusted by distributing the error equally to all the turning points.



## **BENCHMARK LIST**

# Survey Fieldbook Benchmark List Report

Report Created: 2/21/2017  
Time: 8:28am

**Fieldbook:** 1600130 Site 1

**Slope Distance Scale Factor:** 1.000000000000

**Note:** All units in this report are in feet unless specified otherwise.

Name	Northing	Easting	Elevation	Description	STA O/S
CPBM1	1142011.0610	1150816.5248	500.888	L-CUT ON CONC ABUTMENT WALL	J STA 33+48.79, OS 28.53 L
CPBM2	1141962.9545	1150873.4123	486.544	L-CUT ON CONCRETE JERSEY BARRIER	J STA 31+94.38, OS 56.54 L
CPBM3	1141843.4044	1150848.0966	486.055	L-CUT ON CONCRETE JERSEY BARRIER	J STA 30+73.01, OS 42.46 L
CPBM4	1141783.7108	1150860.8110	505.078	L-CUT ON CONCRETE ABUTMENT WALL	J STA 30+20.48, OS 11.39 L
CPBM7	1143524.7860	1150869.0856	483.007	X-CUT ON TOP OF W- BEAM GRP	J STA 48+75.38, OS 12.33 R
CPBM8	1140410.6405	1151145.6548	515.9403	MAG NAIL SET IN UTP / NM5	J STA 16+22.04, OS 12.24 R

## **HORIZONTAL CONTROL POINT ELEVATION LIST**

# Survey Fieldbook Coordinate List Report

Report Created: 2/21/2017  
Time: 8:28am

**Fieldbook:** 1600130 Site 1

**Slope Distance Scale Factor:** 1.000000000000

**Note:** All units in this report are in feet unless specified otherwise.

Number	Northing	Easting	Elevation	Code	Description	STA
<b>1GPS</b>	1142010.2460	1152143.5290	501.7608	CBP	REBAR ALUM CAP	ML STA 22+06.89
<b>2GPS</b>	1141975.0774	1150937.1494	483.0513	CBP	REBAR ALUM CAP	ML STA 10+00.00 J STA 32+26.20
<b>2A</b>	1141979.2509	1150760.5940	488.1228	CBS	REBAR AND CAP	
<b>3</b>	1142048.0880	1150809.1906	499.2507	CBP	REBAR AND CAP	J STA 33+73.52
<b>3A</b>	1142552.9085	1150690.6556	488.0586	CBS	REBAR AND CAP	
<b>4GPS</b>	1143047.6844	1150723.6303	483.8835	CBP	REBAR ALUM CAP	J STA 43+76.77
<b>5</b>	1141766.5477	1150867.0542	503.7375	CBP	REBAR AND CAP	J STA 30+06.20
<b>6GPS</b>	1140803.6370	1151057.0122	508.1434	CBP	REBAR ALUM CAP	J STA 20+24.73
<b>7GPS</b>	1143991.6359	1150986.1134	476.8522	CBP	REBAR AND CAP	J STA 53+56.54
<b>8GPS</b>	1139797.6351	1151252.0184	546.2161	CBP	REBAR AND CAP	J STA 10+00.00



**LEVEL LOOP NO. 1**

LOOP 1

# FOIT-ALBERT ASSOCIATES

PROJECT P.I.N.	16001.30 SITE 1	DATUM NAD83	UNITS FT	INSTRUMENT: SERIAL NO.: 333205	DATE 11-1-16	WEATHER CLOUDY	P.C. 53	INST. Mm	ROD	SHEET / OF 2
TURN	3 WIRE BS	BS (+)	HI	3 WIRE FS	FS (-)	ELEV.	ADJ. ELEV.	DESCRIPTION	DISTANCE +	-
	4.825 3.910 3.030	3.930	505.6908			501.7608		CBP 1 REBAR WITH ALUMINUM CAP	179.5'	
TP 1				7.810 7.075 6.330	7.075	498.6158	498.6159		150.0'	198.0'
	2.760 2.010 1.260	2.010	500.6208							
TP 2				7.560 6.840 6.115	6.840	493.7858	493.7861			149.5'
	3.580 2.860 2.130	2.860	496.6858						145.0'	
TP 3				6.635 5.895 5.150	4.895	491.7508	491.7512			148.5'
	7.470 0.880 0.280	0.880	492.6508						119.0'	
TP 4				10.445 9.580 8.760	9.580	483.0508	483.0513	CBP 2 REBAR AND ALUMINUM CAP		176.5'
SS				7.270 6.070 4.870	6.070	486.5608		CBPM 2 L-CUT ON CONC TENSION BRACKET		
	10.600 9.710 8.840	9.720	492.7708						176.0'	
TP 5										118.5'
	5.770 5.020 4.265	5.020	496.7808						150.5'	

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**LEVEL LOOP NO. 2**



# FOIT-ALBERT ASSOCIATES

LOOP 2

PROJECT P.I.N.	160001.30 SITE 1	DATUM NAD83	UNITS FT	INSTRUMENT: LEICA DNA 03 SERIAL NO.:	DATE 11-1-16	WEATHER CLOUDY	P.C. 60'S	INST. MM	ROD	SHEET 1 OF 2
TURN	3 WIRE BS	BS (+)	HI	3 WIRE FS	FS (-)	ELEV.	ADJ. ELEV.	DESCRIPTION	DISTANCE +	-
	3.310	2.940	489.5008			486.5608		CPBM 2 L-CUT ON CONC TERSEY BARRIER	74.5'	
TP1	2.965			3.930	3.410	486.0903	486.0917	CPBM 3 L-CUT ON CONC TERSEY BARRIER		104.0'
	12.060	11.750	497.8408						61.5'	
	11.750									
TP2	11.445			2.065	1.795	496.6458	496.0476			53.5'
				1.795						
				1.530						
	13.680	12.330	509.3758						56.0'	
	13.330									
TP3	13.050			4.670	4.280	505.0458	505.0984	CPBM 4 L-CUT ON CONC BRIDGE ABUTMENT		78.0'
				3.280						
				2.890						
	2.770	1.665	506.7608						221.0'	
	1.665									
	0.560									
TP4				7.980	7.365	499.3958	499.3993			123.0'
				7.365						
				6.750						
	5.125		504.1808						68.0'	
	4.785									
TP5	4.445			3.965		500.4158	500.4202	CPBM 1 L-CUT ON CONC BRIDGE ABUTMENT		44.0'
				3.265						
				3.045						
	1.795		502.4858						44.5'	
	1.570									
	1.350									
TP6				11.130		491.5958	491.6011			48.0'
				0.870						
				0.650						

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# FOIT-ALBERT ASSOCIATES

PROJECT P.I.N.	160071.30 SITE 1	DATUM NAD88	UNITS FT	INSTRUMENT: LEICA DNA 03 SERIAL NO.: 333205	DATE 11-1-16	WEATHER CLOUDY	P.C. 60.5	INST. M.M.	ROD	SHEET 2 OF 2
TURN	3 WIRE BS	BS (+)	HI	3 WIRE FS	FS (-)	ELEV.	ADJ. ELEV.	DESCRIPTION	DISTANCE +	-
TP7	3.770	3.590	495.1058						36.0	
	3.590									
	3.410									
TP8				14.020		481.4958	481.5019			67.0
				13.690	13.690					
				13.350						
TP8	7.305	7.120	488.6158						52.5	
	7.120									
	6.860									
TP8				2.320		486.5538	486.5608	OPBM 2 L-CUT ON CORNER JERSEY BARRIER		51.5
				2.062	2.062					
				1.805		-486.5608			61.4 =	56.9 118.3
TP8						-0.007	8	8 TURNS = + 0.000875	TURN	
TP8		ACTUAL MISCL. SURF.				0.007				0.2241
TP8		ALLOWABLE MISCL. SURF.				0.03	0.03			
TP8						0.0142	0.0142	0.007		

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LOOP 3

# FOIT-ALBERT ASSOCIATES

PROJECT 16001.30 P.I.N. SITES 10000.00			DATUM NAVD83	UNITS FT	INSTRUMENT: LEICA DNA 03 SERIAL NO.: 333205		DATE 1-4-17	WEATHER 30° FAIR	P.C. mm	INST. JC	ROD	SHEET 1 OF 3
TURN	3 WIRE BS	BS (+)	HI	3 WIRE FS	FS (-)	ELEV.	ADJ. ELEV.	DESCRIPTION	DISTANCE +			
12-1	1.735	1.105	502.0252			500.9202		C.PEN. 1 "I" ON CONC ABUTMENT WALL	134.5			
	1.105											
	0.440											
12-2				1.350	7.070	494.9552	494.9552		1			156.0
				1.070								
				1.350								
12-3	1.450	0.350	495.1152			487.7652	487.7652		120.0			
	0.850		491.1552			483.7252	483.7252					
	0.250											
12-4				1.450	3.110	487.7652	487.7652		154.0			
				3.550								
12-5	4.705	4.052	487.7652			483.7252	483.7252		35.5			
	4.052		483.7252			483.7252	483.7252					
	3.840											
12-6				5.611	5.001	483.7252	483.7252	C.B.P. - 4A B+C				
				5.261								
				1.912								
12-7	4.800	4.070	487.7652			483.7252	483.7252		104.1			
	4.070		483.7252			483.7252	483.7252					
	3.340											
12-8				1.10	6.085	481.6679	481.6679					
				0.85								
				0.85								
12-9	5.071	4.560	486.2312			483.7252	483.7252		98.0			
	4.560		483.7252			483.7252	483.7252					
	4.030											
12-10				0.710	3.220	483.7252	483.7252	C.B.P. - 7A B+C - 7th OF 10-0000				
				3.210								
				0.720								

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# FOIT-ALBERT ASSOCIATES

PROJECT 16001.30 P.I.N. SITE 1 JUDD RD.										DATUM NAD83		UNITS FT		INSTRUMENT: LEICA DINA 03 SERIAL NO.: 333205		DATE 1-17-17		WEATHER 30° B.W.		P.C. 0.00		INST. 5" C		ROD		SHEET 7 OF 3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
TURN	3 WIRE BS	BS (+)	HI	3 WIRE FS	FS (-)	ELEV.	ADJ. ELEV.	DESCRIPTION														DISTANCE +																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
1P-1	3.610	3.119	482.320					482.8655	483.7202	2.300	482.8702														98.5	114.7																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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**LEVEL LOOP NO. 4**

LOOP 4

# FOIT-ALBERT ASSOCIATES

PROJECT / 6001.30 P.I.N. SITE 1 SUDO RD.			DATUM NAVD. 83	UNITS FT	INSTRUMENT: LEICA DNA 03 SERIAL NO.: 333205		DATE 7-24-17	WEATHER 20° C, 11° F	P.C. 1111.1	INST. JC	ROD	SHEET 1 OF 2
TURN	3 WIRE BS	BS (+)	HI	3 WIRE FS	FS (-)	ELEV.	ADJ. ELEV.	DESCRIPTION		DISTANCE		
	4.960	4.180	505.2724			505.0984		OPEN-4" CUT ON CONC ABUTMENT WALL				
	4.180											
	3.900											
AP. 1				5.130			504.8880					
				5.130								
				5.130								
	6.836	6.060	505.9304									
	6.060											
	5.290											
AP. 2				5.130			505.0330					
				5.130								
				5.130								
	8.170	7.416	505.9904									
	7.416											
	6.770											
AP. 3				5.130			508.1457					
				5.130								
				5.130								
	7.808	7.320	505.9904									
	7.320											
	6.750											
AP. 4				5.130			513.4445					
				5.130								
				5.130								
	8.170	7.416	505.9904									
	7.416											
	6.770											
AP. 5				5.130			515.9403					
				5.130								
				5.130								
	8.170	7.416	505.9904									
	7.416											
	6.770											
AP. 6				5.130			508.1410					
				5.130								
				5.130								

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53

500



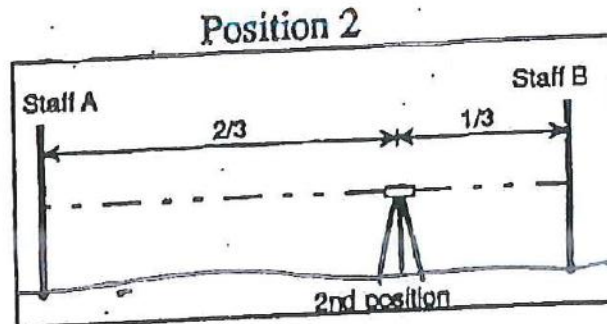
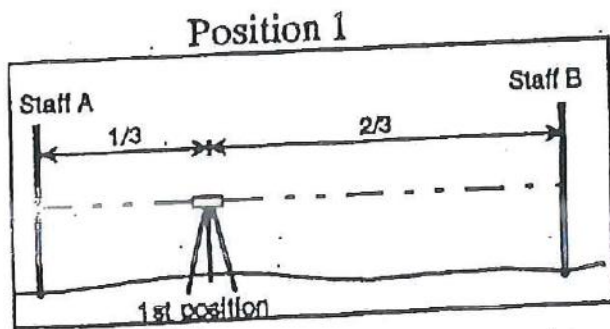
## **PEG TESTS**



**Foit-Albert Associates**  
Architecture, Engineering and Surveying, P.C.

OB 16001.30 SITE 1 Judd Rd  
SHEET NO. 1 OF 1

CALCULATED BY JS DATE 11-1-16  
CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
SCALE \_\_\_\_\_



1ST SET-UP

A 4.165

B 4.809

$\Delta$  ELEV -0.644 ( $A' - B'$ )

DIFF 0 ✓

$\Delta$  COLLIMATION \_\_\_\_\_

ABSOLUTE COLLIMATION \_\_\_\_\_

2ND SET-UP

B 4.579

A 3.935

$\Delta$  ELEV -0.644 ( $B^2 - A^2$ )

CALCULATED ROD READING FOR CHECK @ A2 \_\_\_\_\_

ACTUAL ROD READING @ A2 (AFTER ELECTRONIC CALIBRATION) \_\_\_\_\_

DATE: 11-1-16

INST.: LEICA DNA03

P.L.: JS

PROJECT: 16001.30

Per. No.: \_\_\_\_\_

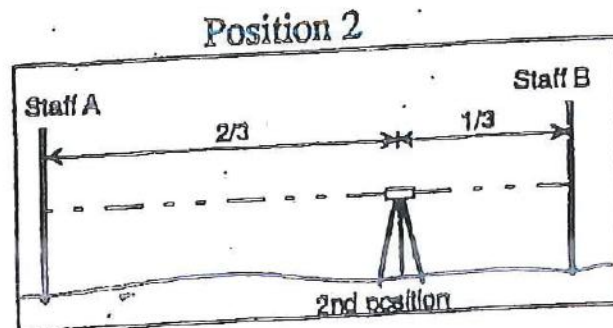
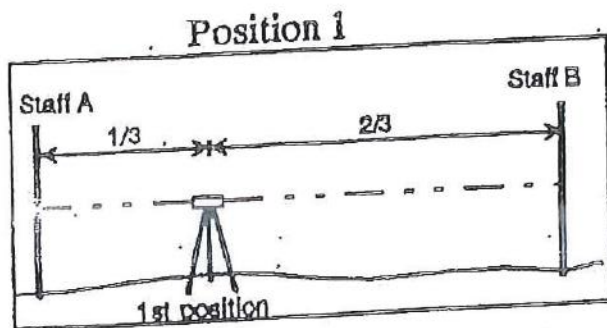
$\pi$ : MM



Foit-Albert Associates  
Architecture, Engineering and Surveying, P.C.

DB 16001.30 SITE 1 JUDD RD  
SHEET NO. 1 OF 1

CALCULATED BY MM, JC DATE 1-4-17  
CHECKED BY 35° PAIN DATE \_\_\_\_\_  
SCALE \_\_\_\_\_



1ST SET-UP

A 5.024

B 5.421

2ND SET-UP

B 5.330

A 5.005

$\Delta$  ELEV 0.327 ( $A' - B'$ )

$\Delta$  ELEV 0.325 ( $B^2 - A^2$ )

DIFF -0.002 ✓

$\Delta$  COLLIMATION \_\_\_\_\_  
ABSOLUTE COLLIMATION \_\_\_\_\_

CALCULATED ROD READING FOR CHECK @ A2 \_\_\_\_\_

ACTUAL ROD READING @ A2 (AFTER ELECTRONIC CALIBRATION) \_\_\_\_\_

DATE: 1-4-17

INST.: \_\_\_\_\_

P.R.: \_\_\_\_\_

PROJECT: 16001.30 SITE 1 JUDD RD, PER. 16.

$\pi$ : \_\_\_\_\_

## **EQUIPMENT DATA SHEETS**



# TRIMBLE S6 TOTAL STATION

## KEY FEATURES

Now available with Trimble VISION technology for video robotic control and scene documentation

Powerful and flexible, ready for anything

Trimble DR Plus technology for long range and superior accuracy

Unmatched fast and smooth performance with MagDrive servo technology

Trimble SurePoint accuracy assurance automatically corrects instrument pointing



## POWERFUL AND FLEXIBLE

The Trimble® S6 Total Station provides the power and flexibility required by today's Surveying Professionals. With the industry's most advanced technology and available feature set, the Trimble S6 Total Station will meet the changing needs of your business, allowing your investment to go further.

## TRIMBLE VISION TECHNOLOGY

Now available with optional Trimble VISION™ technology, the Trimble S6 gives you the power to see everything the instrument sees without a trip back to the tripod. Direct your survey with live video images on the controller. Now you are free to capture measurements, to prism or reflectorless surfaces, remotely, and with point-and-click efficiency.

The on-board camera integrates surveyed data with the live scene images, so you can verify the work that you've done before leaving the job site. Calibrated photo documentation provides customers with deliverables they know they can trust.

## TRIMBLE DR PLUS TECHNOLOGY

Trimble DR Plus™ range measurement technology provides extended range of Direct Reflex measurement without a prism to exceptionally long range distances. Hard-to-reach or unsafe targets are no obstacle to the Trimble S6. Trimble DR Plus, combined with MagDrive™, creates unmatched capability for quick and safe measurements, without compromising on accuracy.

## MAGDRIVE SERVO TECHNOLOGY

The Trimble S6 Total Station redefines surveying instrument performance with unsurpassed integration of servos, angle sensors and measurement technology. The instrument's advanced error compensation provides fast, accurate measurement every time. With smooth, silent MagDrive servo motors, the Trimble S6 offers exceptional speed.

## TRIMBLE SUREPOINT ACCURACY ASSURANCE

The Trimble S6 Total Station aims and stays on target through windy weather, vibrations, handling, and sinkage. Trimble SurePoint™ technology enables the Trimble S6 to actively correct for unwanted movement ensuring accurate pointing and measurement every time. Reduce aiming error, avoid costly re-measurement and be confident in your results with Trimble SurePoint.

With its exclusive MultiTrack™ technology and Target ID capabilities, surveyors can choose the type of target, passive or active, that best suits the jobsite conditions and be confident that they will find and lock to the correct target.

## ELIMINATE SEARCH TIME WITH GPS SEARCH

With GPS Search the Trimble S6 locks onto a prism in just seconds. Using a consumer grade GPS card with Bluetooth receiver or your survey grade GNSS in a Trimble I.S. rover configuration, GPS Search uses GPS positioning at the robotic rod to locate or reacquire targets rapidly. With GPS Search, waiting for target search becomes a thing of the past.

## INTEGRATED SURVEYING

Put the equipment in your truck or van to the best possible use by combining your GNSS with your robotic rod into a Trimble I.S. Rover™. In clear sky, enjoy the high productivity of GNSS measurements. In obstructed areas, Trimble Access seamlessly switches to optical measurements. Or collect both GNSS and optical data simultaneously for redundant results. With the Trimble I.S. Rover, you have the freedom to use the best tool for the jobsite conditions, optimizing your productivity.



# TRIMBLE S6 DR PLUS

## PERFORMANCE

### Angle measurement

Sensor type ..... Absolute encoder with diametrical reading  
Accuracy (Standard deviation based on DIN 18723) ..... .2" (0.6 mgon)  
3" (1.0 mgon), or 5" (1.5 mgon)  
Angle Display (least count) ..... 0.1" (0.01 mgon)

### Automatic level compensator

Type ..... Centered dual-axis  
Accuracy ..... 0.5" (0.15 mgon)  
Range .....  $\pm 5.4'$  ( $\pm 100$  mgon)

### Distance measurement

#### Accuracy (RMSE)

##### Prism mode

Standard ..... 2 mm + 2 ppm (0.0065 ft + 2 ppm)  
Standard deviation according to ISO17123-4 ..... 1 mm + 2 ppm (0.003 ft + 2 ppm)  
Tracking ..... 4 mm + 2 ppm (0.013 ft + 2 ppm)

##### DR mode

Standard ..... 2 mm + 2 ppm (0.0065 ft + 2 ppm)  
Tracking ..... 4 mm + 2 ppm (0.013 ft + 2 ppm)

### Measuring time

#### Prism mode

Standard ..... 1.2 sec  
Tracking ..... 0.4 sec

#### DR mode

Standard ..... 1–5 sec  
Tracking ..... 0.4 sec

### Range

#### Prism mode (under standard clear conditions<sup>1,2</sup>)

1 prism ..... 2500 m (8202 ft)  
1 prism Long Range mode ..... 5500 m (18,044 ft) (max. range)  
Shortest range ..... 0.2 m (0.65 ft)

### DR mode

	Good (Good visibility, low ambient light)	Normal (Normal visibility, moderate sunlight, some heat shimmer)	Difficult (Haze, object in direct sunlight, turbulence)
White card (90% reflective) <sup>3</sup>	1,300 m (4,265 ft)	1,300 m (4,265 ft)	1,200 m (3,937 ft)
Gray card (18% reflective) <sup>3</sup>	600 m (1,969 ft)	600 m (1,969 ft)	550 m (1,804 ft)

Shortest range ..... 1 m (3.28 ft)

### DR Ranges (typically)

Concrete ..... 600 m–800 m (1968–2624 ft)  
Wood construction ..... 400 m–800 m (1312–2624 ft)  
Metal construction ..... 400 m–500 m (1312–1640 ft)  
Light rock ..... 400 m–600 m (1312–1968 ft)  
Dark rock ..... 300 m–400 m (984–1312 ft)  
Reflective foil 20 mm ..... 1000 m (3280 ft)

### DR Extended Range Mode

White Card (90% reflective)<sup>3</sup> ..... 2000 m–2200 m  
Gray Card (18% reflective)<sup>3</sup> ..... 900 m–1000 m  
Accuracy ..... 10 mm + 2 ppm (0.033 ft + 2 ppm)

### Camera

Chip ..... Color Digital Image Sensor  
Resolution ..... 2048 x 1536 pixels  
Focal length ..... 23 mm (0.07 ft)  
Depth of field ..... 3 m to infinity (9.84 ft to infinity)  
Field of view ..... 16.5° x 12.3° (18.3 gon x 13.7 gon)  
Digital zoom ..... 4-step (1x, 2x, 4x, 8x)  
Exposure ..... Automatic  
Brightness ..... User-definable  
Contrast ..... User-definable  
Image storage ..... Up to 2048 x 1536 pixels  
File format ..... JPEG

## GENERAL SPECIFICATIONS

### EDM SPECIFICATIONS

Light source	Pulsed laserdiode 905 nm, Laser class 1
Laser pointer coaxial (standard)	Laser class 2
Beam divergence	
Horizontal	4 cm/100 m (0.13 ft/328 ft)
Vertical	8 cm/100 m (0.26 ft/328 ft)
Atmospheric correction	-130 ppm to 160 ppm continuously

### Leveling

Circular level in tribrach	8 1/2 mm (8'0.007 ft)
----------------------------	-----------------------

Servo system	MagDrive servo technology, integrated servo/angle sensor electromagnetic direct drive
--------------	---

Rotation speed	115 degrees/sec (128 gon/sec)
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Rotation time Face 1 to Face 2	2.6 sec
--------------------------------	---------

Positioning time 180 degrees (200 gon)	2.6 sec
--	---------

Clamps and slow motions	Servo-driven, endless fine adjustment
-------------------------	---------------------------------------

### Centering

Centering system	Trimble 3-pin
------------------	---------------

Optical plummet	Built-in optical plummet
-----------------	--------------------------

Magnification/shortest focusing distance	2.3x/0.5 m-infinity (1.6 ft-infinity)
--	---------------------------------------

### Telescope

Magnification	30x
---------------	-----

Aperture	40 mm (1.57 in)
----------	-----------------

Field of view at 100 m (328 ft)	2.6 m at 100 m (8.5 ft at 328 ft)
---------------------------------	-----------------------------------

Shortest focusing distance	1.5 m (4.92 ft)-infinity
----------------------------	--------------------------

Illuminated crosshair	Variable (10 steps)
-----------------------	---------------------

Tracklight built in	Not available in all models
---------------------	-----------------------------

Operating temperature	-20 °C to +50 °C (-4 °F to +122 °F)
-----------------------	-------------------------------------

Dust and water proofing	IP55
-------------------------	------

Humidity	100% condensing
----------	-----------------

### Power supply

Internal battery	Rechargeable Li-ion battery 11.1 V, 5.0 Ah
------------------	--

#### Operating time<sup>1</sup>

One internal battery	Approx. 6.5 hours
----------------------	-------------------

Three internal batteries in multi-battery adapter	Approx. 20 hours
---	------------------

Robotic holder with one internal battery	13.5 hours
--	------------

#### Operating time for video robotic<sup>4</sup>

One battery	5.5 hours
-------------	-----------

Three batteries in multi-battery adapter	17 hours
--	----------

### Weight

Instrument (servo/Autolock)	5.15 kg (11.35 lb)
-----------------------------	--------------------

Instrument (Robotic)	5.25 kg (11.57 lb)
----------------------	--------------------

Trimble CU controller	0.4 kg (0.88 lb)
-----------------------	------------------

Tribrach	0.7 kg (1.54 lb)
----------	------------------

Internal battery	0.35 kg (0.77 lb)
------------------	-------------------

Trunnion axis height	196 mm (7.71 in)
----------------------	------------------

Communication	USB, Serial, Bluetooth <sup>®</sup> s
---------------	---------------------------------------

Security	Dual-layer password protection; available on some models
----------	--



## TRIMBLE S6 TOTAL STATION

### ROBOTIC SURVEYING

#### Autolock and Robotic Range<sup>2</sup>

Passive prisms ..... 500 m–700 m (1,640–2,297 ft)

Trimble MultiTrack Target ..... 800 m (2,625 ft)

#### Autolock pointing precision at 200 m (656 ft) (Standard deviation)<sup>2</sup>

Passive prisms ..... <2 mm (0.007 ft)

Trimble MultiTrack Target ..... <2 mm (0.007 ft)

Shortest search distance ..... 0.2 m (0.65 ft)

Type of radio internal/external ..... 2.4 GHz frequency-hopping,  
spread-spectrum radios

Search time (typical)<sup>6</sup> ..... 2–10 sec

### GPS SEARCH/GEOLock WITH THE TRIMBLE MULTITRACK TARGET

GPS Search/GeoLock ..... 360 degrees (400 gon) or defined horizontal and  
vertical search window

Solution acquisition time<sup>7</sup> ..... 15–30 sec

Target re-acquisition time ..... <3 sec

Range ..... Autolock & Robotic range limits

1. Standard clear. No haze. Overcast or moderate sunlight with very light heat shimmer.
2. Range and accuracy depend on atmospheric conditions, size of prisms and background radiation.
3. Kodak Gray Card, Catalog Number E1527795.
4. The capacity in –20 °C (–5 °F) is 75% of the capacity at +20 °C (68 °F).
5. Bluetooth type approvals are country specific. Contact your local Trimble Authorized Distribution Partner for more information.
6. Dependent on selected size of search window.
7. Solution acquisition time is dependent upon solution geometry and GPS position quality.

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Specifications subject to change without notice.

**NORTH AMERICA**  
Trimble Navigation Limited  
10368 Westmoor Drive  
Westminster CO 80021  
USA

**EUROPE**  
Trimble Germany GmbH  
Am Prime Parc 11  
65479 Raunheim  
GERMANY

**ASIA-PACIFIC**  
Trimble Navigation  
Singapore Pty Limited  
80 Marine Parade Road  
#22-06, Parkway Parade  
Singapore 449269  
SINGAPORE

TRIMBLE AUTHORIZED DISTRIBUTION PARTNER





# DATASHEET

## TRIMBLE R8 GNSS RECEIVER

### KEY FEATURES

Advanced Trimble R-Track technology

Unmatched GNSS tracking performance

Includes Trimble Maxwell 6 chip with 220 channels

Remote configuration and access

Base and rover communications options to suit any application



The Trimble® R8 GNSS Receiver sets the new standard for full-featured GNSS (Global Navigation Satellite System) receiver technology. This integrated system delivers unmatched power, accuracy and performance in a rugged, compact unit.

#### ADVANCED TRIMBLE R-TRACK TECHNOLOGY

The Trimble R8 GNSS delivers the latest advancements in R-Track™ technology, designed to deliver reliable, precise positioning performance. In challenging areas for GNSS surveying, such as tree cover or limited sky view, Trimble R-Track provides unmatched tracking performance of GNSS satellite signals.

Trimble R-Track with Signal Prediction™ compensates for intermittent or marginal RTK correction signals, enabling extended precision operation after an RTK signal is interrupted.

The new CMRx communications protocol provides unprecedented correction compression for optimized bandwidth and full utilization all of the satellites in view, giving you the most reliable positioning performance.

Featuring the Trimble Maxwell™ 6 chip, the Trimble R8 GNSS advances the industry with more memory and more GNSS channels. Trimble delivers business confidence with a sound GNSS investment for today and into the future.

#### Broad GNSS Support

The Trimble R8 GNSS supports a wide range of satellite signals, including GPS L2C and L5 and GLONASS L1/L2 signals. In addition, Trimble is committed to the next generation of modernized GNSS configurations by providing Galileo-compatible products available for customers well in advance of Galileo system availability<sup>1,2</sup>. In support of this plan, the new Trimble R8 GNSS is capable of tracking the experimental GIOVE-A and GIOVE-B test satellites for signal evaluation and test purposes.

#### FLEXIBLE SYSTEM DESIGN

The Trimble R8 GNSS receiver combines the most comprehensive feature set into an integrated and flexible system for demanding surveying applications. The Trimble R8 GNSS includes a built-in transmit/receive UHF radio,

enabling ultimate flexibility for rover or base operation. As a base station, the internal NTRIP caster provides you with customized access<sup>3</sup> to base station corrections via the Internet.

Trimble's exclusive, Web UI™ eliminates travel requirements for routine monitoring of base station receivers. Now you can assess the health and status of base receivers and perform remote configurations from the office. Likewise, you can download post-processing data through Web UI and save additional trips out to the field.

#### ENABLING THE CONNECTED SITE

Pair the speed and accuracy of the Trimble R8 GNSS receiver with flexibility and collaboration tools of Trimble Access™ software. Trimble Access brings field and office teams closer by enabling data sharing and collaboration in a secure, web-based environment. With optional streamlined workflows, Trimble Access further empowers surveyors and survey teams for success. Now it is easier than ever to realize the potential of the Trimble Connected Site. Connecting the right tools, techniques, services and relationships enables surveying businesses to achieve more every day.

<sup>1</sup> Galileo Commercial Authorization Receiver technology having Galileo capability to operate in the Galileo frequency bands and using information from the Galileo system for future operational satellites is restricted in the publicly available Galileo Open Service Signal-In-Space Interface Control Document (GAL OS SIS ICD) and is not currently authorized for commercial use.

Receiver technology that tracks the GIOVE-A and GIOVE-B test satellites uses information that is unrestricted in the public domain in the GIOVE-A & B Navigation Signal-In-Space Interface Control Document. Receiver technology having developmental GIOVE-A and B capability is intended for signal evaluation and test purposes.

<sup>2</sup> For more information about Trimble and GNSS modernization, please visit [http://www.trimble.com/srv\\_new\\_era.shtml](http://www.trimble.com/srv_new_era.shtml).

<sup>3</sup> Cellular modem required.





# TRIMBLE R8 GNSS RECEIVER

## PERFORMANCE SPECIFICATIONS

### Measurements

- Trimble R-Track technology
- Advanced Trimble Maxwell 6 Custom Survey GNSS chip with 220 channels
- High precision multiple correlator for GNSS pseudorange measurements
- Unfiltered, unsmoothed pseudorange measurements data for low noise, low multipath error, low time domain correlation and high dynamic response
- Very low noise GNSS carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
- Signal-to-Noise ratios reported in dB-Hz
- Proven Trimble low elevation tracking technology
- Satellite signals tracked simultaneously:
  - GPS: L1C/A, L2C, L2E (Trimble method for tracking L2P), L5
  - GLONASS: L1C/A, L1P, L2C/A (GLONASS M only), L2P
  - SBAS: L1C/A, L5
  - Galileo GIOVE-A and GIOVE-B

### Code differential GNSS positioning<sup>1</sup>

Horizontal..... 0.25 m + 1 ppm RMS  
 Vertical..... 0.50 m + 1 ppm RMS  
 WAAS differential positioning accuracy<sup>2</sup>..... typically <5 m 3DRMS

### Static and FastStatic GNSS surveying<sup>1</sup>

Horizontal..... 3 mm + 0.1 ppm RMS  
 Vertical..... 3.5 mm + 0.4 ppm RMS

### Kinematic surveying<sup>1</sup>

Horizontal..... 10 mm + 1 ppm RMS  
 Vertical..... 20 mm + 1 ppm RMS  
 Initialization time<sup>3</sup>..... typically <10 seconds  
 Initialization reliability<sup>4</sup>..... typically >99.9%

## HARDWARE

### Physical

Dimensions (WxH)..... 19 cm x 11.2 cm (7.5 in x 4.4 in), including connectors

Weight ..... 1.34 kg (2.95 lb) with internal battery, internal radio, standard UHF antenna.  
 3.70 kg (8.16 lb) entire RTK rover including batteries, range pole, controller and bracket

### Temperature<sup>5</sup>

Operating..... -40 °C to +65 °C (-40 °F to +149 °F)  
 Storage..... -40 °C to +75 °C (-40 °F to +167 °F)

Humidity..... 100%, condensing  
 Water/dustproof..... IP67 dustproof, protected from temporary immersion to depth of 1 m (3.28 ft)

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Shock and vibration..... Tested and meets the following environmental standards:

Shock..... Non-operating: Designed to survive a 2 m (6.6 ft) pole drop onto concrete. Operating: to 40 G, 10 msec, sawtooth

Vibration..... MIL-STD-810F, FIG.514.5C-1

## Electrical

- Power 11 to 28 V DC external power input with over-voltage protection on Port 1 (7-pin Lemo)
- Rechargeable, removable 7.4 V, 2.4 Ah Lithium-Ion battery in internal battery compartment. Power consumption is 3.2 W, in RTK rover mode with internal radio. Operating times on internal battery:
  - 450 MHz receive only option..... 5.8 hours<sup>7</sup>
  - 450 MHz receive/transmit option..... 3.7 hours<sup>8</sup>
  - GSM/GPRS..... 4.1 hours<sup>9</sup>
- Certification Class B Part 15, 22, 24 FCC certification, 850/1900 MHz. Class 10 GSM/GPRS module. CE Mark approval, and C-tick approval

## Communications and Data Storage

- 3-wire serial (7-pin Lemo) on Port 1. Full RS-232 serial on Port 2 (Dsub 9 pin)
- Fully integrated, fully sealed internal 450 MHz receiver/transmitter option:
  - Transmit power: 0.5 W
  - Range<sup>6</sup>: 3-5 km typical / 10 km optimal
- Fully integrated, fully sealed internal GSM/GPRS option<sup>7</sup>
- Fully integrated, fully sealed 2.4 GHz communications port (Bluetooth<sup>®</sup>)<sup>9</sup>
- External cellphone support for GSM/GPRS/CDPD modems for RTK and VRS operations
- Data storage on 57 MB internal memory: 40.7 days of raw observables (approx. 1.4 MB / Day), based on recording every 15 seconds from an average of 14 satellites
- 1 Hz, 2 Hz, 5 Hz, 10 Hz, and 20 Hz positioning
- CMR+, CMRx, RTCM 2.1, RTCM 2.3, RTCM 3.0, RTCM 3.1 Input and Output
- 16 NMEA outputs, GSO, RT17 and RT27 outputs. Supports BINEX and smoothed carrier

1 Accuracy and reliability may be subject to anomalies due to multipath, obstructions, satellite geometry, and atmospheric conditions. Always follow recommended survey practices.

2 Depends on WAAS/EGNOS system performance.

3 May be affected by atmospheric conditions, signal multipath, obstructions and satellite geometry.

4 May be affected by atmospheric conditions, signal multipath, and satellite geometry. Initialization reliability is continuously monitored to ensure highest quality.

5 Receiver will operate normally to -40 °C. Internal batteries are rated to -20 °C.

6 Varies with terrain and operating conditions.

7 Varies with temperature.

8 Varies with temperature and wireless data rate.

9 Bluetooth type approvals are country specific.

Contact your local Trimble Authorized Distribution Partner for more information.

Specifications subject to change without notice.



## NORTH AMERICA

Trimble Engineering  
 & Construction Group  
 5475 Kellenburger Road  
 Dayton, Ohio 45424-1099 • USA  
 800-538-7800 (Toll Free)  
 +1-937-245-5154 Phone  
 +1-937-233-9441 Fax

## EUROPE

Trimble GmbH  
 Am Prime Parc 11  
 65479 Raunheim • GERMANY  
 +49-6142-2100-0 Phone  
 +49-6142-2100-550 Fax

## ASIA-PACIFIC

Trimble Navigation  
 Singapore Pty Limited  
 80 Marine Parade Road  
 #22-06, Parkway Parade  
 Singapore 449269 • SINGAPORE  
 +65-6348-2212 Phone  
 +65-6348-2232 Fax

TRIMBLE AUTHORIZED DISTRIBUTION PARTNER



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# LEICA digital levels at a glance

Technical data	LEICA DNA03	LEICA DNA10
Area of use	<ul style="list-style-type: none"> <li>– Quick measurements of heights, height differences and stake outs</li> <li>– I. and II. order levelling</li> <li>– Precision measurements</li> </ul>	<ul style="list-style-type: none"> <li>– Quick measurements of heights, height differences and stake outs</li> <li>– Cadastral levelling</li> <li>– Technical levelling</li> </ul>
Accuracy	Standard deviation height measurement per 1km double-run (ISO 17123-2)	
Electronic measurements:		
with Invar staffs	0.3mm	0.9mm
with standard staffs	1.0mm	1.5mm
Optical measurements	2.0mm	2.0mm
Standard deviation distance measurement (electr.)	1cm/20m (500ppm)	
Range		
Electronic measurement	1.8m – 110m	
Optical measurement	from 0.6m	
Electronic measurement		
Resolution height measurement	0.01mm, 0.0001ft, 0.0005inch	0.1mm, 0.001ft
Time for single measurement	typically 3 seconds	
Measurement modes	Single, average, median, repeated single measurements	
Measurement programs	Measure & Record, staff height/distance BF, aBF, BFFB, aBFFB	
Coding	Remark, Free code, Quick code	
Data storage		
Internal memory	6000 measurements or 1650 station	
Backup	PCMCIA card (ATA-Flash/SRAM) SRAM compatible with Omnidrive MCR4	
Online operations	GSI format via RS232	
Data exchange internal memory	GSI8/GSI16/XML/flexible formats	
Telescope magnification	24x	
Compensator		
Type	Pendulum compensator with magnetic damping	
Slope range	±10'	
Compensator setting accuracy	0.3"	0.8"
Display	LCD, 8 lines at 24 characters	
Battery operated		
GEB111	12h operation	
GEB121	24h operation	
Battery adapter GAD39	Alkaline battery, 6x LR6/AA/AM3, 1.5V	
Weight	2.8kg (incl. battery GEB111)	
Environmental conditions		
Working temperature	–20°C to +50°C	
Storage temperature	–40°C to +70°C	
Dust/water (IEC60529)	IP53	
Humidity	95%, non condensing	



**Total Quality Management**  
is our commitment to total  
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For more information about  
our TQM program, ask  
your local Leica Geosystems  
agent.

**Leica**  
Geosystems

Leica Geosystems AG  
CH-9435 Heerbrugg  
(Switzerland)

Phone +41 71 727 31 31

Fax +41 71 727 46 73

[www.leica-geosystems.com](http://www.leica-geosystems.com)

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729342en – X.02 – RDV



# Certificate Of Calibration

Calibration Date: 3/4/2016

Instrument Model: Trimble S6

Serial Number: 93010506

Technician: George Scott

Next Due Date: 3/4/2017

Before:

X/H: 0.0013g

Y/N: -77.6065g

H: -0.0008g

V: -77.6139g

After:

X/H: 0.0018g

Y/N: -77.6081g

H: -0.0004g

V: -77.6104g

O.P. ✓

Mail: ✓

EDM: ✓

Radio: ✓

This certificate confirms that the above instrument has been inspected, calibrated and is working within the manufacturer's specifications by

The calibration of this instrument is guaranteed to be within product specifications when the unit leaves Keystone Precision Instruments. Neither Keystone Precision Instruments or representative will assume liability incurred during use of this unit should unit lose calibration.

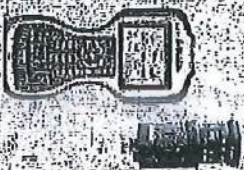
**KEYSTONE  
PRECISION  
INSTRUMENTS**

1670 East Race Street

Allentown, PA 18109

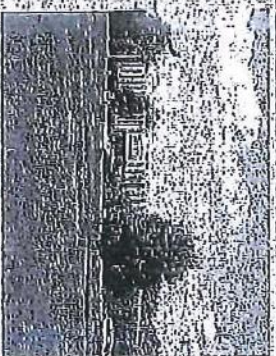
1-800-833-9250

WWW.KEYPRE.COM



**Trimble**

Preferred Service Provider





## **COMPUTER FILES**

D214386  
New York State Thruway Authority  
Design Phase I-IV, Replacement of 8 Syracuse Division Bridges  
Judd Road over Mainline Mile Post 240.48 in the Syracuse Division  
Oneida County

**List of Computer Files**

D214386\_map\_surv\_base\_site 1\_3D.dgn  
D214386\_map\_surv\_points\_site 1\_3D.dgn  
D214386\_map\_surv\_dtm\_site 1\_3D.dgn  
D214386\_map\_surv\_text\_site 1\_2D.dgn  
D214386\_map\_surv\_control\_site 1\_3D.dgn  
D214386\_map\_surv\_bridge deck\_site 1.dtm  
D214386\_map\_surv\_existing ground\_site 1.dtm  
D214386\_dat\_surv\_site 1.fwd

**List of Field Files**

1600130.csv  
1600130SITE1A.csv  
1600130SITE1B.csv  
1600130SITE1C.csv  
1600130SITE1D.csv  
1600130SITE1E.csv  
1600130SITE1F.csv  
1600130SITE1G.csv  
1600130SITE1H.csv  
1600130SITE1I.csv  
1600130SITE1J.csv  
1600130SITE1K.csv  
1600130SITE1S7.rw5  
1600130SITE1S7A.rw5  
1600130SITE1S7C.rw5  
1600130SITE1S7D.rw5  
1600130SITE1S7E.rw5  
1600130SITE1S7F.rw5  
1600130SITE1S7G.rw5