

ERI -6 – 2893
Substructure Monumentation
and
Monitoring

PROJECT DESCRIPTION

Bridge No. ERI-6-2893 carries three lanes of State Route 6 (one eastbound lane, one westbound lane, and one turn lane) and two sidewalks over the Vermilion River in Vermilion, Ohio. The superstructure is a single span steel through truss. The substructure consists of reinforced concrete abutments and wingwalls. The substructure units of the bridge were monumented and measured with electronic distance measuring equipment. Control points were established off the bridge for measurement of the points on the substructure units.

Purpose:

Establish monumentation and baseline data for monitoring movement in the bridge substructure.

Monumentation:

Four threaded rods were set in the abutments, establishing two survey points on each abutment referenced to the centerline of the bearings.

Four secondary control monuments (two 5/8" rebar with cap, one survey marker spike, and one MAG nail) were established under the bridge to observe the threaded rods from two locations.

Three primary control monuments (two 40" X 3/4" rebar with cap and one survey marker spike) were established outside the area of possible movement. Local benchmarks were established.

Procedure:

After all monuments were established, the following procedures were followed.

1. GPS observations were recorded for each of the primary control monuments. GPS data was processed providing horizontal and vertical data for each monument.
2. Using a recently calibrated instrument a closed traverse was completed through the primary and secondary monuments based on the GPS data. Recorded data was processed providing horizontal and vertical data for the secondary monuments.
3. Each of the threaded rods was observed from each of two secondary monuments recording a minimum of one direct and one reverse reading for each rod. The data was processed providing horizontal and vertical data for the four threaded rods.
4. A level circuit by digital level was completed to establish the elevation of the threaded rods.
5. Field data was entered into a spreadsheet providing a basis for comparison with future observations. All coordinates and elevations are in English units of feet.

Future observations:

Procedure steps 2, 3, 4 and 5 will be repeated for future observations.

Data:

Point Definitions

Primary Control

PCM 1 – 3/4” rebar with cap stamped “PRIMARY” (SV1)

PCM 2 – Survey Marker Spike (SV2)

PCM 3 – 3/4” rebar with cap stamped “PRIMARY” (SV3)

Secondary Control

SCM 1 – Survey Marker Spike (SV4)

SCM 2 – MAG Nail (SV5)

SCM 3 – 5/8” rebar with cap stamped “TRAVERSE PT” (SV6)

SCM 4 – 5/8” rebar with cap stamped “TRAVERSE PT” (SV7)

Control Rods

SUR 1 – 5/8” threaded rod set in bridge seat (SV10)

SUR 2 – 5/8” threaded rod set in bridge seat (SV11)

SUR 3 – 5/8” threaded rod set in bridge seat (SV12)

SUR 4 – 5/8” threaded rod set in bridge seat (SV13)

Field Data:

PRIMARY CONTROL

	FIELD	POINT	PT.	NORTHING	EASTING	ROD	ELEV.	DESCRIPTION
Date: 8/24/2022								
PCM1	SV1	639758.8183	2008009.3643	577.11	3/4" REBAR W/ PRIMARY CAP			
PCM2	SV2	639457.3550	2007520.4765	589.09	SURVEY MARKER SPIKE			
PCM3	SV3	639725.9372	2007662.2343	585.65	3/4" REBAR W/ PRIMARY CAP			
Date: 12/8/2022								
PCM1	SV1	639758.8212	2008009.3624	577.11	3/4" REBAR W/ PRIMARY CAP			
PCM2	SV2	639457.3534	2007520.4858	589.15	SURVEY MARKER SPIKE			
PCM3	SV3	639725.9338	2007662.2346	585.66	3/4" REBAR W/ PRIMARY CAP			

SECONDARY CONTROL

FIELD				ROD	
POINT	PT.	NORTHING	EASTING	ELEV.	DESCRIPTION
Date: 8/24/2022					
SCM1	SV4	639717.6304	2007545.9996	574.31	SURVEY MARKER SPIKE
SCM2	SV5	639662.0759	2007603.2126	575.51	MAG NAIL
SCM3	SV6	639672.6815	2007368.5027	574.99	5/8" REBAR W/ TRAV CAP
SCM4	SV7	639609.9153	2007428.8729	575.15	5/8" REBAR W/ TRAV CAP
Date: 12/8/2022					
SCM1	SV4	639717.6379	2007545.9899	574.32	SURVEY MARKER SPIKE
SCM2	SV5	639662.0735	2007603.2140	575.52	MAG NAIL
SCM3	SV6	639672.6733	2007368.5001	574.99	5/8" REBAR W/ TRAV CAP
SCM4	SV7	639609.9065	2007428.8694	575.14	5/8" REBAR W/ TRAV CAP

CONTROL RODS

FIELD.				ROD		SEAT
POINT	PT.	NORTHING	EASTING	ELEV.	DESCRIPTION	ELEV.
Date: 8/24/2022						
SUR1	SV10	639620.8925	2007370.8790	579.73	5/8" THREADED ROD	579.67
SUR2	SV11	639663.9301	2007363.1096	579.69	5/8" THREADED ROD	579.65
SUR3	SV12	639707.4913	2007602.0445	579.33	5/8" THREADED ROD	579.28
SUR4	SV13	639664.5632	2007609.9112	579.34	5/8" THREADED ROD	579.28
Date: 12/8/2022						
SUR1	SV10	639620.8792	2007370.8827	579.74	5/8" THREADED ROD	579.68
SUR2	SV11	639663.9203	2007363.1109	579.70	5/8" THREADED ROD	579.66
SUR3	SV12	639707.4796	2007602.0414	579.34	5/8" THREADED ROD	579.29
SUR4	SV13	639664.5544	2007609.9095	579.35	5/8" THREADED ROD	579.31

SURVEY:

The field survey was performed by Richland Engineering Limited, a Wallace Pancher Group company, on August 24th and December 8th, 2022.

Prepared by:



Brian Besecker, P.S.
P.S. #7375

Reviewed by:

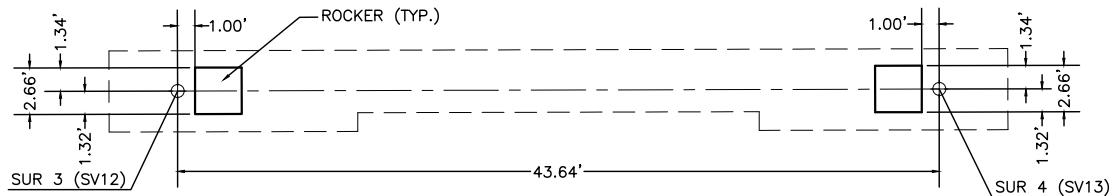


David L. Rinehart, P.E., S.I.
P.E. #55967

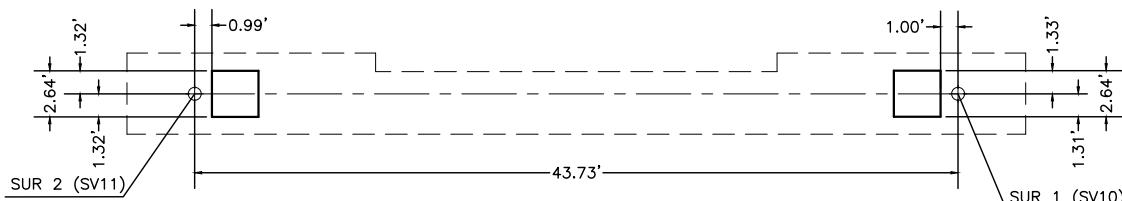
ERI - 6 - 2893
SUBSTRUCTURE MONUMENTATION
THREADED ROD LOCATIONS



NORTH

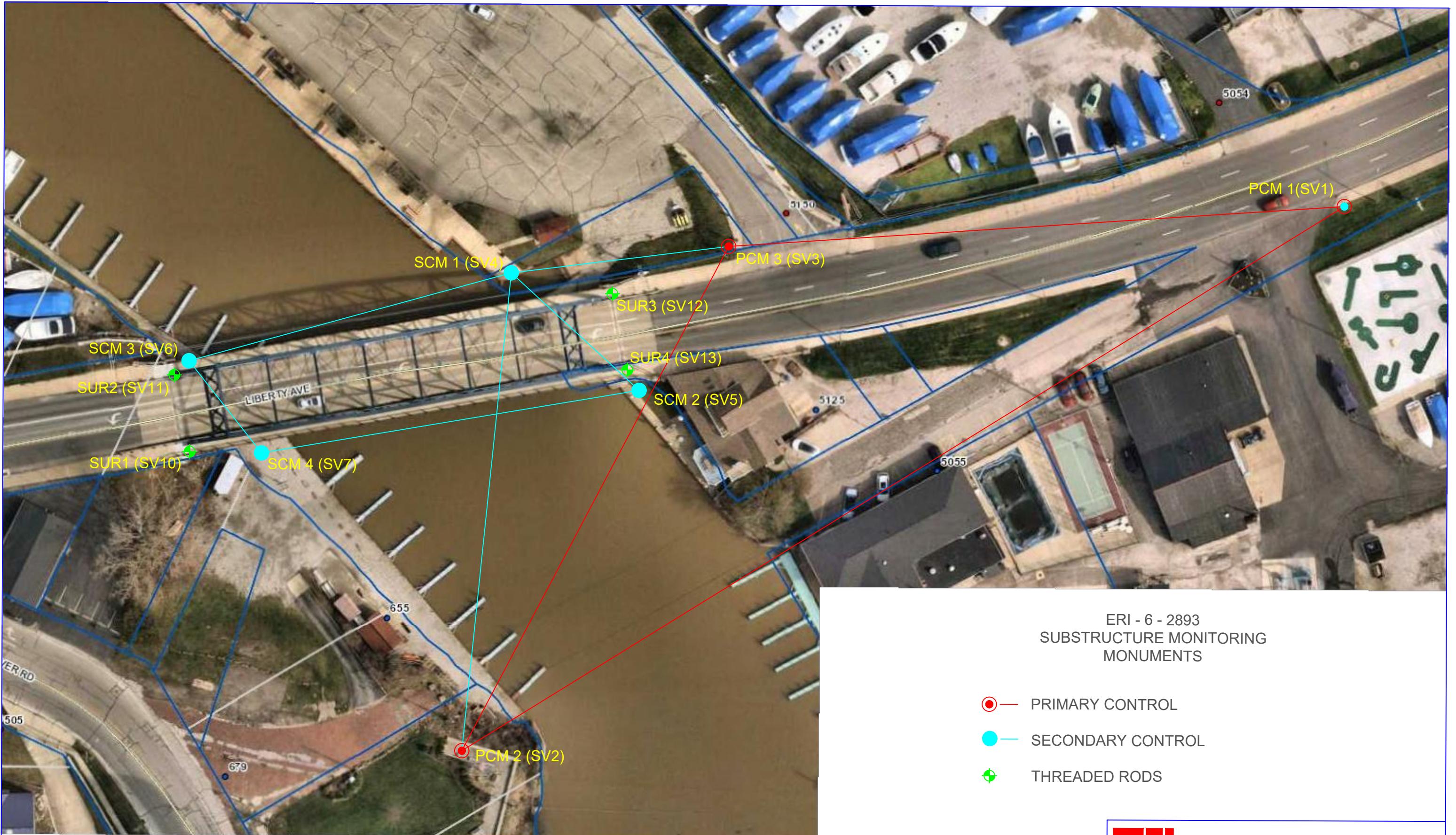


FORWARD ABUTMENT



REAR ABUTMENT





ERI - 6 - 2893
SUBSTRUCTURE MONITORING
MONUMENTS

- PRIMARY CONTROL
- SECONDARY CONTROL
- THREADED RODS



RICHLAND ENGINEERING LIMITED
A WALLACEPANCHER GROUP COMPANY

29 NORTH PARK STREET

MANSFIELD, OHIO