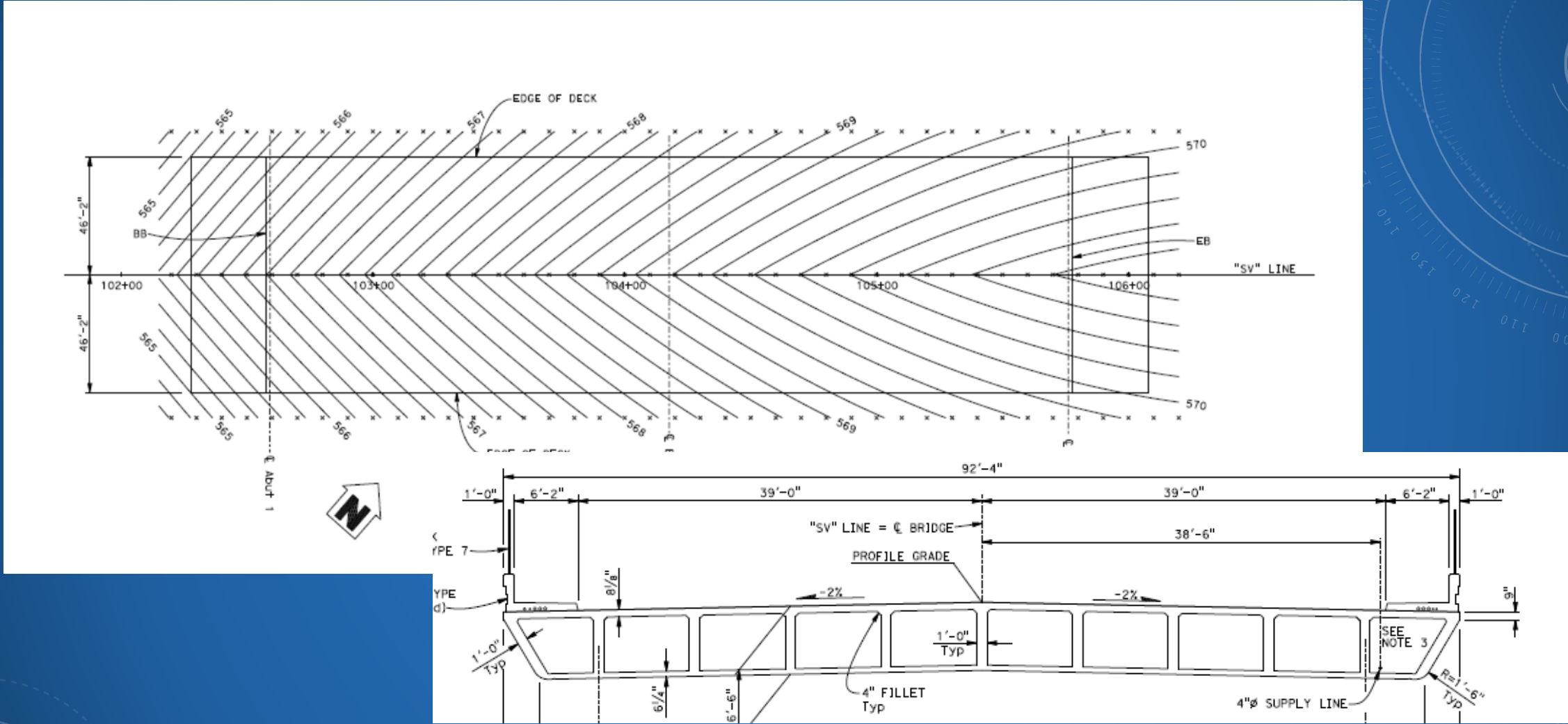


BRIDGE DECK GRADES AND INTERMEDIATE GRADES



WHY ARE WE TALKING ABOUT THIS?

- New technologies that are being developed and utilized
- Clear guidance on roles and responsibilities for survey data
- Develop consistent implementation throughout the State



BRIDGE DECK GRADES AND INT GRADES



DIGITAL COMMUNICATION

- Bim
 - Building Information Modeling
 - Goal is Five Dimension (5D)
 - X (Easting), Y (Northing), Z (Elevation), Time, \$
- Ab1037
 - Assembly Bill signed 9/23/22
 - Milestones Defined
- Format
 - 3D surface file “.xml” for now..
- Equipment Used with Digital Technology
 - RTK Rovers
 - Total Stations



Assembly Bill No. 1037

CHAPTER 493

(((Summarized and paraphrased)))

Section 14111 of the Government Code, relating to infrastructure.

[Approved by Governor September 23, 2022]

The Department shall develop an Implementation Plan for the use and integration of Digital Construction Management Technologies (DCMT) ..”from preconstruction to asset life cycle” (APS through As-Built)



BRIDGE DECK GRADES AND INT GRADES



What are we using in the the field today

Civil 3D

Robotic Total Station

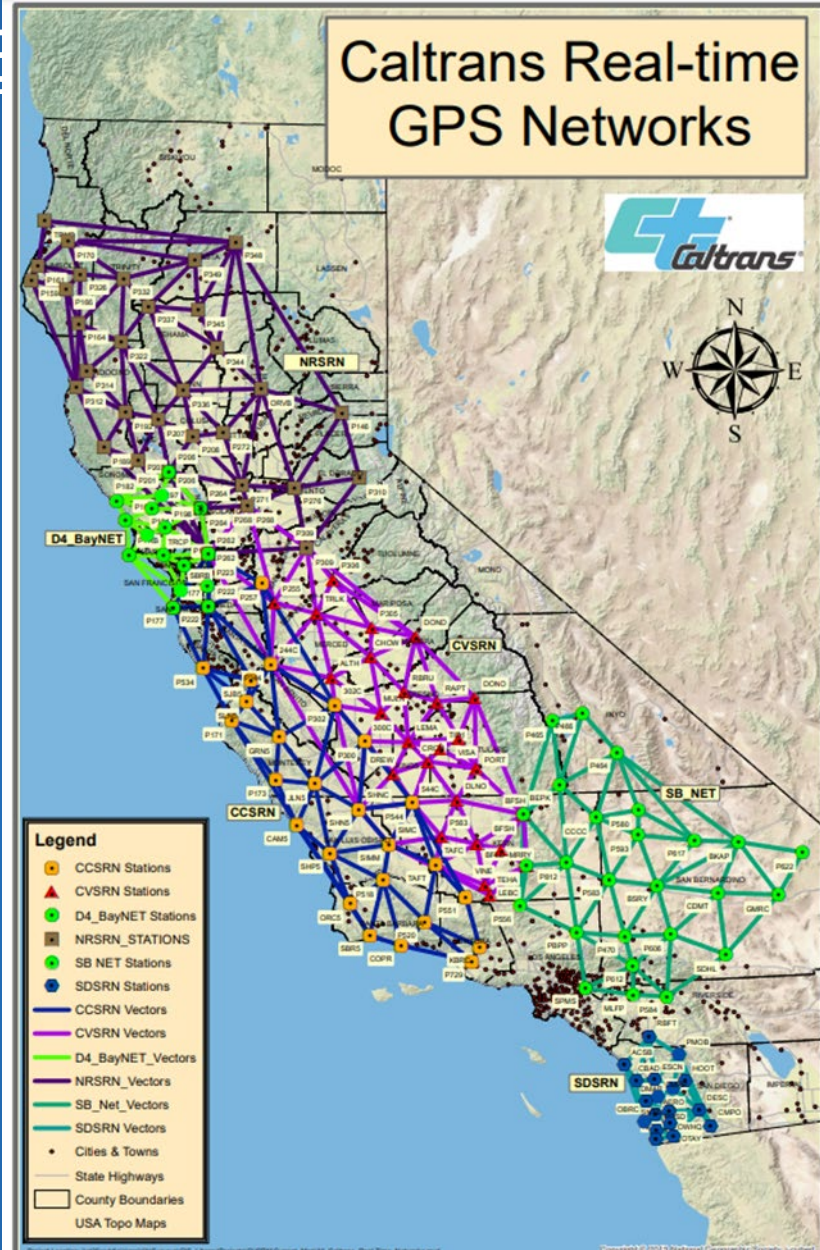
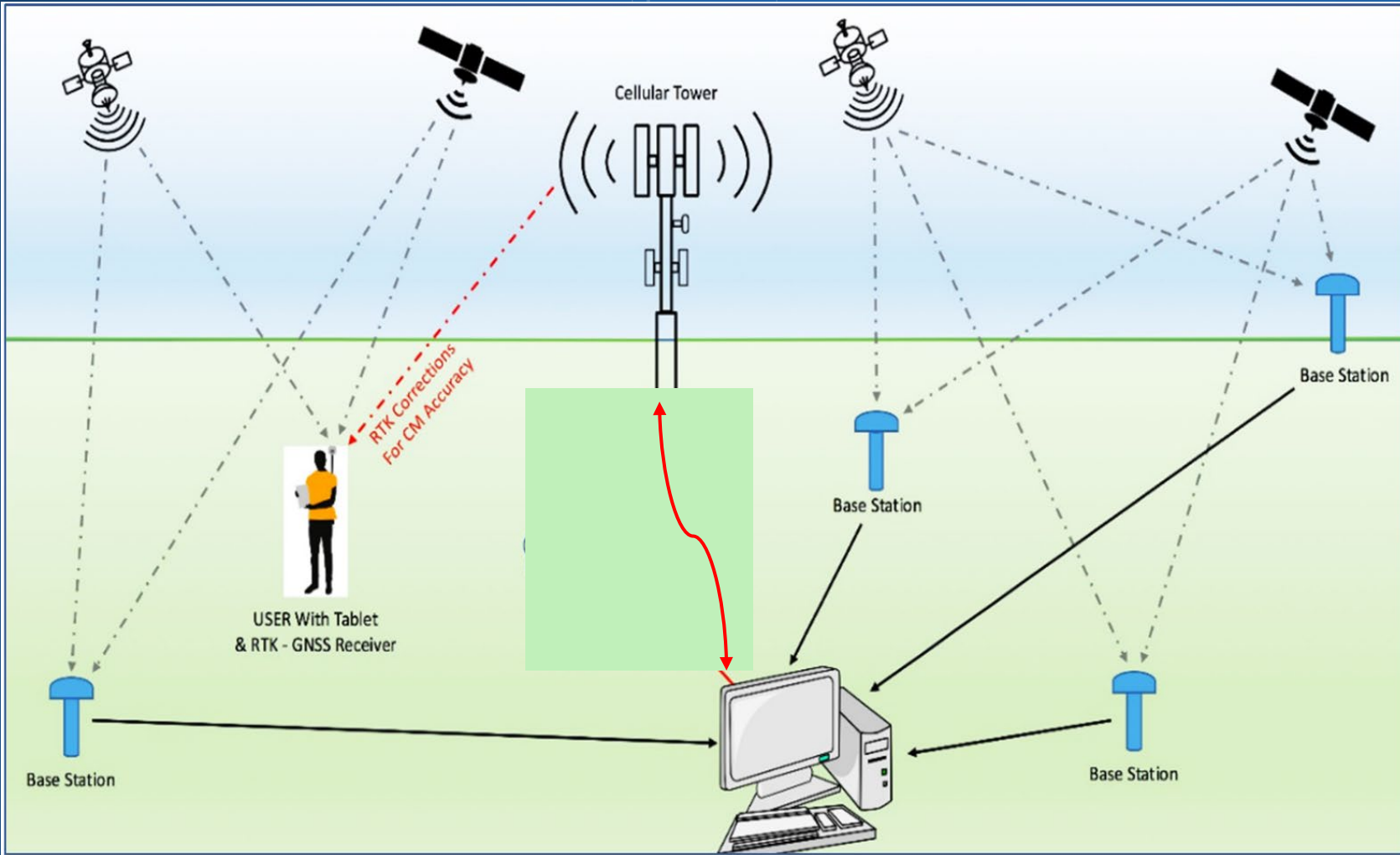
Data Collector

Trimble GNSS Systems



BRIDGE DECK GRADES AND INT GRADES





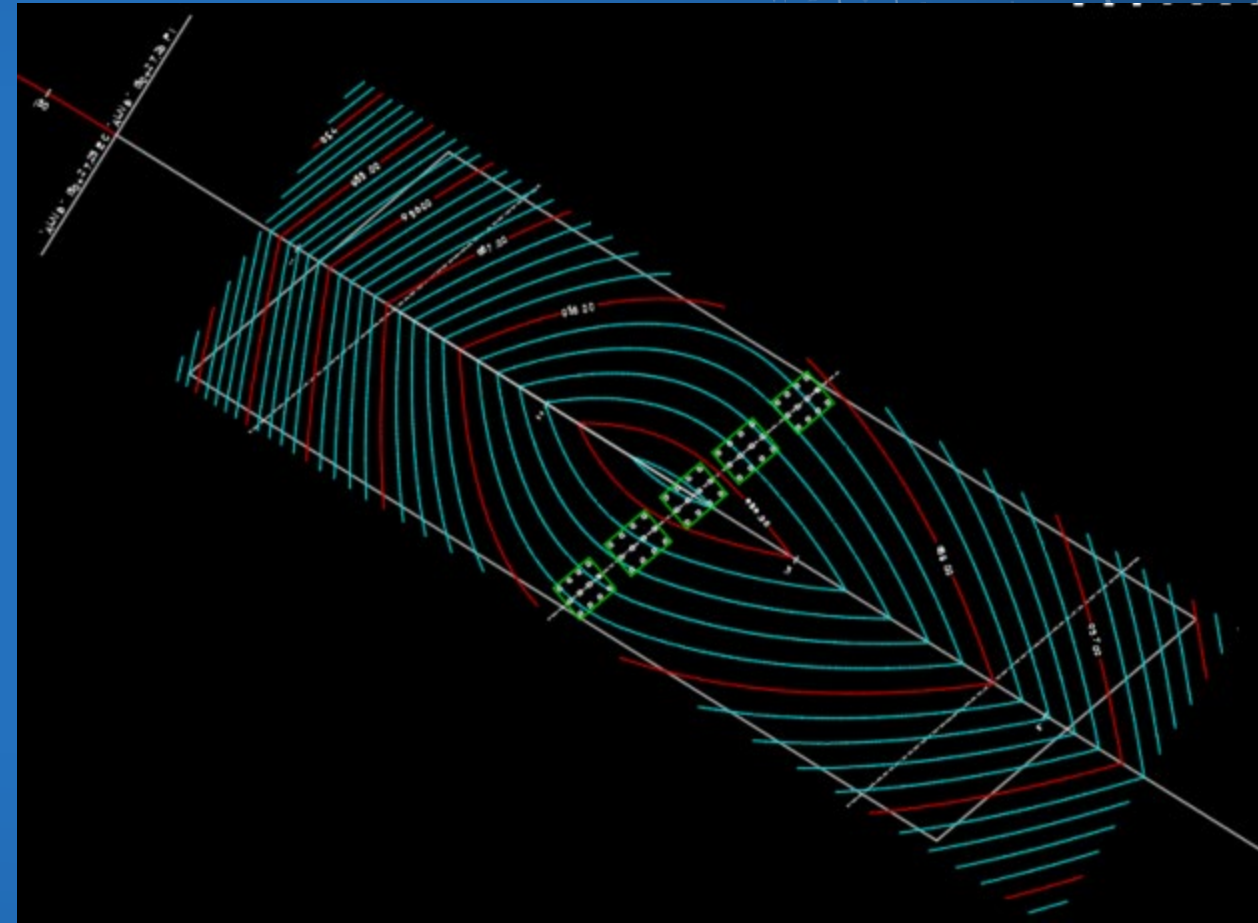
BRIDGE DECK GRADES AND INT GRADES



3D SURFACES INTEGRATING INTO CT BRIDGE BUILDING TODAY

USE CIVIL 3D TO CREATE:

DIGITAL DECK CONTOURS
BRIDGE ALIGNMENTS
CAMBER
FALSEWORK INTEGRATION



BRIDGE DECK GRADES AND INT GRADES



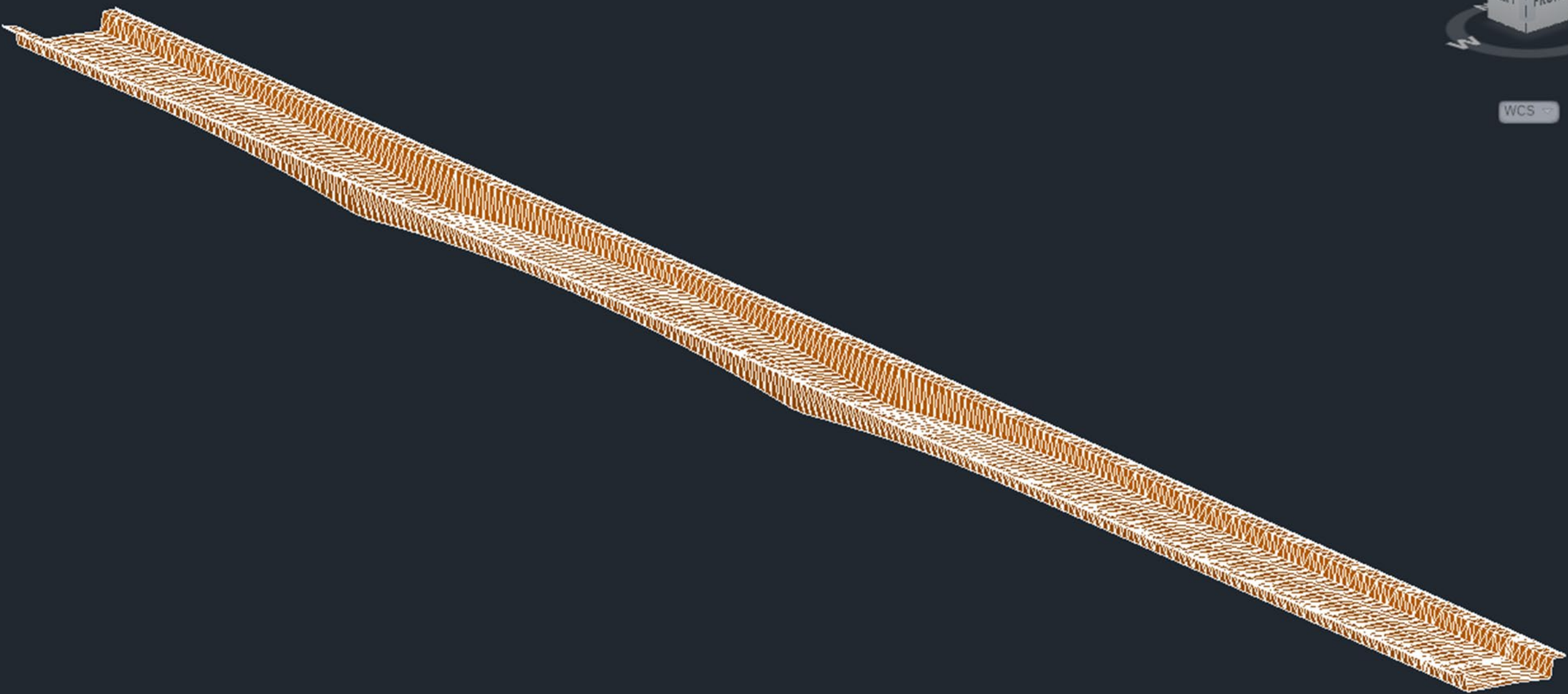


BRIDGE DECK GRADES AND INT GRADES



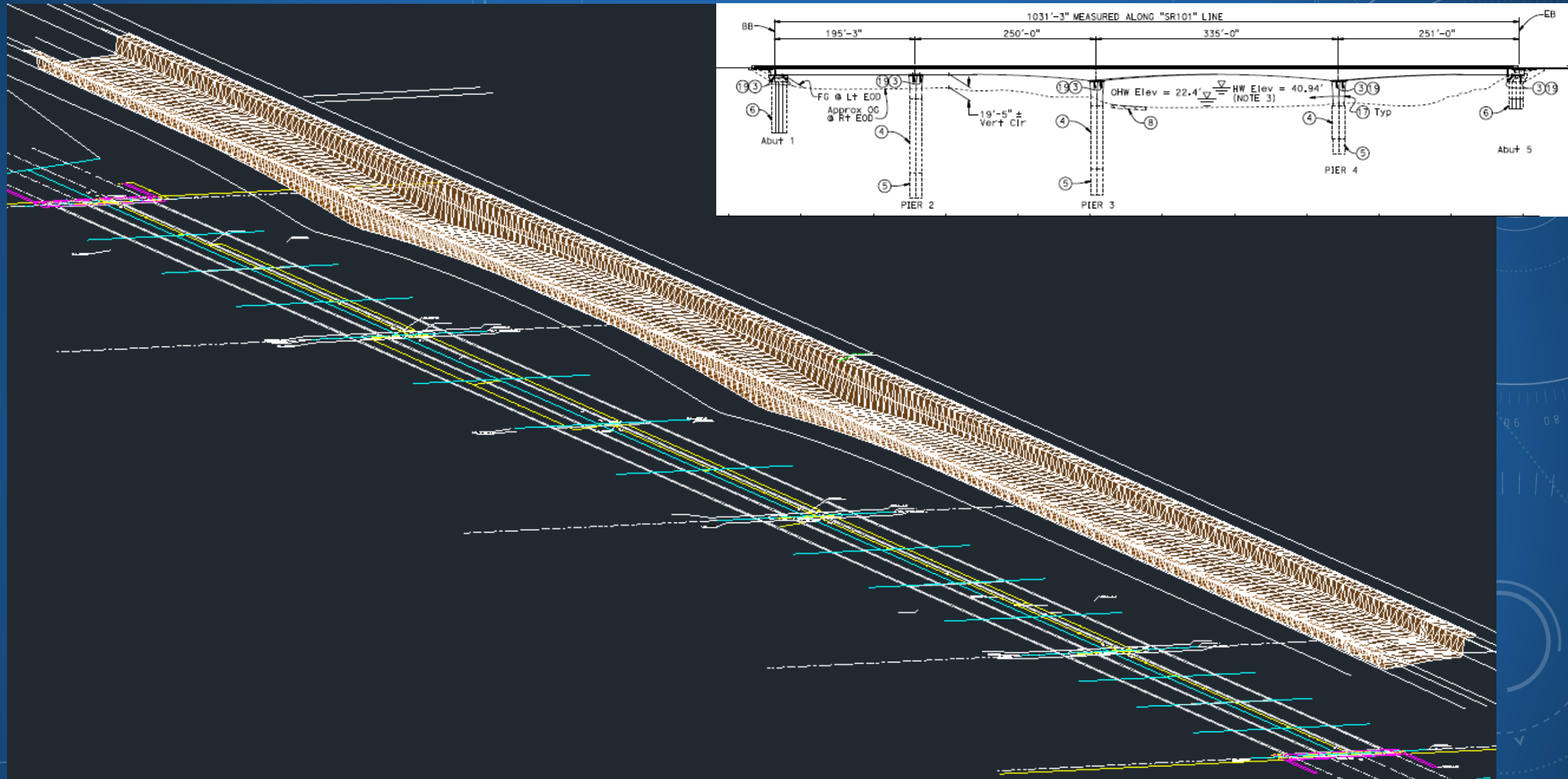


WCS



BRIDGE DECK GRADES AND INT GRADES





BRIDGE DECK GRADES AND INT GRADES



Hello Caltrans employee!

Available files for 10-1C3304:

Project Bucket Search

Caltrans Bidding Connect Account:

(Sign in is r

(Cl

Note:

The California Depart
administering a non-d
agree to the terms of t
A database will record
exempted.
The implementation w

- 10-1C3304
 - Addenda
 - ad1
 - 10-1C3304IH.pdf (3.68 Mb)
 - 10-1C3304ad1.pdf (92.3 Kb)
 - ad2

Supplemental Info

- 10-1C3304-IH.pdf (4.55 Mb)
- 1C330ExistingBrdgs.xml (103.73 Kb)
- 1C330ExistingGround.xml (7.32 Mb)

10-1C3304 | [List of Bid Items](#) | [Bid Summaries](#) | [P](#)
 Widening Bridges, Ramps And Roadway.
 10-SJ-205-R4.6/R9.0 * Date Advertised 01/18/2022
 Bids Opening in Sacramento * Bids Open 03/15/2022
 Date Awarded 04/05/2022
 Estimate: \$17,000,000
 In San Joaquin County In And Near Tracy From Ja
 The Contractor must have either a Class A license
 300 Working Days * 22% DBE Requirement *
[See Non-Bidding Planholders](#) | [See Bidding Planh](#)

- 10-1C3304ad5plans.pdf (768.4 Kb)
- Forms for Bid
 - 10-1C3304dbeforms.pdf (597.81 Kb)
- Project Plans (Requires NDA sign off).
 - 10-1C3304plans-pgs_001-100.pdf (27.08 Mb)
 - 10-1C3304plans-pgs_101-200.pdf (25.44 Mb)
 - 10-1C3304plans-pgs_201-322.pdf (21.45 Mb)
- Notice to Bidders & Special Provisions
 - 10-1C3304fv.pdf (265.11 Kb)
 - 10-1C3304sp.pdf (1.59 Mb)
- Supplemental Info
 - 10-1C3304-IH.pdf (4.55 Mb)
 - 1C330ExistingBrdgs.xml (103.73 Kb)
 - 1C330ExistingGround.xml (7.32 Mb)
 - 1C330_EarthWork_Full-052821.pdf (10.29 Mb)
 - 205GL_EB_EP.xml (2.15 Kb)
 - 205GL_EB_ES.xml (2.33 Kb)

5)

majority of the work: C-12, C-10, C-8.



2023+ : Standard Spec change to require Survey QC Plan

Brief History

- 1960s : Division of Highways – Bridge Department
 - Performed all surveying –project control (fair bidding)
- 1974 : Caltrans ->(Department Office Land Survey)
 - Increased Contractor claims due to inconsistent, timely, and/or accurate surveys
- 1987 : Contract bid item for Contractor supplied survey (line & grade)
- 1988 : State re-acquires line and grade responsibilities (SS 5-1.07)
- 1993-1998 BCM 175-1 : Defined SC policy for state provided line and grade
- 2010 –2018 Emphasis removed from SC to provide line and grade (SS 5-1.26)
- 2019 BCM 175-1 Deleted (no longer an SC process)
- 2021 : Standard Spec changed to 5-1.24 (Survey Manual Chapter 12)



BRIDGE DECK GRADES AND INT GRADES



Current Specifications

2010 -> 2022 Standard Specification

5-1.26 -> 5-1.24 CONSTRUCTION SURVEYS

The Department places stakes and marks under Chapter 12, "Construction Surveys," of the Department's *Surveys Manual*.

Submit your request for Department-furnished stakes:

1. Once staking area is ready for stakes
2. On a *Request for Construction Stakes* form

After your submittal, the Department starts staking within 2 business days.

Preserve stakes and marks placed by the Department. If the stakes or marks are destroyed, the Department replaces them at the Department's earliest convenience and deducts the cost.

51-1.03F(5) Finishing Roadway Surfaces

51-1.03F(5)(a) General

Construct concrete roadway surfaces of structures, approach slabs, sleeper slabs, and adjoining approach pavement, and concrete decks to be covered with another material, to the grade and cross section shown. Surfaces must comply with the specified smoothness, surface texture, and surface crack requirements.

The Engineer sets deck elevation control points for your use in establishing the grade and cross section of the deck surface. The grade established by the deck elevation control points includes all camber allowances. Elevation control points will not be closer together than approximately 8 feet longitudinally and 24 feet transversely to the bridge centerline.

12 General

The Department is responsible for providing construction surveys to establish “control stakes”, also known as “grade stakes” for basic line and grade for project construction unless the contract specifies otherwise. From these control stakes the Contractor sets, when needed, supplemental “working stakes.” The control stakes are also used by the Resident Engineer (RE) or the Structure Representative to check the work for contract compliance.

CONSTRUCTION SURVEYS • November 2012

12.1 Policy

The basic contract requirements regarding lines and grades, and construction stakes and marks, are included in the *Standard Specifications*. Additional contractual requirements might be shown on the plans or included in the special provisions for the work.

The Department’s basic policy regarding Department-furnished construction stakes, as defined by this document and the *Standard Specifications*, is to provide the necessary control stakes to establish the lines and grades required for the completion of the work.

Working stakes used by the Contractor in actually performing the work are the Contractor’s responsibility and are to be set by the Contractor’s forces based on Department-furnished control stakes. Methods used to establish working stakes are at the Contractor’s option. These methods may include any means capable of maintaining the necessary tolerances as required by the *Standard Specifications* and by the RE. Except for any contractual restrictions, the Contractor has the right to employ reasonable means and methods to prosecute the work on a project, including the use of Automated Machine Guidance (AMG) equipment.

INTRODUCTION

This guide describes the current bridge construction surveying practices and procedures performed by Structure Construction's (SC) field Engineering staff on Caltrans administered bridge construction projects

Although the primary purpose of this document is to establish specific guidelines and thereby ensure uniformity in procedures, we recognize that no specific staking policy can be applied in all situations. Of necessity, surveying and stakeout techniques as well as the actual amount of surveying performed must be left to the discretion of the field engineer. To ensure statewide uniformity, however, all field personnel will be expected to conform as closely as possible to the guidelines as established herein.

GENERAL:

As a general guidance Structure Construction will interpret Section 5-1.24, "Construction Surveys" and 51-1.03F(5) "Finishing Roadway Surfaces" of the Standard Specifications as

Responsibilities of all parties should be discussed and finalized in the preconstruction meeting. A general list of activities that are expected to be completed during a typical bridge project with their responsible parties are shown in Appendix O.

Current Specification References (2022 Standard Specifications)

Unless specifically ordered in the Contract Special Provisions, the Standard Specifications listed below will apply to all contracts:

1-1.07B GLOSSARY

"...informational submittal: Written information that does not require the Department's response."

5-1.01 GENERAL

"...Provide QC..."

5-1.03 ENGINEER'S AUTHORITY

"The Engineer makes the final decision on questions regarding the Contract, including...Work

Structure Construction (SC) provides quality assurance for element layout during construction. A

Responsibilities of all parties should be discussed and finalized in the preconstruction meeting. A general list of activities that are expected to be completed during a typical bridge project with their responsible parties are shown in Appendix O.

by a minimum of two qualified individuals.

description and drawings of how elements will be constructed to their final elevation and alignment. It is the Department's interpretation of the QC Plan to include all pertinent elevations and alignment required for bridge construction that are not specifically shown in the project plans.

SC personnel will check both theoretical and actual elevations and alignments of bridge components for accuracy. The Survey QC Plan should be considered an informational submittal as defined in Standard Specifications Section 1-1.07B and as a best practice, should be reviewed by a minimum of two qualified individuals.

83-2.05C, 83-2.08C(3), 83-2.09C CONSTRUCTION
"Erect railings carefully and true to line and grade."

83-3.03A(3) ADJUSTING BARRIER HEIGHT
"...the Engineer determines the adjustment amount before the concrete is placed..."

Activity	Contractor	SC	Surveys
<u>Project Alignment</u>			QC
<u>Working stakes</u>	QC	QA	
<u>Settlement period monitoring:</u> Establish stake location for grid Minimum 4 locations (two in settlement area & two outside) Record displacement twice a week	QC	QA	QA
<u>Footings, Wingwalls, Retaining Walls, Abutment, Piers/Bents/Columns, Box Culverts</u> Reference Stakes			QC
<u>Precast</u> Girders & Slabs	QC	QA	
<u>Pile layout:</u> Tip & Cut-off Place reference elevation (spike) adjacent to pile location	QC	QA	
<u>Footing geometry:</u> Footing elevations Offset to reference line (edge of footing)	QC	QA	
<u>Wingwall/Retaining Wall:</u> Wall geometry Top and bottom of wall elevation Offset to reference line (face of wall) Expansion/Construction Joints Aesthetic Treatment Drains/Weep holes	QC	QA	
<u>Abutment backwall, bearing seat, shear key:</u> Pour strips Bearings Elevations and layout	QC	QA	
<u>Column/Pier:</u> Top of column/Layout, pin elevation Proper vertical alignment Drop cap & bents Slip form location	QC	QA	

Activity	Contractor	SC	Surveys
<u>Falsework:</u> Bearing capacity test Falsework layout (Bent Centerlines) Soffit elevations at bent lines Cut sheets (preliminary soffit grade) Verify bottom cap elevation Calculate post length	QC	QA	
Stringer Camber Strips		QC	
Major lines: EOD, CL Bent/Piers, etc.			QC
<u>Deck:</u> Establish/check bulkheads at diaphragms Bidwell / Roller screed	QC	QA	
Deck dowels & EOD elevations		QC	
EOD alignment		QA	QC
<u>Approach Slab:</u> Set approach slab form panel at interface of pavement Ensure rails for screeds are set to grade	QC	QA	
<u>Rail:</u> Profile rail & provide fills to bottom of rail (@ 10 – 20ft interval) Permanent elevation (copper nails)		QC	
Bolts / Post pocket layout	QC	QA	
<u>Displacement Monitoring:</u> Existing structure	QC	QA	QA
<u>Permanent Vertical / Horizontal Clearances:</u> Soffit Bridge Mounted signs Abutment & Column		QC	
<u>Permanent elevation:</u> Rails/Sidewalks			QC

QUESTIONS?

???????



BRIDGE DECK GRADES AND INT GRADES

