

APPENDIX C: MONTEREY HIGHWAY VIADUCT, PRECAST BOX GIRDER YARD DIMENSIONS



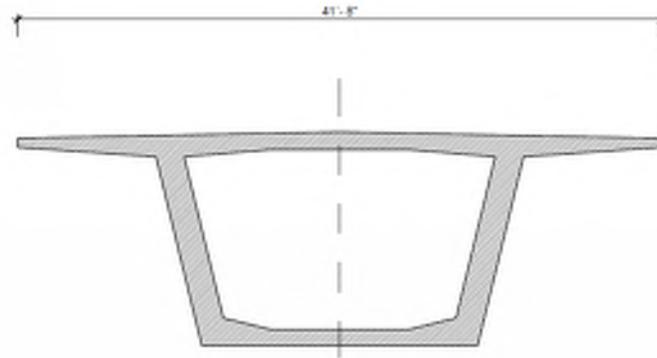
Appendix C
Monterey Highway Viaduct
Precast Box Girder Yard Dimensions



1. Introduction

To establish the necessary dimensions of a box girder precast manufacturing yard, the required production rate, beam manufacturing process, yard layout and the installation/erection equipment must be considered.

The precast yard will need to produce typical single cell box girder sections up to 130 ft. in length.



As a baseline scenario, the beams production and installation/erection must meet the construction schedule of 2.5 years (30 months). The number of precast yards and installation/erection equipments must fit within this construction schedule considering their individual production and installation rates.

1. Introduction

Supply needs:

The total length of the Monterey Highway Viaduct is 142,798 ft., and consists of four different structure types:

- Typical single column spans: 122,200 ft (85.57%)
- Multi-column straddle bents: 9,800 ft (6.86%)
- Long Span balanced cantilever spans: 5,500 ft (3.85%)
- CIP continuous spans: 5,300 ft (3.71%)

Typical single column spans and straddle bent spans will be constructed using precast beams, since they cover more than 92% of the total viaduct length.

The precast yard must be capable of producing 132,000 ft. of precast box girder beams.

Manufacture Planning:

In order to meet the overall construction schedule the beam installation/erection rate is estimated at 1,023 feet per week. The required number of beam launching gantries and associated support equipment is estimated as follows:

- Total precast beam length: 132,000 ft
- Construction Schedule: 30 months (129 weeks)
- Precast beam installation rate/week: $132,000 \text{ ft} / 129 \text{ weeks} = 1,023 \text{ ft per week}$
- Number of launching gantries: $1,023 \text{ ft} / 650 \text{ ft per week per team} = 1.57 \rightarrow 2 \text{ gantries}$

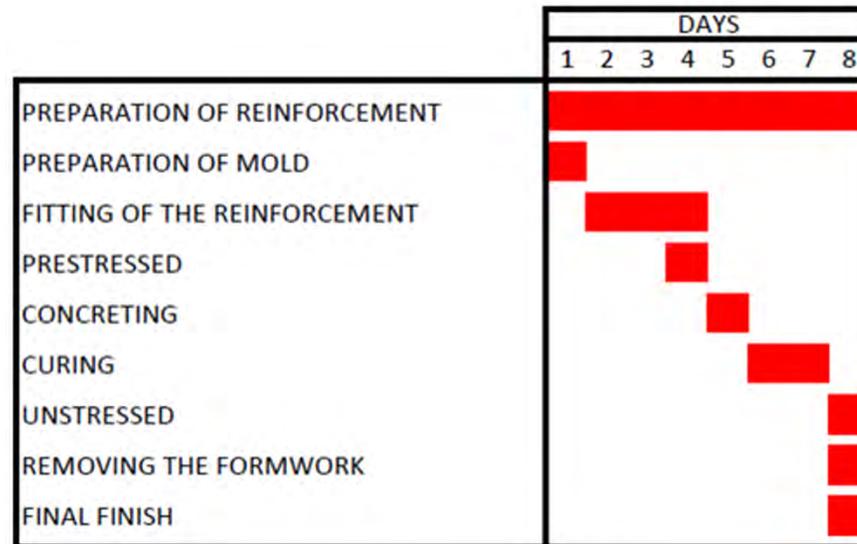
1. Introduction

Production needs:

The precast yard will need to produce 1,300 ft. of precast beams a week in order to supply each of the two installation/erection teams with 650 ft. of precast beams per week.

Yard Production Rate:

A precast yard with 3 – 260 ft. casting benches can produce 780 ft. of precast beams per week. The work would alternate between the benches, including work tasks such as armouring, concreting or removing the formwork.



1. Introduction

Precast yards

As stated previously, a single precast yard production rate is estimated to be 780 ft. of precast beam per week.

In order to keep up with the two installation/erection teams combined rate of 1300 ft/week, the number of precast yards needed is estimated as follows:

- Total precast beam length: 132,000 ft
- Installation/Erection per week (ft): 1,300 ft/week (650 ft / week * 2 gantries)
- Number of precast yard needed: $1,300 \text{ ft/week installation} / 780 \text{ ft/week production} = 1.66 \rightarrow 2 \text{ precast yards needed}$

2. Dimensions of the precast yard

To overall dimensions and layout of a precast yard should take into account the following elements and its space requirements:

1. Beam Manufacture
2. Concrete Manufacture
3. Steel Storage
4. Beam Storage (25 Units)
5. Equipment Parking
6. Parking & Building
7. Road

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2. Dimensions of the precast yard - Beam Manufacture

1. Beam Manufacture

Beam manufacture is the most important element of the precast yard, as it will be where the precast beams are manufactured. In order to match the beam manufacturing pace to the erection pace, it is necessary to have 3 - 260 foot long benches that are capable of holding two beams each. For the purposes of sizing the precast yard, the beams are assumed to be single cell box girders, up to 130 feet in length, and 43 foot deck width.

The facility cranes must be able to lift 130 ft. long beams, each weighing an estimated 1,000 tons.

The estimated dimensions needed for beam manufacture is 460 ft. x 333 ft., representing an area of approximately 153,225 ft.².

2. Dimensions of the precast yard- Concrete Manufacture

2. Concrete Manufacture

The precast yard requires an exclusive concrete mixing plant to supply the concrete necessary for the manufacturing of the beams.

The daily production capacity must equal the volume of concrete required for two 130 ft. beams. This daily concrete production is estimated at 8,400 ft.³/day. The concrete manufacturing plant must have an output of 1,150 ft.³ / hour. The space for the concrete manufacturing area includes room for:

- o Cement silos
- o Stockpiles of aggregates
- o Additive silos

The estimated dimensions needed for concrete manufacturing is 485 ft. x 150 ft., representing an area of approximately 71,700 ft.².



2. Dimensions of the precast yard- Steel Storage

3. Steel Storage

A reinforcing and prestressing steel stockpile area is needed for steel supplies, which will also include a scrap metal processing area.

The estimated dimensions needed for reinforcing and steel storage is 280 ft. x 130 ft., representing an area of approximately 36,300 ft.².



2. Dimensions of the precast yard- Beam Storage

4. Beam Storage (25 Units)

The beam storage area will be used to cure and store the beams prior to erection.

Given the large dimensions of the beams, the storage area must take into account space for the movement of mobile gantries for loading and access to the transport roads.

The estimated dimensions needed for this beam storage is 525 ft. x 435 ft., representing an area of approximately 290,625 ft.².

2. Dimensions of the precast yard- Equipment Parking

5. Equipment Parking

The precast yard will have other machinery and heavy equipment needed for the production the beams and transport, loading and unloading of different materials and handling of the beams. This equipment includes: mobile gantries, overhead cranes, loaders, truck cranes, forklifts, etc.

The estimated dimensions needed for heavy equipment parking is 280 ft. x 130 ft., representing an area of approximately 36,300 ft.².



2. Dimensions of the precast yard- Building & Parking

6. Building & Parking

The precast yard will have buildings for technical and construction staff, cafeteria, changing rooms and other necessary facilities, plus a space reserved for staff parking.

The estimated dimensions needed for the buildings and parking is 300 ft. x 130 ft., representing an area of approximately 45,000 ft.².



2. Dimensions of the precast yard- Road

7. Road

The precast yard will have a road around the perimeter of the yard, which provides access to all facilities. The road must provide access to the prefabricated beam stockpile area, and must consider the space needed for beam movement and other transportation limitations.

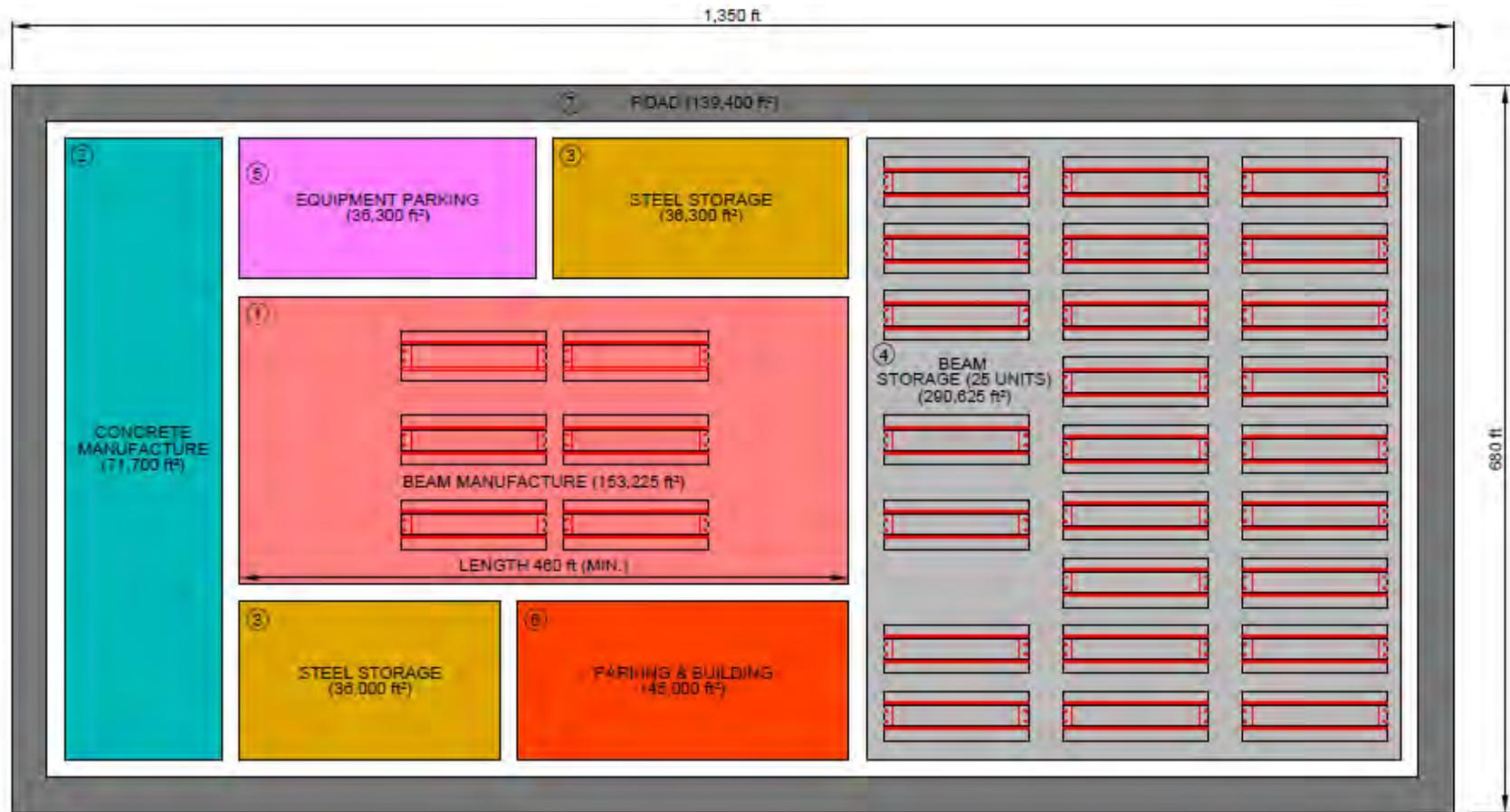
The road occupies an area of approximately 139,400 ft.².

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3. Precast yard layout

Total yard dimensions

The sum of all the above items requires a total area of 21.07 acres, with approximate dimensions of 1,350 ft. x 680 ft.



Precast Yard

