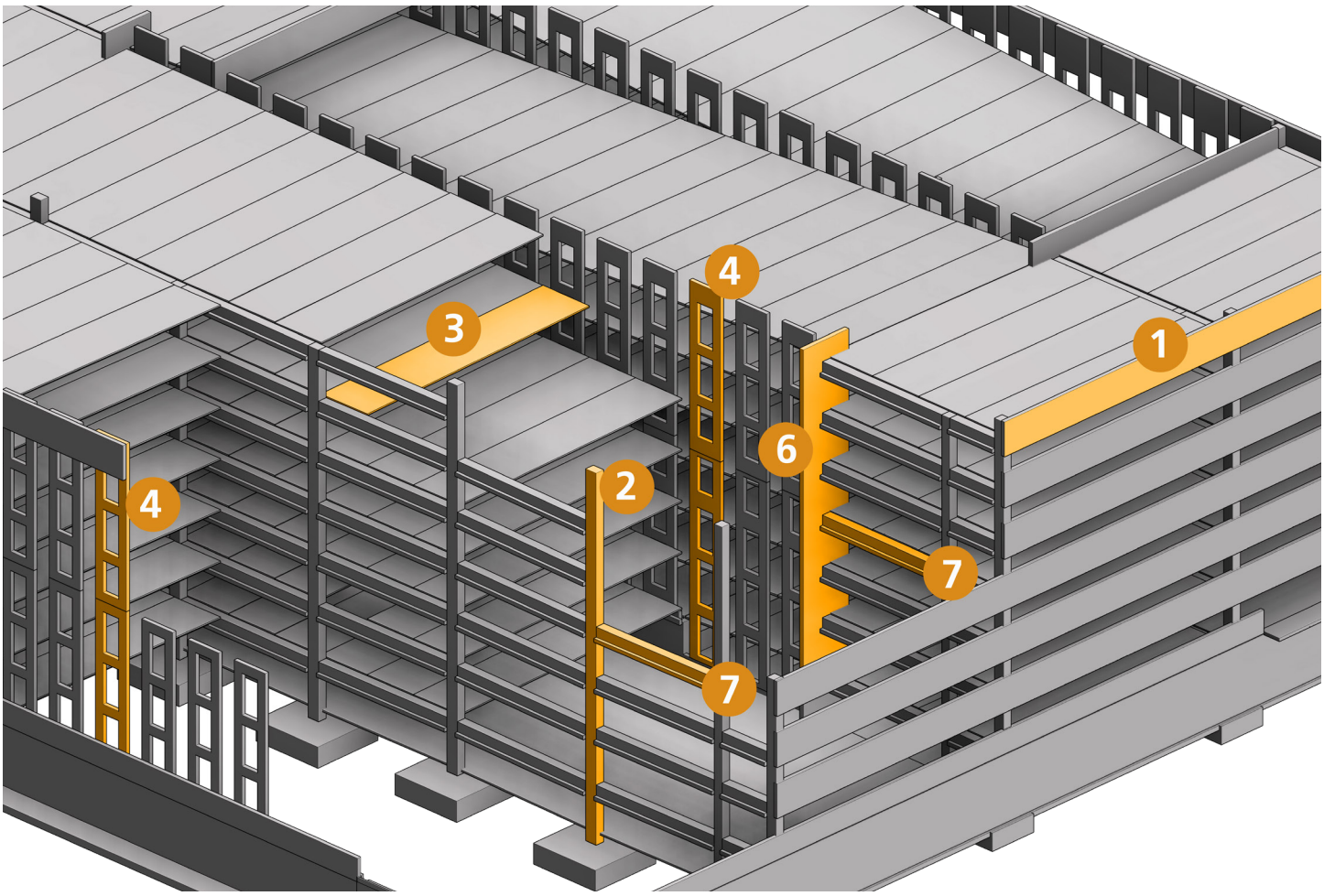
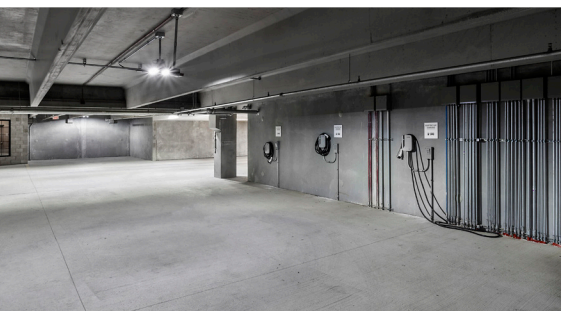
Parking Structure Design Details

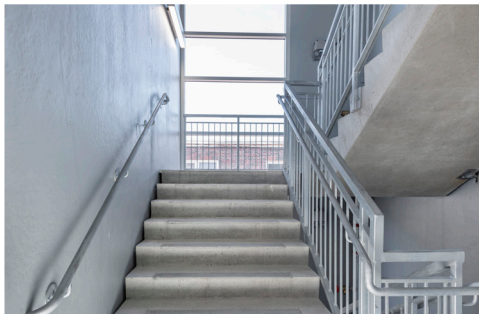
WELLS



Typical Components

1. Spandrels: carries the double tee (architectural finishes available to meet design requirements).
2. Columns: typical column size of 24" x 24"; larger columns may be required at exterior of multi-level structures (precast parking decks can be designed to be column-free on the interior).
3. Double Tees: typical 60' double tee span to accommodate two 18' long parking spaces and a 24' wide drive aisle. Longer lengths available.
4. Light Wall: load bearing interior wall designed with or without openings. Can also be an exterior architectural panel.
5. Stair and Elevator Core: precast wall panels and precast stair components are utilized to meet design requirements.
6. Shear Wall: designed to meet seismic or wind requirements (line of sight openings can be incorporated if desired).
7. Beam: inverted tee beam carries double tees allowing for ideal traffic flow crossovers (drive aisle and parking).

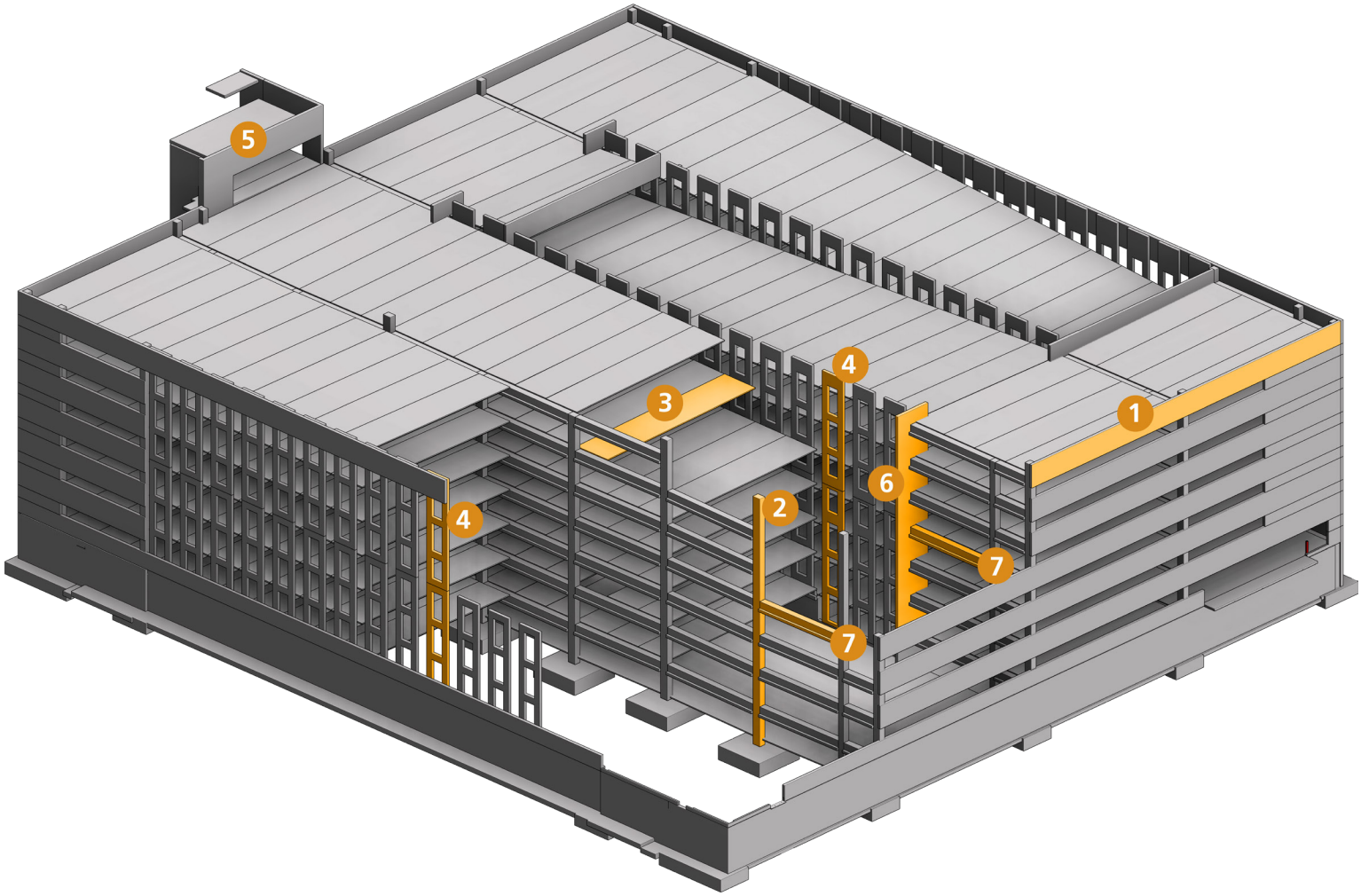




Design Guidelines

Functional layout and exterior design aesthetics can be achieved in the most cost effective way by working with Wells early on in the design process. Here are a few design guidelines we can help address in your planning process.

- Assume 300-325 sq ft per car space to obtain total square footage of parking structure
- Typical bay spacing is 36’ x 60’ wide bays, accommodates three 12’-0” wide double tees
- Spandrels designed to accommodate and fall protection height of 42”
- Dimensions of usable site: select traffic flow plan that will fit the site dimension
- Traffic ingress/egress conditions: ramp slopes, traffic flow, etc.
- Ramps are typically recommended slope of 6% (up to 7% has been used successfully) when parking on ramp
- Local building code limitations: stall size, aisle width, headroom, ADA, etc.
- Deck drainage
- Lateral bracing and shear wall locations
- Connection details at major interfaces
- Exterior finishes, mix designs, and product samples
- Snow removal considerations



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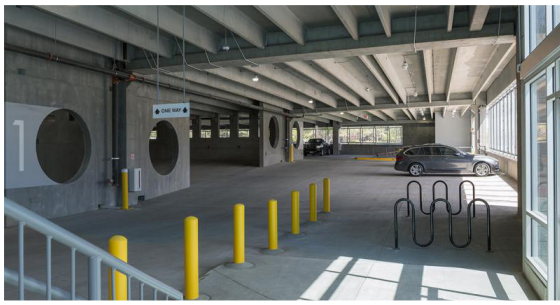


Typical Double Tees

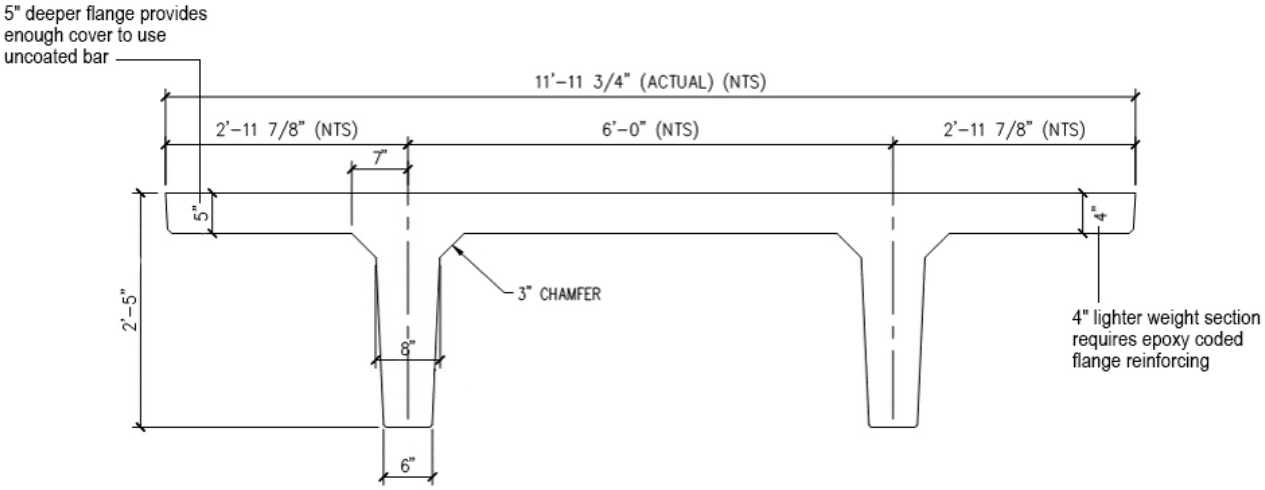
Factory Topped Double Tees

Standard Product

- Typically 12′-0″ wide x 29″ deep
- Double tee stem spacing is 6′
- Deck: up to 63′ span
- Factory controlled broom finish on driving surface

High Performance, Sustainable Double Tees

- More durable and less long-term maintenance than cast-in-place
- No concrete topping or sealer required on driving surface
- Spanning members that provide a driving surface
- Other tee sizes available along with field topped, consult your sales representative



Drainage

Proper drainage of the parking structure floors is mandatory, to eliminate ponding water, which promotes the absorption of deleterious chlorides into the concrete. Minimum slopes in two directions are necessary to achieve positive drainage to avoid ponding water.

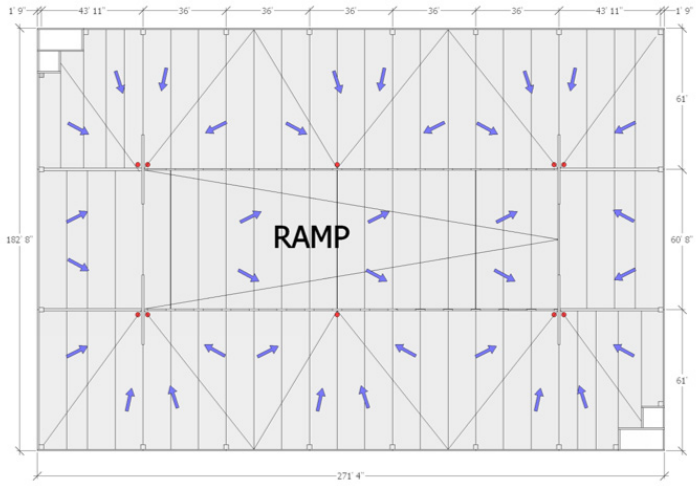
Slopes of 1.5% are common with 1% being the minimum acceptable field limit after construction tolerances are considered. Pitch is necessary to help ensure positive drainage and to overcome the effects of finishing tolerance, camber, and surface irregularities. Cross-bay drainage can best be achieved by raising one end of the floor members.

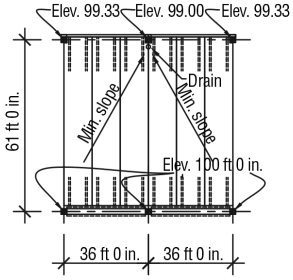
Drainage for Precast Parking Structures

- Diagonal slope should not be less than 1/8" per foot
- Do not put drains at expansion joints

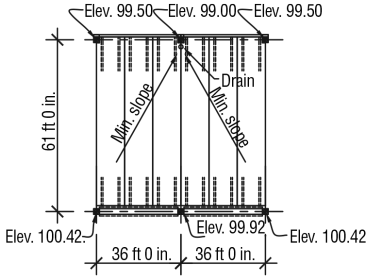
Design Considerations

- Positive slope
- Slope to drain
- Camber effect





A.) Drainage plan using warped double tees



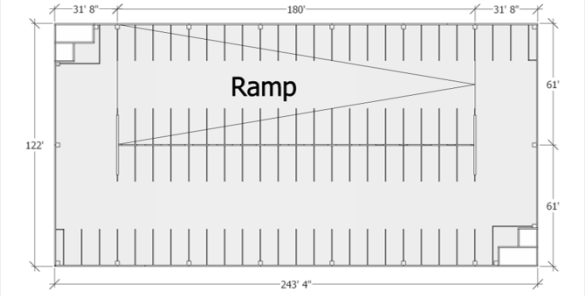
B.) Drainage plan with no warping of double tee

Efficiencies in Design

The most efficient parking structure in terms of square feet per space is generally thought to be 90-degree parking with two-way traffic. However, the efficiency advantage may be overstated. Properly designed angle-parking layouts with one-way end crossovers can yield similar efficiencies as compared to 90-degree layouts. The ease of parking and improved safety with a one-way traffic angled parking layout may offset any decrease in efficiency when compared to 90-degree parking building construction to proceed while the design is developed.

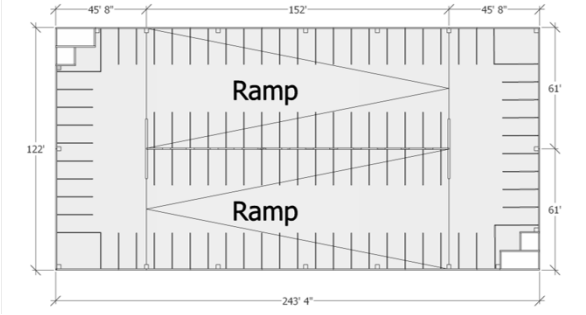
Single Ramp without End Bay Parking

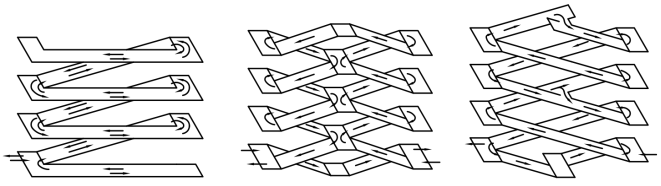
- 29,686 sq ft floor plate
- 88 spaces
- 337 sq ft per space



Double Ramp with End Bay Parking

- 29,686 sq ft floor plate
- 94 spaces
- 315 sq ft per space
- 6.5% more efficient
- Camber effect

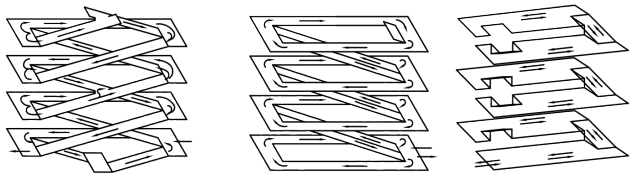




Two Bay
Two Way Single Thread Helix

Two Bay
One Way End to End Single Helix

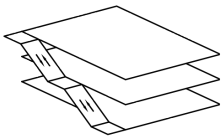
Two Bay
One Way Double Thread Helix



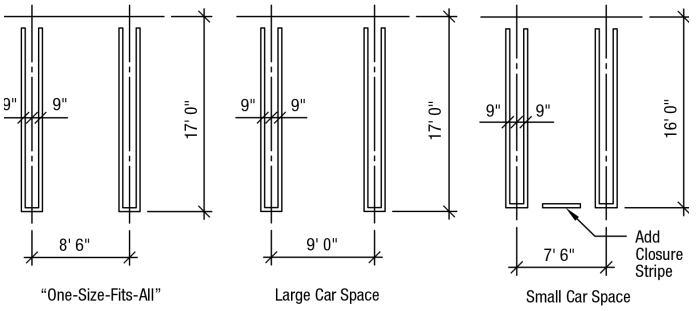
Three Bay
One Way Double Thread Helix

Four Bay
One Way Side By Side Single Helix

Two Bay
Two Way Split Level Helix

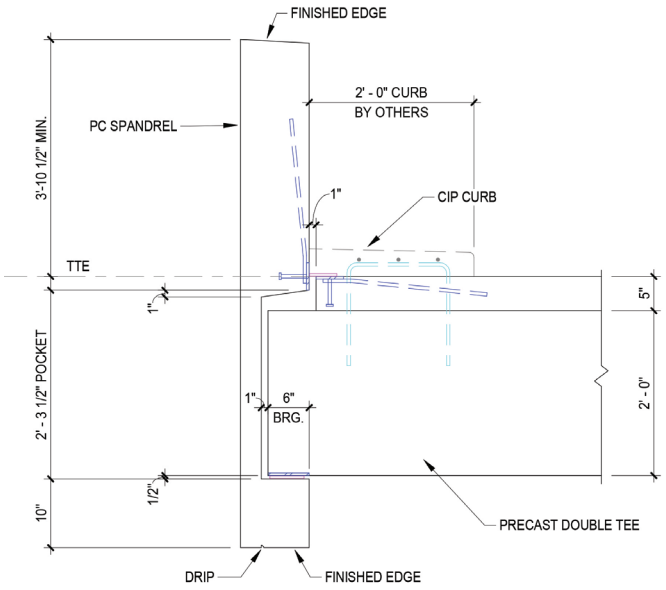


Express Ramp

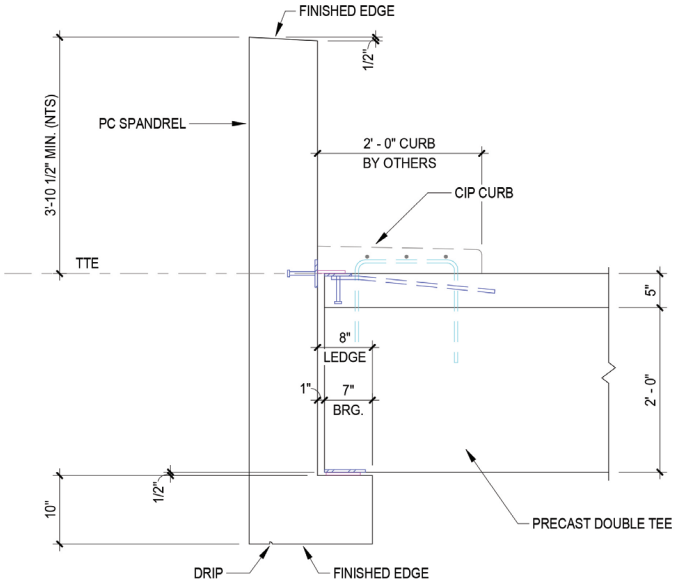


Design Details

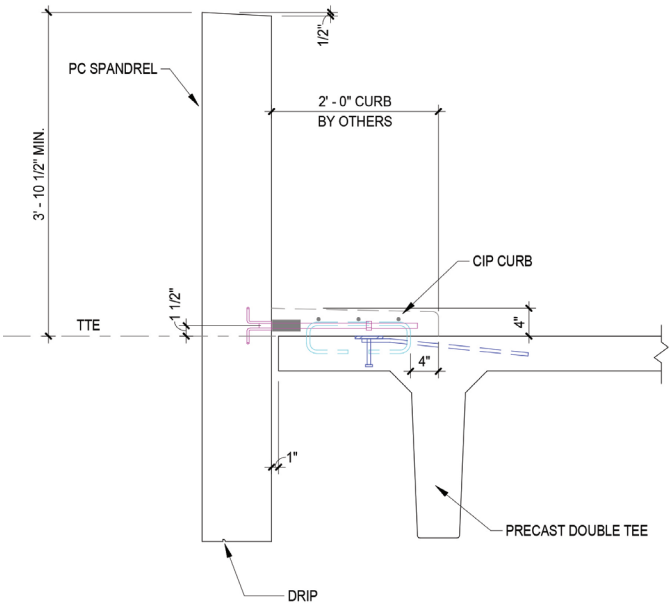
Precast Double Tee Bearing at Pocket Spandrel



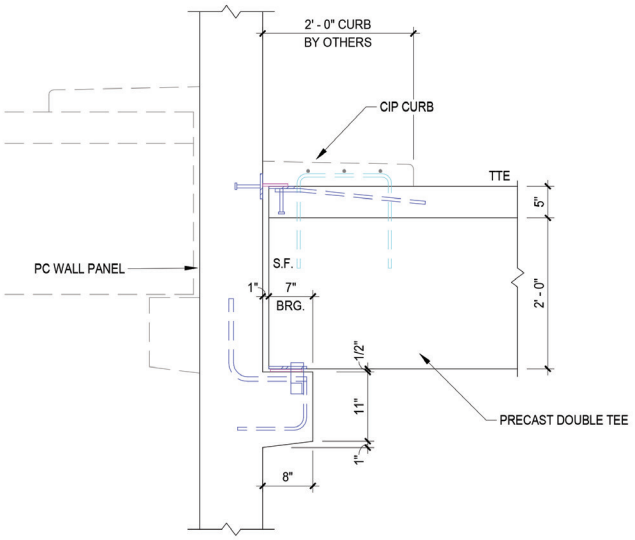
Precast Double Tee Bearing at L-Spandrel



Typical Curb Connection at Spandrel

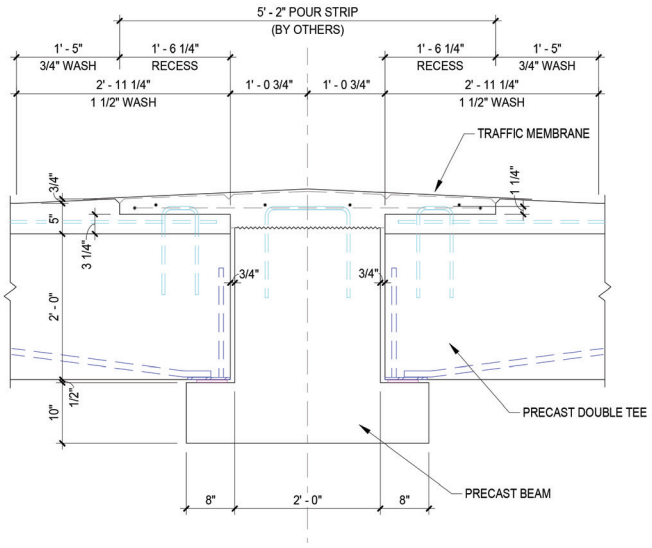


Precast Double Tee Bearing at Vertical Wall

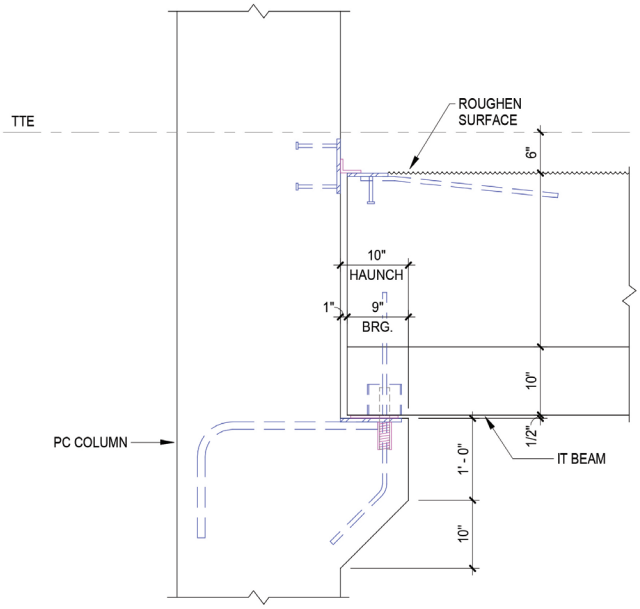


Design Details

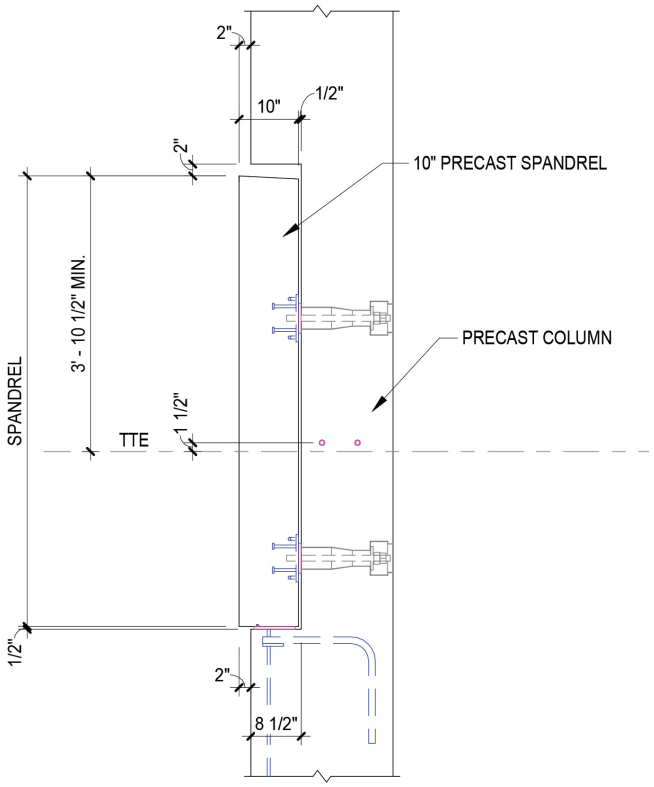
Double Tee Bearing at Crossover Beam



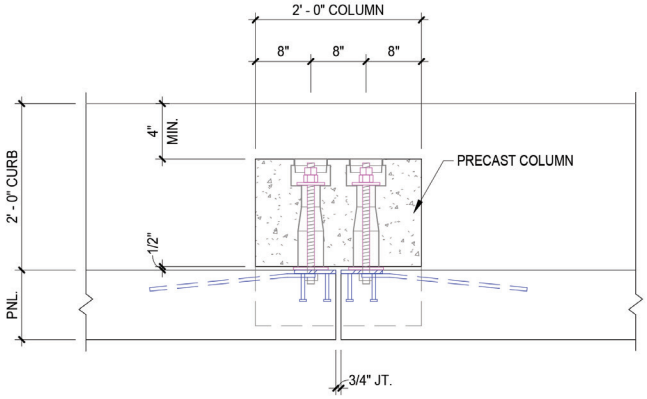
Beam to Column Connection



Spandrel to Column Connection at Bearing Condition

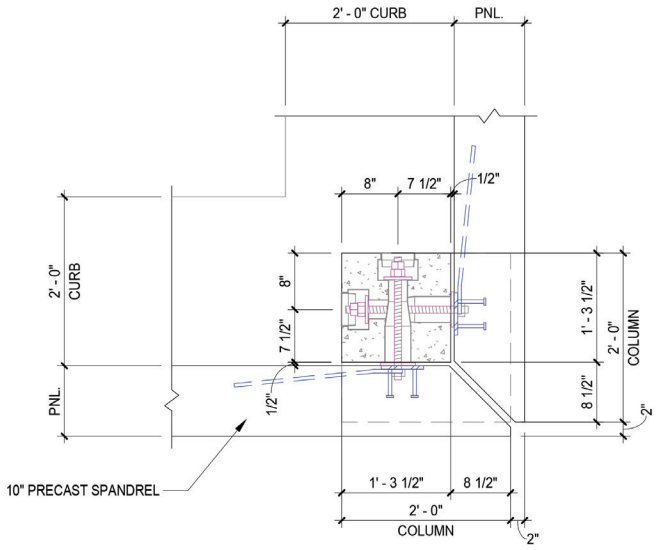


Spandrel to Column Tie Back Connection

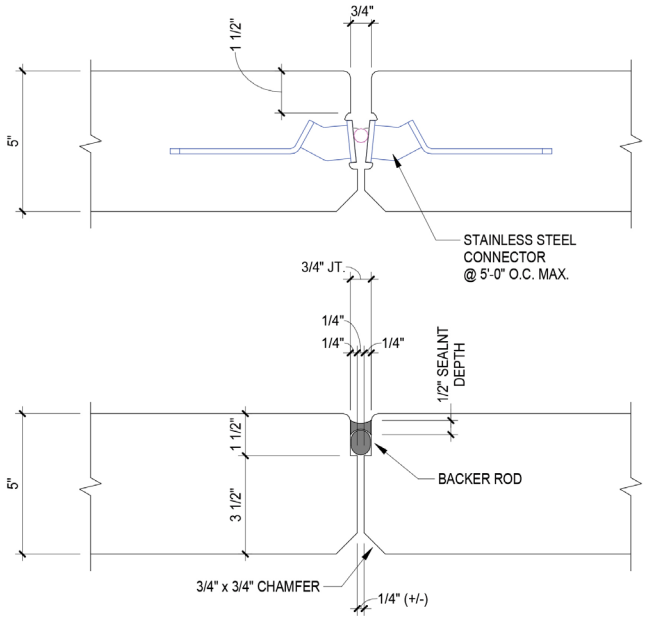


Design Details

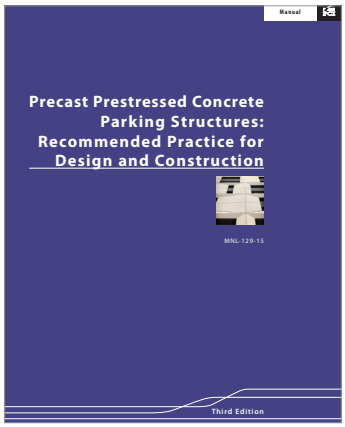
Spandrel to Column Tie Back Connection at Corner

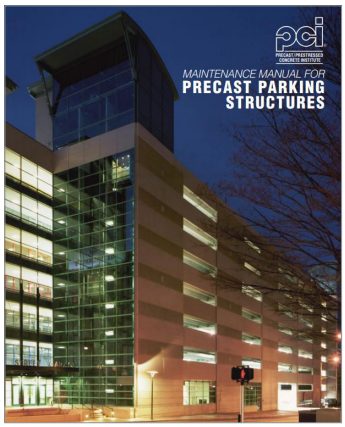


Double Tee Flange to Flange Connection



PCI Parking Design Manuals





"When it comes to parking, Wells brings a higher expertise. They play a key role in defining issues, bringing solutions and ultimately helping us establish an understanding of the overall cost."

FIL REA
PRECONSTRUCTION MANAGER
& SENIOR ESTIMATOR - WEITZ

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