Engineering Justification for Alternate Pay Item Pricing
Item: 714-11956 – STRUCTURE, COATED REINFORCED CONCRETE, BOX SECTIONS, 10 FT X 9 FT (Unit: LFT)

---

1. Narrative: Why Alternates Were Needed

The requested item, a 10 FT x 9 FT coated reinforced concrete box section, is not commonly bid in the project region, resulting in insufficient direct historical pricing data. To ensure a reliable and competitive estimate, alternate pay items with similar structural characteristics and dimensions were identified. These alternates provide a basis for establishing a fair market price by leveraging available bid data from comparable box section sizes and configurations.

---

2. Candidate Summary

- **714-11120:** 16 FT x 6 FT, 96 ft², Adjusted Price: $2,484.38/LFT, Data Points: 3
- **714-11185:** 10 FT x 8 FT, 80 ft², Adjusted Price: $2,559.38/LFT, Data Points: 8
- **714-11187:** 12 FT x 6 FT, 72 ft², Adjusted Price: $3,750.00/LFT, Data Points: 9
- **714-11444:** 13 FT x 7 FT, 91 ft², Adjusted Price: $4,500.00/LFT, Data Points: 3
- **714-11755:** 11 FT x 7 FT, 77 ft², Adjusted Price: $2,712.27/LFT, Data Points: 3
- **714-11957:** 15 FT x 6 FT, 90 ft², Adjusted Price: $3,335.00/LFT, Data Points: 3

---

3. Weighting Narrative

To derive a representative unit price, alternates were blended using a weighted average approach. The primary criteria for weighting were:

- **Area Similarity:** Alternates with cross-sectional areas closest to the target (90 ft²) were given higher weight, as structural cost per foot is strongly correlated with area.
- **Data Robustness:** Alternates with more data points were favored for statistical reliability.
- **Configuration Similarity:** Preference was given to alternates with similar width-to-height ratios.

Blended Alternates and Weights:

- **714-11957 (15x6, 90 ft²):** Exact area match; weight = 0.40
- **714-11444 (13x7, 91 ft²):** Closest area (91 ft²); weight = 0.20
- **714-11185 (10x8, 80 ft²):** Slightly smaller area but strong data (8 points); weight = 0.20
- **714-11120 (16x6, 96 ft²):** Slightly larger area; weight = 0.10
- **714-11755 (11x7, 77 ft²):** Moderate area, moderate data; weight = 0.10

Excluded:
- **714-11187 (12x6, 72 ft²):** Area too small and adjusted price is an outlier.

Rationale:
The largest weight is assigned to the exact area match (714-11957), with secondary weights to alternates within ±10% of the target area and/or with strong data. This approach balances area similarity and data reliability, ensuring the estimate reflects both market trends and structural

equivalency.

---

4. Math Work

Given:
- 714-11957: $3,335.00/LFT (weight 0.40)
- 714-11444: $4,500.00/LFT (weight 0.20)
- 714-11185: $2,559.38/LFT (weight 0.20)
- 714-11120: $2,484.38/LFT (weight 0.10)
- 714-11755: $2,712.27/LFT (weight 0.10)

Formula:
Weighted Unit Price = (P1 * W1) + (P2 * W2) + (P3 * W3) + (P4 * W4) + (P5 * W5)

Substitute:
Weighted Unit Price =
(3,335.00 * 0.40) +
(4,500.00 * 0.20) +
(2,559.38 * 0.20) +
(2,484.38 * 0.10) +
(2,712.27 * 0.10)

Result:
= (1,334.00) + (900.00) + (511.88) + (248.44) + (271.23)
= 3,265.55 $/LFT

---

5. Conclusion

The resulting unit price of **$3,265.55/LFT** is reasonable for the project scope, reflecting a blend of market data from structurally and dimensionally similar box sections. The weighting method ensures the estimate is both statistically robust and technically justified, accounting for area similarity and data availability. This approach provides a fair and competitive price for budgeting and bidding purposes, given the lack of direct historical data for the requested configuration.