Innovative / Alternative Contracting Methods and the Analysis of Highway Traffic Noise and Abatement Warrants

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TRB Committee ADC40 Summer Meeting – Minneapolis, MN
July 23-26, 2017

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Acknowledgement

- **Matthew G. Mann, Sr., PE**
  - In-house Consultant for the Noise Abatement Design & Analysis Team in the Office of Planning and Preliminary Engineering at MDOT SHA .
  - Senior Highway Noise Analyst and TNM Technical Expert.
  - Developed numerous analysis tools and procedures.
  - **Provided substantial input into articulating the specific analysis issues and challenges encountered in the context of D-B projects.**

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Focus of Discussion

- Quick overview of contracting methods and goals
- Analysis Processes
- How contracting method affects noise analysis
- **Others experiences**

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Contracting methods

- Design–Bid–Build
- Design–Build
- Progressive Design-Build

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Goals in Pursuing Innovative/ Alternative Contracting

- Consolidating responsibilities to a single entity.
- Foster flexibility and innovation in development of design solutions.
- Shorten overall project delivery time.
- Cost reduction.
- Provide a “better” product/project.

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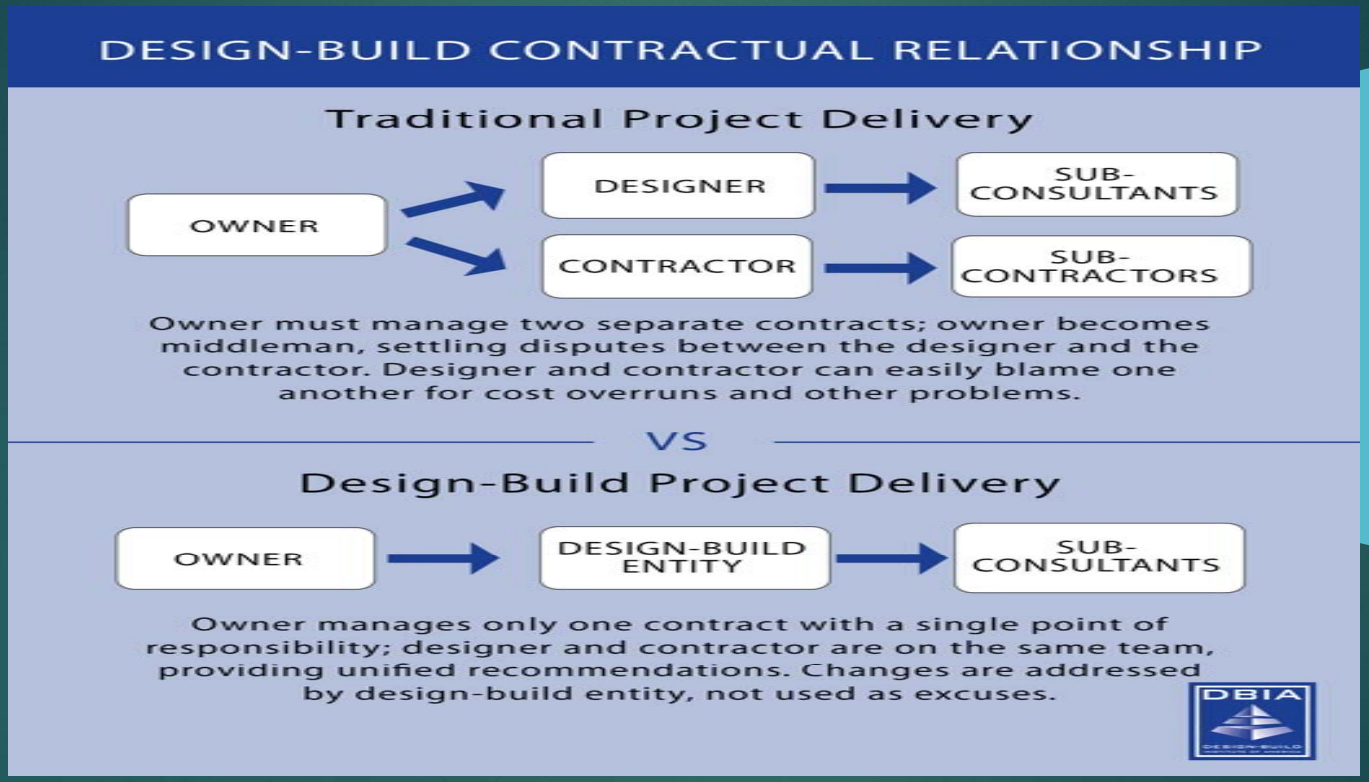
Design–Bid–Build vs. Design-Build



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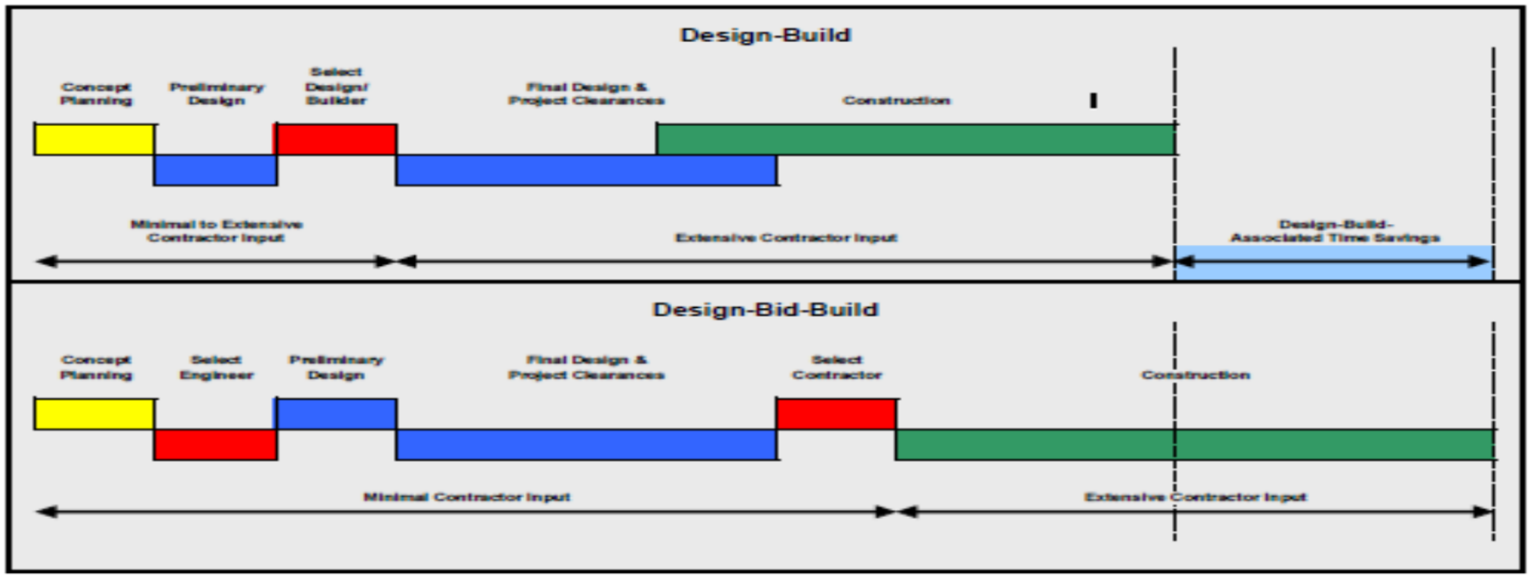
Sequence of Project Delivery Activities by Contract Approach



Source: Dr. Keith Molenaar, University of Colorado at Boulder

Graphic from Design-Build Effectiveness Study – Final Report, January 2006, for USDOT, FHWA

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Design-Bid-Build

- "Traditional" method.
- Sequential.
  - Application of environmental regulations / permitting.
- Lengthy schedules.
- Noise analysis follows sequential process.
  - Inventory / Identification of land uses.
  - Existing noise measurements / model validation.
  - Future prediction of noise levels.
  - Impact evaluation.
  - Abatement analysis.

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Design-Build

- Fixed price based on preliminary design (15-30%).
- Concurrent final design activities, based upon preliminary design provided by owner.
- Compressed schedules.
- Environmental analyses (including noise) based on preliminary design.
- Performance specifications (including for mitigation).
- Streamlined processes.

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Progressive Design - Build

- Design-builder retained early in project, in some cases prior to start of design development.
- Design-builder selected primarily on qualification; cost and schedule not considered in selection.
- Minimized prescriptive detail to foster maximum flexibility and innovation.
- Two phase delivery..
  - Phase 1 - pricing level design, preconstruction services & negotiation of firm contract price.
  - Phase 2 – Final design & construction.

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So, how has D-B / PDB affected the conduct of highway noise analyses?

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General observations

- Studies and research into “effectiveness” of D-B approach to projects; little to no mention of specific environmental considerations, except for issues of permitting.
- Other environmental clearances / approvals through the NEPA process not specifically evaluated in terms of scheduling influences, data requirements.

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General observations

- Influence by political or other “outside forces”, which require extremely compressed project schedules, D-B preferred approach.
- It appears that adoption of D-B and PD-B is being done in a “regulatory vacuum”; technical analysis must be completed with less than optimal base information, and in a compressed timeframe.
- Design changes that require revisiting of previous analysis can result in changes in impact and abatement determinations.

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Other Specific Issues (Noise)

- Standard sequential procedures don't always apply.
  - Every project requires a customized analysis approach.
    - Mature analysis (final design-level base data) completed prior to RFP including performance specs for confirmed abatement measures.
    - Abatement eligibility determined after RFP, during the D-B process.
    - Base data only prepared for the RFP consisting of existing measurements and validation. No future abatement warrants yet determined.
    - Abatement implementation deferred to separate D-B to follow main project. Barrier concepts developed in-house under existing worst case (EWC) to facilitate/support subsequent "future build" barrier analysis.
    - Schedules may dictate model development and measurement be done concurrently.

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Other Specific Issues (Noise)

- Standard sequential procedures don't always apply.
  - Some project analyses based on conceptual designs; detailed designs do not yet exist.
    - EWC modeling (conducted **prior to** measurements/validation) used to determine where noise barriers may likely be required; used to develop early project cost estimates.
    - Noise abatement liability is being sought based on conceptual designs.
    - Only viable for certain projects like those that do not involve radical or substantial changes to the existing facility. (e.g. projects designed for congestion relief)
      - *Auxiliary lanes.*
      - *Restriping for added capacity.*
      - *Part-time / hard-running shoulder use.*

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SOLUTION

- Collaborative approach to conduct of noise analyses (already part of MDOT SHA practice/procedures).
  - Establishing / providing NSA delineations/definitions to analysis provider.
  - Traffic data pre-processing for TNM.
  - Ongoing, intermediate technical reviews (measurements, modeling, and abatement analysis).
  - Allows for targeted efforts at streamlining certain aspects of the noise analysis (based on scheduling pressures).

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Any thoughts /experiences with D/B in conducting highway noise analysis?

THANK YOU

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