Building Better Broadband

ACCELERATING DESIGNS & SECURING PERMIT APPROVALS

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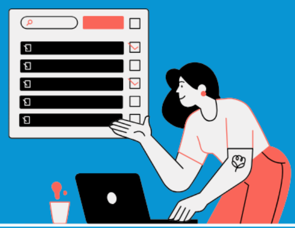
Fiber Broadband ASSOCIATION

Deployment Specialists Committee &
Engineering Best Practices Working Group

When fiber leads, the future follows.

Building Better Broadband



Engineering Best Practices: Accelerating Designs & Securing Permit Approvals

IT'S TIME FOR A CLEARER PATHWAY TO GUIDE EVERY FIBER BUILD FOR OPTIMAL SPEED & QUALITY

Early decisions shape project success. Prioritizing these questions will inform the end-to-end engineering process.

- Where are we building?
- What are we building?
- How much will it cost?
- How will we build it?
- Who is involved?

ENGINEERING PATHWAY

PLANNING & HIGH LEVEL DESIGN (HLD)

- Geography and demographics
- Budget and funding
- Time-to-market/schedule

FIELDING & BASE MAPPING

- Existing data sources
- Field data capture
- The role of AI

LOW LEVEL DESIGN (LLD)

- Cable, permit and construction drawings
- Standards
- GIS/CAD integration

PERMITTING APPROVALS

- Permitting authority engagement
- Engineering requirements

CONSTRUCTION READINESS

- Delivery formats for local constituents
- Digital as-built process

This framework supports developing best practices that enable clearer plans, better coordination, and faster builds.

IMPORTANT THINGS TO CONSIDER

- Clear communication across all stakeholders with well-defined coordination.
- Think about manufacturing and avoiding waste. Look to the Japanese 'Muda' principle.
- Ensure all data sets can be utilized downstream.

Please see our other white papers detailing best practices for permitting and locates *here*

PURPOSE AND VISION

- Promote clarity, efficiency, and quality on broadband engineering practices across planning, design, permitting, and construction.
- Provide a common and consistent baseline for how broadband projects are planned, designed, and executed, while still allowing for regional and local flexibility.
- Create a best practices foundation built on FBA members' hard-won experiences and lessons learned to help networks builders and stakeholders avoid mistakes, accelerate time-to-market, reduce cost overruns, achieve greater predictability, and maximize the impact of public funding.
- Establish a common approach for broadband engineering and deployment similar to the success of FHWA's standardized approach in transportation.

FOUNDATIONAL QUESTIONS GUIDING EVERY BUILD

Every successful broadband project begins with five defining questions. A standardized framework requires these questions to be clearly answered before design or permitting begins:

1. ***Where are we building?***
   Identify target communities, service gaps, and environmental/geographic conditions.
2. ***What are we building?***
   Define network architecture (fiber model), build types (overhead, underground), and capacity and scalability goals.
3. ***How much will it cost?***
   Establish funding alignment, budgeting transparency, and cost-efficiency benchmarks.
4. ***How will we build it?***
   Determine construction methods, applicable safety standards, and resource planning.
5. ***Who is involved?***
   Clarify public engagement requirements and stakeholder roles, authority, and lines of communication among engineers, regulatory agencies, and contractors.

These questions serve as the strategic foundation of a standardized approach to broadband networks and ensure all stakeholders begin with unified expectations, accountability, and measurable outcomes.

Answers to these questions, the resulting plans, and supporting documents, will become the guiding principles that determine the outcomes and ultimate success of the project.

CORE PRINCIPLES OF A STANDARDIZED FRAMEWORK

To bring national consistency without stifling innovation, broadband engineering should align several guiding principles:

- Collaboration and Coordination: Clear communication and well-defined coordination across all regulatory agencies (local, state, federal), utilities, and contractors.
- Data Integration and Transparency: Apply interoperable GIS/CAD standards and digital as-builts that flow from field to final record, with tiered expectations for areas facing technology challenges.
- Efficiency and Sustainability: Encourage lean processes and reduced waste for simplicity of design and lower cost where applicable and appropriate.
- Quality and Accountability: Ensure that every phase of a broadband build meets consistent standards for documentation, safety, and deliverables.

AN ENGINEERING PATHWAY FRAMEWORK

The Engineering Working Group has outlined the following end-to-end structure that improves consistency, reduces risk, and accelerates broadband builds nationwide.

1. ***Planning & High-Level Design (HLD)***
   - Develop clear project objectives informed by geography, demographics, and funding.
   - Evaluate technology, feasibility, and cost alignment before entering detailed design.
   - Use standardized templates and formats for deliverables to improve comparability and streamline permitting reviews.
2. ***Fielding & Base Mapping***
   - Integrate existing datasets and use AI-assisted field capture where applicable.
   - Capture accurate survey-grade data efficiently to inform all design needs. Whenever possible, capture once to avoid multiple trips to the field, and exploit the latest advancements in digital fielding, reality capture, and AI-based analytics that operate at scale.
   - Ensure field data translates seamlessly into design systems through general guidance on standardized data prerequisites.

3. ***Low-Level Design (LLD)***

    - Seamlessly transition and convert planning concepts into detailed, constructible designs.
    - Standardize engineering requirements and CAD/GIS layers and naming conventions for consistency. Leverage available systems, IT, and engineering standards and limit proprietary schemas, formats, and tools. Data sets should be portable, exchangeable, and migratable among/to other systems to the greatest extent possible.
    - Support downstream coordination between design, permitting, and construction teams through early review and integrated collaboration processes. Use of a unified "single pane of glass" approach should be favored as much as possible.

4. ***Permitting & Approvals***

    - Promote early engagement with permitting authorities and utilities.
    - Implement consistent engineering submittal standards for faster reviews.
    - Transition to digital workflows for review, tracking, and approval.
    - Encourage agency-specific "permit-ready packages" that follow an established common, best-practice approach.

5. ***Construction Readiness***

    - Validate that all design, cost, and approval data are aligned before mobilization.
    - Deliver digital as-builts and "construction-ready" deliverables for quality assurance.
    - Ensure accurate, accessible as-built records that support ongoing maintenance and future network expansion.

ECONOMIC BENEFITS OF STANDARDIZATION

- Accelerates permitting and build-out timelines through predictable requirements.
- Reduces duplication and waste, improving return on investment for public and private investment.
- Elevates quality and safety while promoting equitable and flexible implementation across rural, tribal, and urban communities.
- Builds unified data systems that connect design, construction, and long-term asset management for lower cost via economics of scale.
- Simplifies collaboration among state DOTs, municipalities, and network operators ensuring all stakeholders can stay informed and contribute throughout the design process.