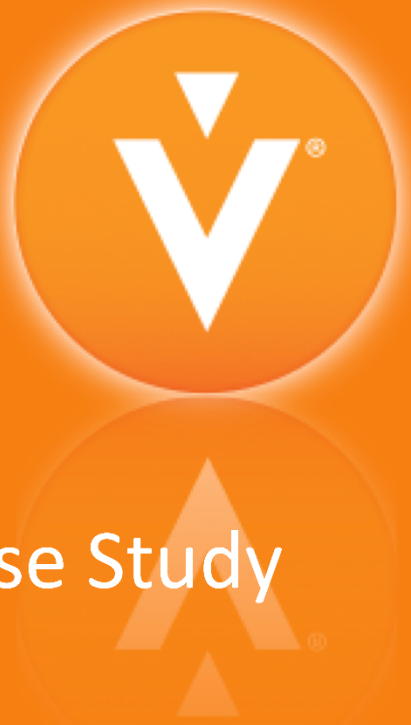
DEPARTMENT OF TRANSPORTATION



VESTED® For Success Case Study

From Tragedy to Triumph:

How the *Minnesota Department of Transportation* Turned the I-35 Bridge Tragedy to Triumph

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Vested For Success

How the Minnesota Department of Transportation
Turned the 1-35 Bridge Tragedy to Triumph

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EXECUTIVE SUMMARY

The world held its collective breath during rush hour, August 1, 2007, as Minnesota's Bridge #9340 buckled, then collapsed into the mighty Mississippi River 64 feet below. More than a hundred vehicles were trapped on the I-35W Bridge as it tumbled into the water, submerging 17 cars and stranding many others. A semi-tractor caught fire, as did several other cars. A school bus carrying 63 children perched precariously against a guard rail; a 20-year-old staff member kicked out the rear emergency exit and helped the students to exit safely.[1] In the end, thirteen people, 8 men and 5 women, died and 145 were injured.

As catastrophic as the bridge failure was, and tragic in loss of life, it became immediately apparent losing one of the major traffic arteries in the Twin Cities area had dire monetary consequences. The Minnesota Department of Transportation (MnDOT) Office of Investment Management estimated the daily cost to motorists at $400,000. The State Department of Economic Development Impact Analysis believed the average net economic impact incurred an additional $113,000 daily reduction in the State's economic output. The Minneapolis Regional Chamber of Commerce claimed the daily cost to business exceeded half a million dollars.

While no one could agree on an exact magnitude of impact, everyone agreed that delay was not an option. MnDOT needed to build a new bridge. Quickly, Minnesota Governor Tim Pawlenty challenged MnDOT to complete a replacement bridge within 18 months. Considering it typically takes that long (or longer) just to identify the scope of a project the size of the I-35 Bridge, MnDOT knew they needed to approach this rebuild in a radically different way.

Much to the amazement of, well, just about everybody, the new state-of-the-art I-35W St. Anthony Falls Bridge opened for business ahead of schedule on September 18, 2008. Cars lined up for hours to experience the privilege to follow First Responders, State Troopers and MnDOT construction vehicles across the 1,223-foot span at 5:00 AM. It was the first official crossing of a breathtaking piece of architecture and technology-infused structure that in 2009 won the Grand Prize Winner from America's Transportation Awards for "representing the best in innovative management, accountability and timeliness."

This case study tells the remarkable story of how MnDOT turned tragedy into triumph using principles that the University of Tennessee researchers have coined Vested Outsourcing. This case study shares how MnDOT worked closely with the contractor - Flatiron Manson Joint Venture and architect FIGG Engineering – and applied the Five Rules of Vested Outsourcing to achieve what some called impossible.

[1] Ten students had minor injuries and one staff member was severely injured.

THE BATTLE WITH THE BRIDGE

Bridge 9340 was part of the US Interstate System I-35W and spanned the Mississippi River in Minneapolis, Minnesota. Its eight lanes carried 140,000 vehicles daily. Opened in 1967, the bridge was a truss arch bridge with a total length of 1,907 feet. Its longest span was 456 feet.

The architects, Sverdrup and Parcel, complied with the 1961 American Association of State Highway Officials (AASHO) Standard Specifications[2] and the bridge had a life expectancy of 50 years. Unfortunately, it took only 23 years for significant problems to emerge. In 1990, the US Department of Transportation (USDOT) classified Bridge 9340 as "structurally deficient."[3] The "structurally deficient" rating was reiterated each year[4] from 1991 until the bridge collapsed. Internal MnDOT communications referred to the possibility of the bridge collapsing and worried that it might have to be condemned. A meeting was planned for 8/20/2007 to determine how best to proceed.

MnDOT canceled the meeting because the bridge collapsed on August 1, 2007.

Progressive Contractors, Inc. (PCI) of St. Michael, Minnesota was performing construction work on the bridge when the disaster occurred. At the time of the collapse, construction had closed four of the eight lanes, and there were 575,000 pounds of construction supplies and equipment on the bridge. The faulty gussets could not bear the load: the bridge center span separated from the rest of the bridge and fell into the water.

Ultimately, the National Transportation Safety Board ruled the primary reason for Bridge #9340's collapse was improperly designed gussets, metal plates that connect beams to one another. Historically, industry experts presumed gussets to be stronger than the members they connect and did not typically test them as part of load ratings.

> *"Of course, I took it personally. Everybody in the department took it personally. Lifetime careers had been built on designing structures that are sustainable and safe. There was an enormous amount of pride. It was just a nightmare for anybody to go through this.*
>
> *It was something you could NOT, not take personally."*
>
> *Jon Chiglo, Project Manager*

[2] The American Association of State Highway and Transportation Officials, (AASHTO) fatigue design rules were substantially improved as a result of research at Lehigh University in the 1970's].
[3] The classification is based on a score of four or lower on a nine-point rating system.
[4] Except for the year 1999, when MnDOT admitted submitting wrong data.

INNOVATION DRIVES PROCUREMENT PROCESS

The collapse damaged public trust and confidence that MnDOT provided appropriate safety for Minnesota citizens. The nature of the tragedy demanded sensitivity and haste; feelings of fear, guilt and gut determination to make it right demanded something other than "business as usual."

MnDOT moved nimbly to meet the challenge. Within 18 hours of the bridge collapse, representatives of the City of Minneapolis, Federal Highway Administration (FHWA), and MnDOT met to decide how to begin rebuilding. They enlisted the help of industry leader Tom Warren[5] who fortuitously happened to be in town, collaborating on another project. Jon Chiglo, one of three MnDOT Project Managers who attended the meeting, received the project management post that afternoon.

John Chiglo knew the bridge rebuild required a profoundly different approach. Figure 1 (following page) shows that following the normal management process, it could possibly take up to five years before construction could even begin. This was unacceptable. If the I-35W St Anthony Falls Bridge Project were to meet the aggressive schedule and funding limitations, the management process needed monumental changes.

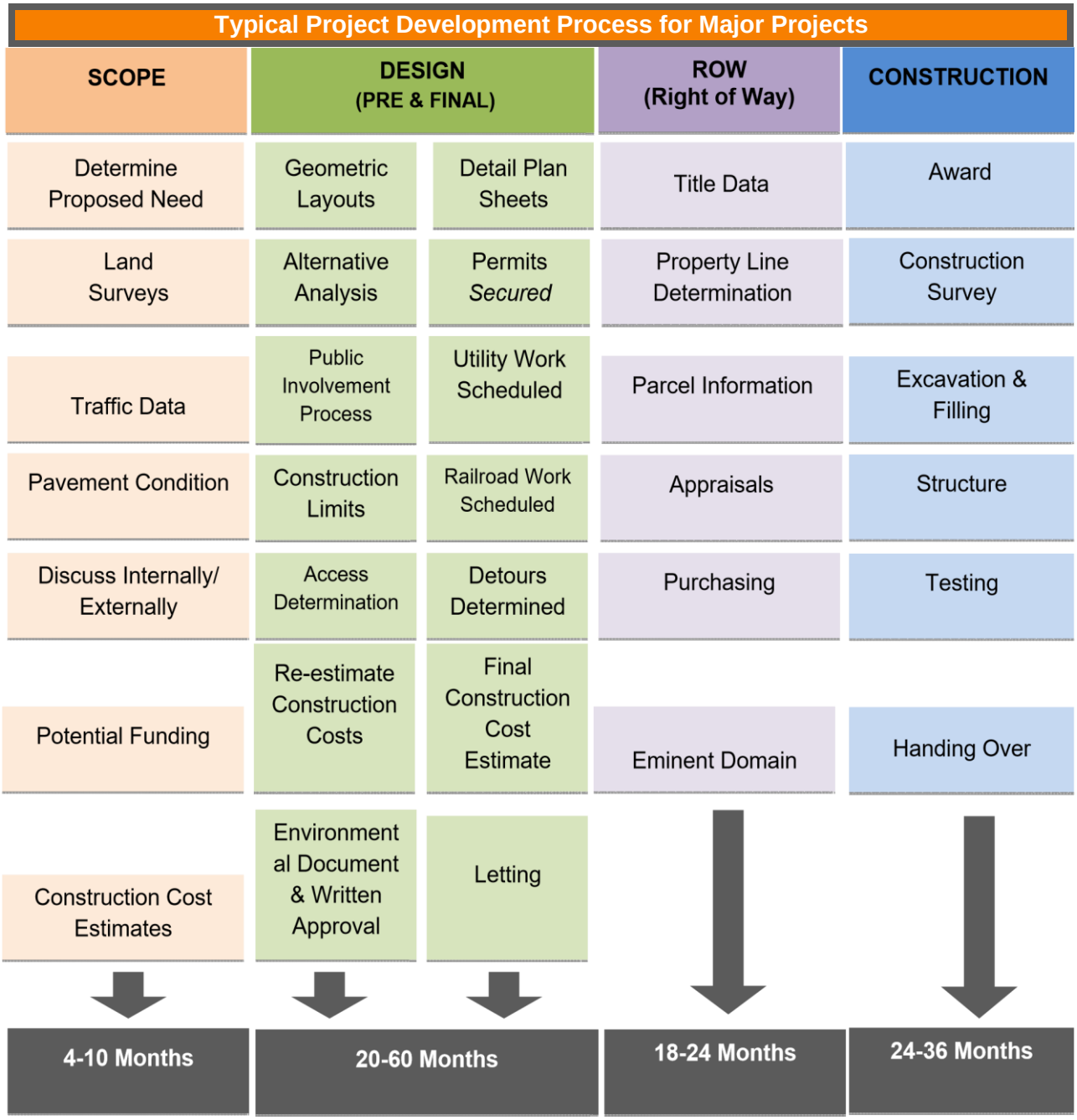
It became apparent to Chiglo and the team they must use more progressive approaches, and began investigating alternative approaches immediately. On the top of the list was the Minnesota Statute §161.3410, a law that gave MnDOT, Minnesota State Colleges and Universities (MNSCU), and the University of Minnesota (UofM) authority to use alternative methods for Project Management procurement.

The law was enacted to encourage the government entities to explore alternative sourcing models to those that had become the norm since the 1950s. Beginning in 1954, the Minnesota Supreme Court ruled the purpose of public bidding was to divest public officials of discretion to avoid even the appearance of "fraud, favoritism, and undue influence."[6] Officials believed it was logical to use the traditional low bid method of procurement to prevent abuse in the award of public projects.

After 1954, the bid with the lowest pricing would win the contract. The model generally was a Cost Reimbursable Contract, providing payment of allowable incurred costs. These contracts established an estimate of the total cost to obligate funds and establish a ceiling that the contractor may not exceed (except at its own risk) without the approval of the Contracting Officer.

[5] Warren was collaborating on another MnDOT project. He was Commissioner of Transportation in Utah during 2002 Olympics
[6] Griswold v. Ramsey County, 65 N.W.2d 647, 652 (Minn. 1954).

Figure 1: Business As Usual Is Not An Option



The cost-plus low bid approach is paved with good intentions of "watching out for taxpayer dollars." However, Chiglo knew the conventional approach had fundamental flaws. Experience had told Chiglo and others that sticking with low bid contracts did not necessarily generate savings. Indeed, cost and time overruns were run-of-the-mill. There is little motivation for the contractor to innovate or bring expenses down because doing so may actually reduce profits.

The 2001 law was a paradigm shift that challenged government procurement agencies to stop seeing "low bid" as the obvious answer and, instead consider "best value." The new law infused discretion back into the process. The legislature believed, in certain circumstances, a different delivery system could achieve better results. Because of the 2001 law, "best value" to the public no longer assumed the low bid automatically won.

Chiglo and his team turned to the 2001 law that gave them the authority to use a *best value* approach versus the conventional cost-plus lowest bid approach. The rationale? It would enable them to balance cost, quality and timeliness as key factors in how they chose the contractors that would ultimately be charged with rebuilding the bridge.

The team also knew that the 2001 law also opened another door they wanted to explore. Specifically, the law granted permission for Design-Build authority, otherwise known as Construction Management at Risk. MnDOT was the first public agency to receive Design-Build authority. Traditionally, MnDOT selected contractors using the low-bid process with the design-bid-build delivery method. This meant MnDOT would design the project, either internally or with consultants, and then put the plans and specifications out for bidding. Usually, quantities were already set, and bidders entered their pricing for various items and respective quantities.

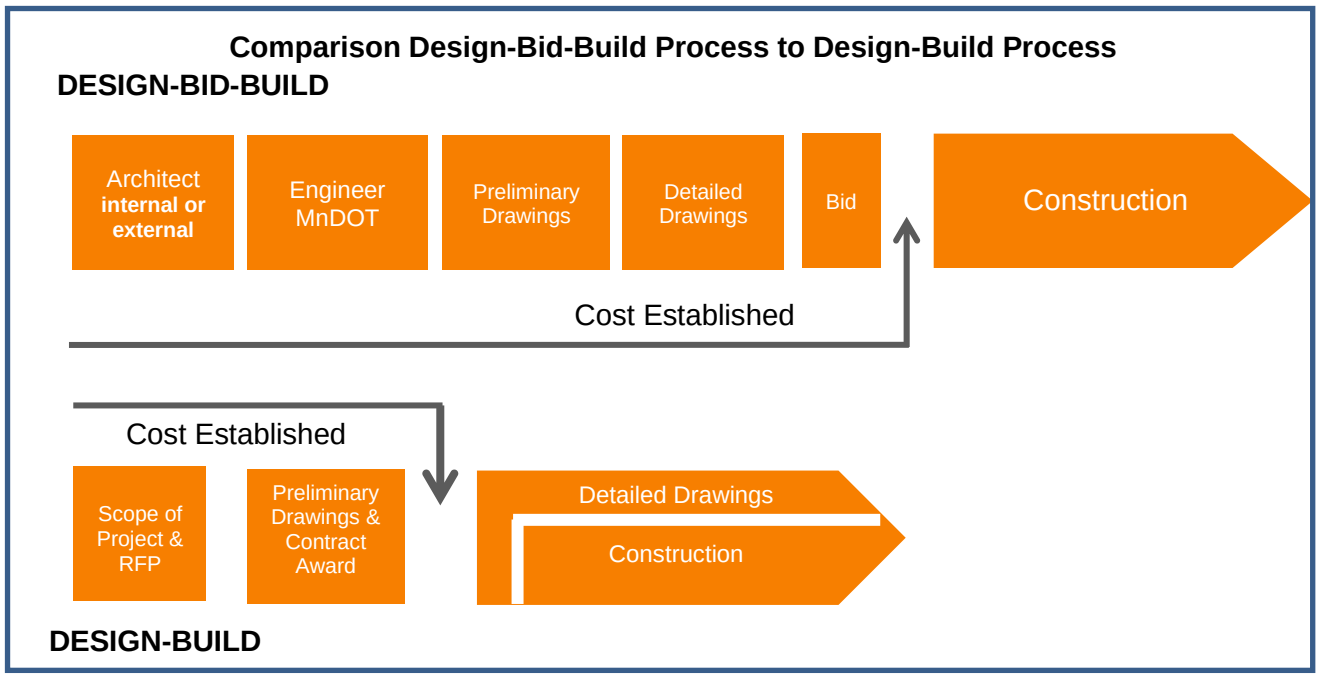
While the 2001 law enabled the use of the Design-Build process, it was rarely used. In fact, it had only been used six times[7]. Chiglo's research showed the use of the new approach used in November 2001 with a $232 Million Project for Rochester's Highway 52 and *took only fifty-one* weeks[8] from project initiation to project completion. However, government procurement groups and MnDOT project managers were used to using the conventional low-bid design-bid-build process and did not feel comfortable using the new approaches even though they were now legally allowed.

With the goal to restore the vital I-35W transportation link by the end of 2008, the group decided to use a combination of Best Value and Design-Build approaches because it stimulated speed of project delivery, design flexibility, and construction innovation. The plan was unanimously approved. Using Design-Build over the usual Design Bid Build process saved time, see figure 2 below.

[7] Highway 212 in the west Twin Cities Metro $238 M; ROC 52 in Rochester $232 M;I-494 in the west Twin Cities Metro $135 M; Highway 52 in Oronoco $37 M ; Highway 10/32 in Hawley $8.6 M; District 4 Signs $1.0 M

[8] This process took **69 days** for the I-35W St Anthony Falls bridge project

Figure 2: Comparison of Building Processes



Armed with this approval, Chiglo's team set out to find the right partner - a contractor that accepted MnDOT's aggressive goals as his or her own, understood the sensitive nature of the Project, and brought unique skills to the table. Further, they wanted a partner that openly shared risks and rewards for clearly defined mutual outcomes. Working more quickly than most folks thought possible, MnDOT moved forward with an unprecedented schedule:

August 1	Bridge collapsed.
August 2	Chiglo named PM; Decision to use Design-Build made.
August 3	Regulatory agencies agreed to expedite the permit process.
	Negotiations with property owners adjacent to the property began.
August 5	MnDOT issued Request for Qualification (RFQ) to interested Design-Build contractors.
August 8	Statements of Qualifications (SOQ) were due.
	MnDOT evaluated the SOQ's and selected five teams eligible to submit bids.
August 23	Categorical Exclusion Environmental document was approved by the FHA. MnDOT issued the Request for Proposals
August 23 – September 13	Daily one-on-one meetings with potential design-build teams to relay scope decisions as they were made.
September 14[9]	MnDOT received four proposals from Design-Build firms.

[9] On previous Design-Build projects, the procurement process ranged from 6 to 12 months.

REBUILDING A BRIDGE: REBUILDING CREDIBILITY

MnDOT is in the business of managing the state of Minnesota's infrastructure. MnDOT vowed to construct an improved, safe, state-of-the-art I-35W St Anthony Falls Bridge. And, while doing so, re-establish public credibility. Were Chiglo and his team to go against conventional approaches for procuring the bridge rebuild – they knew they would need to be very careful in ensuring fairness for all potential bidders and be able to justify why they may not go with the lowest price bidder.

To assure transparency and objectivity to the selection process, MnDOT was required by the 2001 law to list selection criteria for every stage of the process and the evaluation weight of each criterion. The clause in the 2001 law was designed to reduce concerns about excessive discretion and after-the-fact justifications for awards.

Chiglo and his team needed to follow this provision very carefully to ensure they received the "best value" in selecting a contractor and ensure fairness to the bidders. To adhere to the 2001 law, Chiglo's team carefully outlined the performance criteria for selecting a contractor. With clearly documented, weighted criteria, potential bidders could develop a proposal that best aligned their proposal to MnDOT's desired outcomes. The contractor whose proposal scored the highest according to the weighted criteria earned the award.

MnDOT set out by first seeking Requests for Qualifications ("RFQs") from interested bidders. A technical review committee reviewed the RFQs and selected a shortlist of Design-Builders to proceed to the second phase. Chiglo's team outlined the following Qualifications Based Selection ("QBS") that lists evaluation criteria for down-selection of suppliers to the shortlist:

- Proposer's experience as a constructor, designer or Design-Builder
- Key personnel
- Technical competence
- Past performance on similar projects
- Safety record
- Availability to and familiarity with the project locale.

Locally based contractors and designers demanded the last criterion. They wanted some evaluation credit for their proximity to a local project.

After a shortlist was selected, MnDOT issued an RFP with further defined criteria for the bids. Bidders' proposals were separated into two parts, 1) a technical proposal and 2) a price proposal. Different MnDOT teams independently evaluated and scored each part. MnDOT then divided the bidder's price proposal into the score given to the bidder's technical proposal.

Under the best value approach, MnDOT had to award the project to the proposer with the lowest score – *not the lowest price*.

One proposal was from Flatiron Constructors, Inc., and Manson Construction Company. They formed a joint venture (Flatiron Manson Joint Venture, or Flatiron Manson) for this project. Flatiron is a leader within North America's construction and civil engineering industry. Its credentials include many national landmark segmental, bascule, cable-stayed, and suspension bridges. Manson Construction is known for its professional workforce – many of whom are second, third and fourth generation workers. They specialize in constructing foundations, bridges, piers and other marine facilities in the United States.

Flatiron Manson brought in two important partners, Johnson Brothers and FIGG Bridge Engineers, Inc. Johnson Brothers is a heavy civil contractor with 80 years' experience specializing in bridge, highway, infrastructure, marine, industrial and emergency construction services for both public and private clients. They brought the expertise to deliver construction services on a fast-track schedule-driven basis, Design-Build basis, fixed-price, or price-not-to-exceed basis.[10] They also commissioned the support of world-renowned architect Linda Figg, President and CEO of FIGG Bridge Engineers, Inc. FIGG leads the bridge industry with a focus to create landmark bridges across the country.

The parties had worked together in the past, so an advantage of established relationships was evident. All parties brought solid records of bridge-building achievement as well as Design-Build methodology. Together, they constructed a formidable team. Less than 60 days after the tragedy, MnDOT signed a contract with Flatiron Manson. By contract, I-35W St Anthony Falls Bridge was scheduled to open to traffic by Christmas Eve, 2008. The parties involved knew that if they were to succeed, everyone would have to work side by side in a collaborative manner using their skills and resources optimally.

But this spirit of collaboration and joint responsibility spread beyond the contractors. It also included MnDOT. Chiglo and his team wasted no time in stepping up and helping on their end to find ways to work optimally. The short amount of time used for the contract award process set the standard for using time to best advantage. During this time, MnDOT secured eight of the ten required permits,[11] negotiated the relocation of a major gas line near the south abutment, and coordinated with the railroad to allow for the removal of five railroad tracks.

In a truly Vested manner, the organizations also agreed on a shared approach to risk management and responsibilities. Flatiron and Manson accepted liability, both severable and shared. Through the Flatiron Manson Joint Venture, they shared risk with MnDOT in many ways. Risk was assigned to the party best equipped to handle the risk. Some of the ways the parties allocated risk included:

[10] http://www.johnson-bros.com/About.html
[11] the other two became the responsibility of the contractor

- Quantity and Over-Runs - Flatiron Manson had risk associated with quantity and overruns and plan errors.
- Lump Sum Items or Contracts – In a typical MnDOT contract, quantities are meticulously measured, tracked, and compensated accordingly. In a lump sum contract, activities are measured and a percentage of the lump sum offered for reimbursement.
- Quality and Safety - Because Flatiron Manson had more responsibility for quality and safety MnDOT management shifted their role to verification rather than direct supervision. That resulted in the efficient management of MnDOT staff.
- Geotechnical Risk - MnDOT guaranteed soil borings while Flatiron Manson accepted risk associated with variability in the field.
- Design Sequencing and Utility Coordination – the parties agreed to a shared risk of responsibility for coordination for staging.
- Insurance Reimbursement - MnDOT assigned authority for insurance reimbursement to Flatiron Manson in the event of third-party damage (i.e., a car runs into a wall and damages it during construction).

It was clear from the beginning this give-and-take-arrangement set the tone for how the project would be managed. Together, both MnDOT and Flatiron Manson jointly achieved success when the bridge opened early on September 18th, 2008.

PLAYING BY THE RULES

The MnDOT, Flatiron Manson, and FIGG Engineering collaboration on the St. Anthony's bridge project achieved success from its inception. In fact, it exceeded expectations. We believe the reason for this success lays in the fact that MnDOT and its suppliers rigorously adhered to a Vested sourcing business model that follows five key rules. These rules are:

1. Focus on outcomes, not transactions
2. Focus on the WHAT, not the HOW
3. Clearly defined and measurable desired outcomes
4. Pricing model with incentives to optimize cost/service tradeoff
5. Governance structure based on insight, not oversight

This case study captures how MnDOT and Flatiron Manson and FIGG Engineering "played by the rules" when developing how they would collaboratively work on the bridge rebuild. Each rule is discussed to demonstrate how the organizations applied each of the rules.

The two men most responsible for working within the rules and ensuring fair play were Jon Chiglo and Peter Sanderson. MnDOT tapped Jon Chiglo to be Project Manager (PM) for the Project just 18 short hours after the collapse. Chiglo joined Peter Sanderson as Project Manager from the contractor's side. Together, they formed a formidable leadership team and accepted the challenge of designing and building a bridge in just over a year. The duo steered a tight ship – building a beautiful structure with no major injuries, constant community outreach, and unprecedented levels of quality inspections.

Together the men lead the joint MnDOT and Flatiron Manson team to turn tragedy into triumph.

RULE 1: FOCUS ON OUTCOMES, NOT TRANSACTIONS

Historically, MnDOT had used a design-bid-build delivery strategy and instructed contractors on how to perform the work using prescriptive specifications and processes. Here, MnDOT allowed Chiglo and team to use a Design-Build process that brings designers and contractors together early in the detailed design portion of a project. The Design-Build process is an outcome-based approach because it enabled MnDOT to purchase the end results – versus a series of transactions like pounds of concrete and hours of labor. The intent of using an outcome-based model is to allow flexibility, encourage innovation from bidders, and drive accountability for work.

While Chiglo's team visions on an outcome-based approach, the onus of public accountability precludes MnDOT from entering into a "purist version" of outcome-based approaches. Chiglo and his team faced an interesting dilemma found in government contracting processes. For good reason, MnDOT is not allowed to simply toss its complete responsibility over the wall to a potential contractor. Specifically, MnDOT must maintain its community service role and public safety roles.

To fulfill its primary function of public safety, Chiglo and his team balanced a blend of established safety precautions with the Design-Build methods to optimize how MnDOT and the potential contractor worked together. In the end, the I-35W St. Anthony Falls bridge contract wound up being a unique combination of statements granting wide latitude for big picture issues and interesting detailed instructions about smaller issues. Like having to sign the proposal in blue ink or face rejection. What can we say? Sometimes government agencies can't help themselves.

While there were details like blue ink, overall MnDOT granted substantial autonomy and flexibility to the bidders to determine how they would design a bridge that met MnDOT's desired outcomes. In this case, MnDOT stipulated geometric layout, environmental requirements, drainage requirements, and a deadline for completion of December 24, 2008. They also defined six sub-standard roadway geometric design elements to the original I-35W

freeway approaches to the bridge in the original "Request for Proposals," inviting (but not requiring) bidders to eliminate them as part of the project.

In addition, MnDOT clearly defined the expected standards and general specifications in terms of outcomes; the contractor would be required to meet MnDOT's expectations.

Key Attributes of Vested Outsourcing Desired Outcomes

1. Mutually Desired Outcomes become the focus of the project, the foundation for performance metrics, and indications of what will be included in the contract.
2. Outcomes must be objective and measurable.
3. The fewer the outcomes, the better.

The RFP listed MnDOT's six primary Desired Outcomes the potential bidders needed to solve:

1) Safety
    a) Provide a safe project area for workers, the traveling public, community, environment and emergency services during the execution of the Project.
    b) Provide a solution consistent with Mn/DOT design and construction standards.
    c) Provide a solution adaptable to the recovery efforts of the collapsed bridge
2) Quality
    a) Implement a quality management system that ensures the requirements of the Project will be met or exceeded and ensure public confidence.
    b) Reduce future maintenance costs by providing a high-quality project.
3) Schedule
    a) Complete construction by December of 2008.
4) Environmental Compliance
    a) Provide a quality product with minimal impacts to the environment while using context-sensitive solutions.
5) Budget
    a) Implement innovative solutions to maximize the return on taxpayer investment by reducing costs and improving the quality of the transportation system.
6) Aesthetics
    a) Utilize visual quality techniques and context-sensitive design to incorporate the bridge into the surrounding environment.

Focusing on these outcomes allowed Flatiron-Manson and FIGG Engineering to develop innovative and efficient solutions to meet expectations versus simply performing the task outlined in a detailed Statement of Work on a cost-plus basis.

The last criteria – aesthetics – were especially important to Linda Figg – the owner of FIGG Engineering. Linda is well known for her architectural prowess of designing "Bridges As Art." Bridges designed by FIGG Engineering, at the time of Bid Proposal, had received 268 design awards including three Presidential Awards through the National Endowment for the Arts.

FIGG created a consistent concept in order to design all elements harmoniously.

The theme of "*Arches, Water, Reflection*" inspired the lines. The graceful proportions and elegant simplicity of the arches connected bridge elements with refinement. The Project focal point, *Water*, emphasized the Mississippi River. "Reflection" was both the literal reflection captured by the shapes, natural light, and water, as well as the spiritual reflection this bridge site evoked. FIGG paid special attention to geometric enhancements that improved future overpass projects. Ramp access safety needed consideration due to the congestion of rail lines, utilities and local streets.

All in all, Linda Figg envisioned a masterpiece that mirrored the deep ownership and respect offered by true Vested partners in the Project. The Bid Proposal described the Bridge as follows:

> *A Sculptural Bridge -- "The Bridge reflects a series of modern arch forms that are softly set in the site to maximize openness and green scape while focusing on the river. The bridge is a concrete functional sculpture with monolithic connections that create fluid lines between all structural elements. The concrete box girders, variable depth shape transitions in a parabolic curve from 25' deep at the pier to 11' feet deep at the center of the 504' river span. This 2.3:1 ratio is an enhancement over the 2:1 ratio stated in the RFP. The span arrangement is 330', 504', 260', 121' utilizing 3 pier locations. Two pier locations frame the river with the third pier placed on the south side of the historic wall. This allows preservation of the wall while spanning the north bluff with an 80' clear area completely open without an additional pier. The span over the north bluff frames this area with the same 2.3:1 ratio superstructure variable depth curve. The superstructure concrete box girder is a closed shape with inclined walls and smooth surfaces of continuous flat planes. The appearance underneath is sculptural and the shape and concrete material creates a visually clean and quiet space underneath the bridge."*

But aesthetics was only one of MnDOT's six criteria. The Flatiron-Manson proposal was also a model of technological advancements for bridges - minimizing life cycle costs and providing a low maintenance structure. The following architectural drawing illustrates the various benefits of the high-tech, high-performance smart bridge of the future.

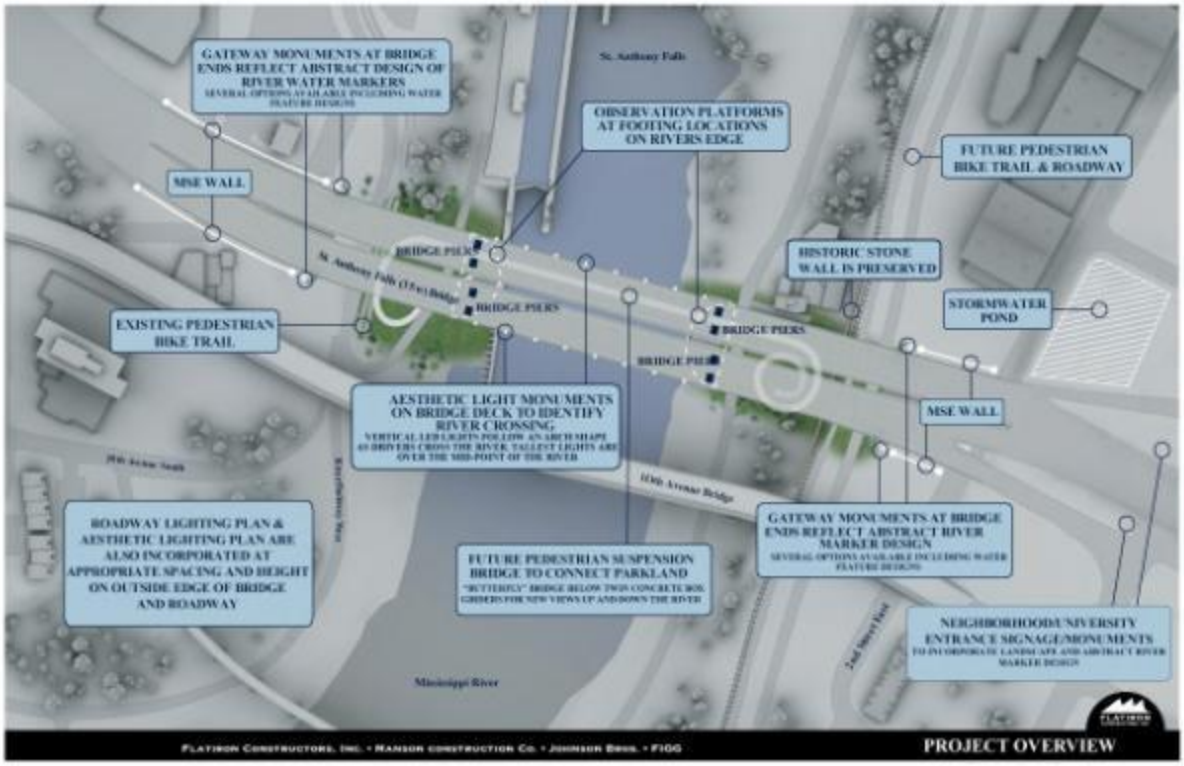


Figure 2: Architect drawing of the Project

The Flatiron Manson bid proposal was so complete, they even promised that “an Owner’s Manual for inspection and maintenance will be provided.”

In the bid document, Flatiron Manson identified many Structural Enhancements offered by their Proposal.

> “*Your new St. Anthony Falls (35W) Bridge will serve as a model of technological advancements for bridges in America. The innovative procedures and materials chosen will minimize life cycle costs, providing a low maintenance structure. This high-tech, high-performance smart bridge of the future gives MnDOT many benefits including the following*:

- *A concrete box girder bridge constructed with high-performance concrete – the concrete mix design for 6,000 psi includes a corrosion inhibitor and specialized admixtures for high density, low permeability and increased electrical resistivity. This provides added protection for the reinforcing steel.*

- *Multiple levels of redundancy – four (4) continuous, parallel post-tensioned concrete box girders provide a redundant design, providing eight (8) webs total. There are no fracture critical members.*
- *The lowest maintenance bridge with pre-stressed concrete.*
- *Superior deck durability - the concrete deck is pre-stressed with a minimum of 250 psi residual compression in the longitudinal direction, and zero tension under load in the transverse direction, maximizing long-term durability.*
- *An integrated wearing surface that eliminates the possibility of overlay delamination.*
- *Extra ducts and anchors in the bridge for future post-tensioning that will provide for a 10% increase in live load capacity when installed*
- *Only two expansion joints in this 1,216-foot river bridge for low maintenance and ease of inspection.*
- *A bridge design that incorporates a minimal number of structural bearings - where utilized the structural bearings are the most durable, corrosion-resistant, and easily replaceable*
- *The ability to replace post-tensioning tendons located inside the box girder void with future Fiber Reinforced Polymer (FRP) strands or other materials as they become available*
- *A special integrated state-of-the-art sensor and monitoring system - this will be installed in the bridge to create a "smart bridge." With this technology, Mn/DOT will know bridge information "real-time" from a remote computer such as structural bridge responses, deck moisture, wind speed, ambient temperature, and deck freezing point temperature.*
- *Only one deck drainage collection point on the structure - the bridge geometry was optimized, resulting in the need for deck drains only at Pier 2. The remaining collection system is off the structure. This minimizes maintenance of the stormwater system on the bridge, enhances durability by reducing deck penetrations, and improves the aesthetic design.*
- *The lowest maintenance bridge crossing the railroad line and providing for future roadway and pedestrian uses.*
- *The concrete pre-stressed continuous arch design enhances aesthetics and durability.*
- *The lowest maintenance bridge crossing 2nd Street. The concrete pre-stressed slab design minimizes the roadway profile to achieve geometry enhancements.*

- *The ability to accommodate the future addition of a 12' wide suspended pedestrian bridge underneath, as part of context-sensitive design enhancements as discussed in the section on Aesthetics. (Not included in current construction pricing)*
- *Observation platform surrounding the main piers facing the water on both banks – the main pier footing configuration provides for this plaza and elevation uniformity as part of the context-sensitive design."*

The bidding process set the tone that MnDOT's contractor would have to make and take ownership of major decisions. In fact, the final contract language could not be clearer that it was Flatiron Manson's responsibility to make and take ownership of major decisions.

> "5.1 Control and Coordination of Work - Contractor shall be solely responsible for and have control over the construction means, methods, techniques, sequences, procedures and Site safety, and shall be solely responsible for coordinating all portions of the Work under the Contract documents, subject, however, to all requirements contained in the Contract Documents."

Clearly, Flatiron Manson not only had accountability, but also shared in the risk for successful completion. Provisions like this exemplify Vested partnerships.

RULE 2: FOCUS ON WHAT, NOT HOW

Vested Outsourcing agreements deliberately abstain from mandating "How" contractors achieve the desired outcomes. As a result, suppliers can bring innovations and proceed more nimbly than usual.

In a paper titled "The Multiple Roles of Specifications in Lean Construction," Patrick T.I. Lam, Mohan M. Kumaraswamy, and S. Thomas Ng highlight performance-based approaches: "The recent proliferation of specialist works has seen an increasing use of performance-based specifications replacing the mainstream 'prescriptive' specifications, which are characterized by detailed descriptions of material and workmanship requirements. In order to give flexibility and encourage innovations in the use of materials, systems and methods, performance specifications state the required end-results and leave the contractors to come up with means to achieve those results.[12]"

MnDOT's objective was to leverage this what-not-how thinking early from the inception in its RFP. To meet the very aggressive schedule, MnDOT allowed bidders to choose from several bridge and wall types, propose geometric solutions to correct substandard elements, and develop visual quality components for the Project. Flatiron Manson chose to construct a

[12] Lam, Patrick T., I., Kumaraswamy Mohan, M., Ng, S., Thomas, THE MULTIPLE ROLES OF SPECIFICATIONS IN LEAN CONSTRUCTION

"concrete box girder variable depth superstructure with a sweeping parabolic curve[13] stretching 504 feet over the Mississippi River." When the contractor makes basic design decisions like this, they also accept basic responsibility for the design. They are no longer entitled to change orders based on quantities or design conflicts. The decision was theirs; therefore, they are responsible for errors or oversights.

However, that is not to say there was no minutia in the contract; there was—remember the blue ink? But, on the grand scale, Flatiron Manson was given great latitude regarding HOW best to do the job. Because the agreement did not tell the contractor exactly how to complete the project, Flatiron Manson could introduce innovation and infuse their expertise in the form of performance-based processes. Of course, MnDOT remained the decision-maker and retained the right to approve or reject ideas.

One such example where Flatiron Manson brought innovative ideas was in concrete casting. The new bridge was a total concrete structure being built through the winter – a *Minnesota* winter. Typically, what that would mean… well, quite frankly, it would mean construction would wait until spring. Concrete does not set well in the cold and Minnesota gets very cold.

Writers describe Minnesota winters as romantic, stunningly beautiful, magical whiteness, pure as the driven snow. To the 400-600 local workers, the better adjective is "BRUTAL." Peter Sanderson remembers that the first, full-out, no-restrictions day of work was Thanksgiving Day… a frigid, windy, and unfortunately typical Minnesota winter day. But Sanderson and his FMJV crew found a way – they built large hut type structures where they placed forms. Fans provided heat directly into the forms. Flatiron Manson monitored and controlled temperatures so concrete could be poured and cured safely, with quality specifications ensured. FMJV even installed ground heaters to prevent the ground from freezing.

Construction needed to protect concrete from heat damage as well as cold. No matter how cold the outside temperature may be, there is a chemical reaction within fresh concrete that creates heat. In the large back-span segments, this heat could compromise the integrity of the structure as it cured. To avoid problems, river water streamed through narrow, plastic PVC tubes inserted lengthwise into the poured concrete. This dropped the temperature of the wet concrete and allowed optimum curing.

Eleven months of 24-hour construction meant work did not stop, no matter how deeply temperature plunged or how strongly winds blew. Flatiron Manson pulled every innovative strategy it could think of to protect the site and keep momentum. Furnaces and hot air pumps abounded. But other strategies were employed, such as building four temporary shelters on wheels to accommodate easy movement around the casting yard to protect newly poured concrete from the elements. Workers and construction elements used thermal blankets. And, of course, as seen in the photo (Figure 3), lots of face masks, hand warmers were stuck inside

[13] A parabolic curve is the most common type used to connect two vertical tangents.

mittens... Flatiron Manson also brought in warming shelters for workers, but, hey, this is Minnesota. Inclement weather, winter and summer, is just part of the deal.

Figure 3: Workers adapt to frigid conditions Photo by MnDOT

An advantage of building the bridge with structural concrete was that it permitted flexibility in the precise location of the 100-plus drilled shafts.[14] This enabled construction to begin before all the design work was complete. Another advantage was it supported hiring a local workforce.[15] Flatiron Manson project manager Peter Sanderson reports, "90 percent of the hourly workers were from Minnesota. We brought in 10 percent carpenters from California…but only after we emptied the union hall for ironworkers. And these guys took such pride rebuilding this bridge; they were great!"

Another innovation was in how the concrete forms were set. Usually, contractors buy one set of bridge pier forms, constructing one pier at a time; Flatiron Manson bought forms to construct all substructure elements simultaneously. To further decrease the time of construction, the backspan sections[16] of the bridge were cast-in-place. On the construction site, less than half a mile south of the bridge, eight casting beds[17] produced precast segments for the main spans. [18] The location provided easy access for project managers. This made it possible to work on all portions of the deck at the same time. The precast segments eventually moved into place using "Bohemian Blue." Bohemian Blue is a large river crane that moved segments from the storage yard onto a flat-bottom barge for transport upriver.

[14] A maximum of 8 feet in diameter
[15] 600 – 800 workers were hired throughout the process
[16] Bridge sections built over land
[17] Typical practice uses one or two casting beds
[18] Bridge sections built over water

On May 25, 2008, 800 - 1000 spectators lined up to watch the Manson team load the first 200ton segment load onto “Bohemian Blue”, float down the river and lift into place. Talk about sidewalk supervisors!

The concrete itself also represented significant innovation, this time, developed by the subcontractor, Cemstone Products. There were several specific uses for concrete[19] on the project, each with its own special mix. Under normal conditions, contractors develop concrete mixes with demanding specifications by creating trial mixes and testing them over time. However, there wasn't time for that on the I-35W project, Cemstone, based on previous experience, used mathematical modeling techniques to develop the mix designs for the bridge.

Figure 4: Greeting sculptures on each side of bridge; Photo by MnDOT

Innovation respected and exceeded design specifications. For example, when 5,000 PSI[20] compressive strength concrete was required, the product tested 8,360 PSI at 28 days, 9,890 PSI at 56 days. The creative approach to durability, fast track building and environmental responsibility are part of the rationale for the I-35W St Anthony Bridge receiving the industry’s 2010 Award of Excellence from the Portland Cement Association.

What’s more, innovation was literally infused into the concrete mix itself. Kevin A. MacDonald, vice president

[19] i.e. Drilled shafts, Footings, Superstructure and deck, Reinforcement and Main Span, each having different specs

[20] The acronym PSI stands for "**P**ounds per **S**quare **I**nch," and is the common unit of measurement for pressure. It can be understood as the amount of force that is exerted on an area of one square inch.

for engineering services of the Cemstone Products Company said, “The new twist over the last 10 years has been to try to avoid materials that generate CO2.”[21] In his mixes, Dr. MacDonald used two industrial waste products — fly ash, left over from burning coal in power plants, and blast-furnace slag to replace normal components of the cement. This resulted in stronger concrete, with associated CO2 emissions that helped reduce the concrete’s carbon footprint.

During the construction itself, electronic sensors monitored the temperature of mass concrete placements. Sensors, embedded in the drilled shafts and piers, provided real-time information about stresses and movements resulting from the loads imposed by the cantilevered segments before they joined together--research that will help future bridge projects around the globe.

Ultimately, MnDOT gave the architect/engineer freedom to design what Popular Mechanics Magazine called “America’s Smartest Bridge.” The architect FIGG Engineer Group,[22] along with subcontractor Iteris, pushed the boundaries in intelligent design. A high-tech structural health monitoring system, equipped with 240 sensors, sends data directly from the bridge to The University of Minnesota,[23] was included within the bridge structure. The monitoring system covers five areas:

- Support of construction processes
- Record of structural behavior (structure monitoring) by MnDOT and U of M
- Control of the automated anti-icing system
- Intelligent Transportation System (ITS) (traffic flow, traffic message signs, etc.)
- Bridge security

While some might argue the sensors added extra costs, they actually help reduce cost in the overall maintenance of the bridge. For example, four different kinds of sensors evaluate the condition of surface wear and tear by measuring whether or not salt[24] is penetrating the pavement on the bridge deck. Bridge repair and replacement are expensive, so early monitoring should make up for the initial cost of the sensors. Another type of sensor measures pressure to keep track of St. Anthony Falls’ expansion joints and bearings. University of Minnesota and MnDOT correlate that data with design codes to analyze how the bridge performs over its lifespan. Finally, wire strain gauges measure temperature and the force per square inch placed on the concrete—all important in assessing a bridge's condition.

Another unique feature that would not have appeared if MnDOT had “called all the shots” is the sculpture that eats air pollution. We’re not kidding. The concrete is a special photocatalytic

[21] Concrete is Remixed with Environment in Mind. (2009, March 31). New York Times: http://www.nytimes.com/2009/03/31/science/earth/31conc.html?pagewanted=1&_r=2
[22] Specifically, Linda Figg, CEO served as the primary architect.
[23] The UofM Engineering Department collaborates with FIGG and MnDOT for real-time data.
[24] Minnesota’s snow and ice demands humungous amounts of salt in winter

concrete called TX Active. The concrete reacts with ultraviolet light and pulls pollutant particles like carbon monoxide, sulfur dioxide, and nitrous oxide out of the air and converts them to less harmful substances. The sculptures contain a compound that makes them self-cleaning, so they should stay white for as long they stand.

As functional as the sculptures may be, they also add poignant beauty. Bathed in sunlight during the day and ethereal blue light[25] at night, they offer serendipitous greeting at both ends of the bridge. Three 30-foot wavy lines, a visual representation of the ancient, universal symbol for water, reach to the heavens, reflecting hope & sunlight.

RULE 3: AGREE ON CLEARLY DEFINED, MEASURABLE OUTCOMES

Because MnDOT made the critical decision to use non-conventional Best Value and Design-Build options, Chiglo and his team knew they would have to create an exhaustive plan to make certain the process was, indeed, fair and provided best value. But Chiglo knew the upfront work would be well worth the effort in terms of delivering a bridge rebuild that met MnDOT's six key goals (listed in Rule 1 section on page 14).

Chiglo and his team started with clearly defining and measuring how they would define success for the project. There were three parts to the Bidding Proposals: 1) Equal Employment Opportunities (EEO) and Disadvantaged Business Enterprise (DBE) Proposal, 2) Technical Proposal, and 3) Pricing Proposal. The EEO and DBE were the easiest part. This part of the proposals primarily affirmed the potential suppliers complied with State and Federal laws and policies. Failure to conform to standards results in rejection acceptance of a contract.

The next easiest part was the pricing component. While the bid price is usually considered the price of the project – Chiglo and team wanted to look beyond the bid price and factor in a critical element - the cost of time. Governor Pawlenty and the public made it clear that time was a significant factor. The goal was set—have the bridge open by Christmas Eve—less than 18 months after the collapse. For this reason, the evaluation criteria included the number of days to complete the project as a critical element of the formula. A "cost" of $200,000 was assigned for each day it would take a contractor to complete the project. The $200,000 was based on the estimated 50 percent of road user costs. This way they gave time a value that could be used in the analysis of the bids.

The final – and hardest component – was evaluating the technical score. Chiglo and his team created multiple committees and advisory groups to assist in bid evaluation and ensure complete fairness. Because the technical component of the proposal would be somewhat subjective in nature, it was important Chiglo's team established formal grading criteria, evaluation criteria, and an evaluation process.

[25] Usually, the floodlights are blue or white. As the community appreciates the art, requests are coming in to use different colors for special events. MnDOT is considering a policy to cover public requests.

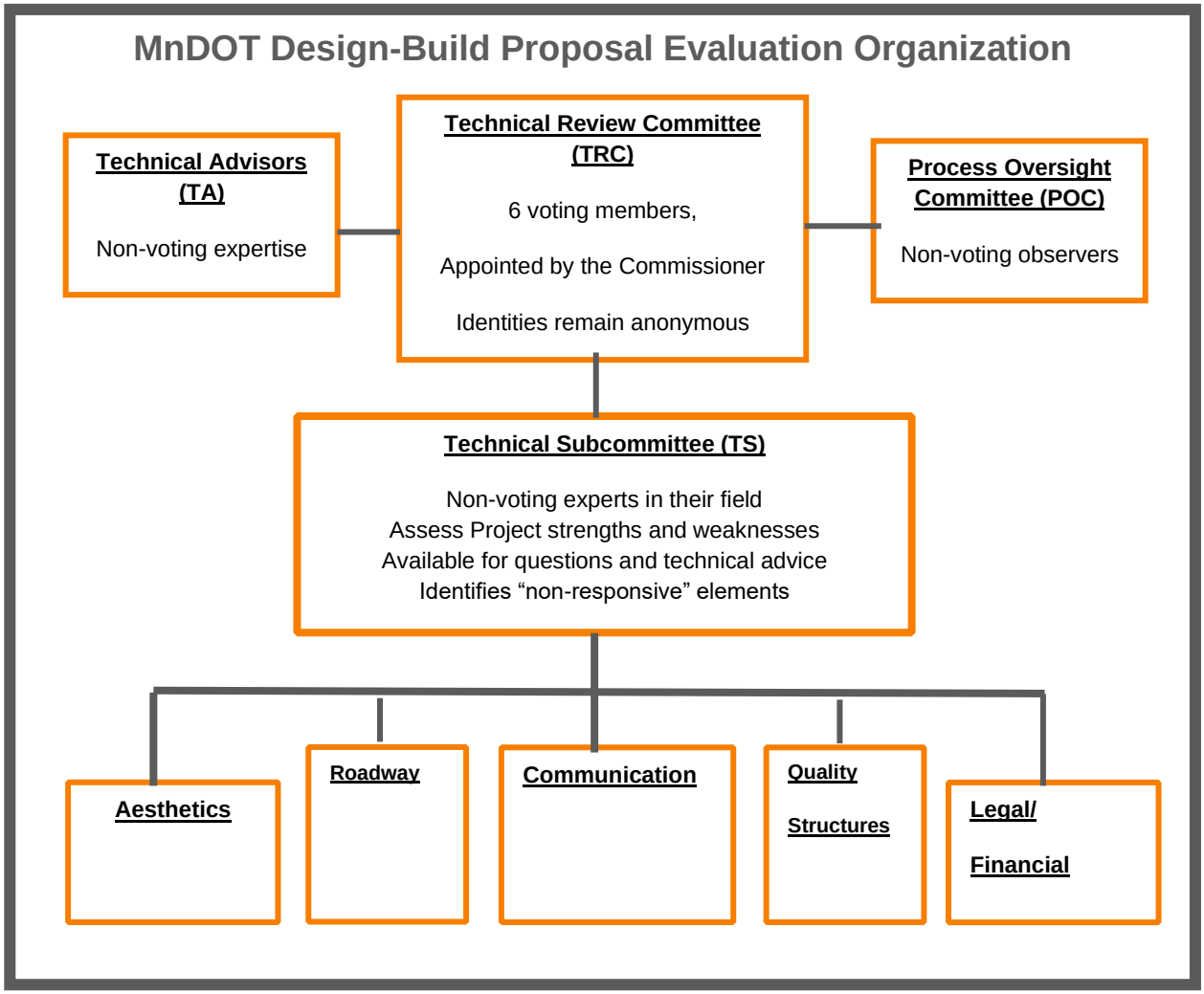
Within the contract evaluation, clarity became evident from beginning to end. The Technical Proposal included narratives to describe each of the categories and the weightings in the following table (Figure 6). The relative weights in the Technical Scoring are in parenthesis. The Vested Outsourcing approach encourages specificity like this to precisely describe the value of various outcomes. This clarity can help suppliers develop sound strategies that optimize for how they will deliver against the criteria.

Figure 5: **Technical Scoring Matrix**

Quality	**(50%)**
Experience and Authority of Key Individuals (20%)	
Extent of Quality Control / Quality Assurance (10%)	
Safety (10%)	
Measures to Evaluate Performance in Construction (10%)	
Aesthetics	**(20%)**
Enhancements to the RFP (10%)	
Approach to Involve stakeholders (10%)	
Enhancements	**(15%)**
Geometric Enhancements (10%)	
Structural Enhancements (5%)	
Public Relations	**(15%)**
TOTAL	**100%**

A key component of the evaluation process was the Technical Review Committee as depicted in Figure 6 on the next page.

Figure 6: MnDOT Design-Build Proposal Evaluation Organization



The entire evaluation process ensured maximum security. Each person with access to the Bid Proposals signed a Non-Disclosure Agreement.

The Technical Review Committee Chair had to sign off on any disclosure made to parties outside the committee structures. The Technical Review Committee and Technical Subcommittee even met in separate rooms. Subcommittee members needed an invitation to enter the Technical Review Committee meeting room. If a non-member appeared for any reason in the Technical Review Committee meeting room, all discussions ceased and paperwork was stored until such person(s) left the room.

Rating the technical proposal was the trickiest part of the process. The Technical Review Committee reviewed the proposals, along with recommendations and comments from Technical Subcommittee and awarded a qualitative rating for each criterion.

The Proposal Evaluation Plan summarized the four assessment levels:

> *"**Excellent** (91-100%) The Proposal demonstrates an approach with unique or innovative methods of approaching the proposed work. The Proposal is considered to significantly exceed stated requirements/objectives in a beneficial way (providing advantages, benefits, or added value to the project) and provides a consistently outstanding level of quality.*
> ***Very Good** (76-90%) The Proposal demonstrates an approach offering unique or innovative methods of approaching the proposed work. The Proposal exceeds the stated requirements.*
> ***Good** (61-75%) The Proposal demonstrates an approach that is considered to adequately meet the RFP requirements/objectives and offers an acceptable level of quality.*
> ***Fair** (50-60%) The Proposal demonstrates an approach that is marginally meets the RFP requirements/objectives.*
> ***Fails** (0-49%) The Proposal is considered to Not Meet the RFP requirements or is Nonresponsive."*

Each of the six Technical Review Committee members assigned a percentage based on the Qualitative Assessment Rankings shown above. Then, the committee multiplied the percentages by the maximum number of points in each category. The product became the final value of the Technical Score.

Ultimately, the team developed a definitive "Best Value Formula" that would become the litmus test selecting the winning bidder with the contract awarded to the bidder with the lowest adjusted bid representing the best value for MnDOT– not the lowest price. The formula comprised of a technical score, the number of days to complete the project, and the contract bid price. (See Figure 7 on the next page)

Figure 7: Best Value Selection Process

BEST VALUE SELECTION PROCESS

Design Build A + B, Best Value Formula

Three Components

- "A" = Contract Bid Price
- Plus "B" = Number of Days to Complete Project, which is multiplied by $200,000 per day - $200,000 per day based on 50% of road user costs
- Divided by Technical Proposal Average Score

Result: Adjusted Bid = **(A) + (B X $200,000) divided by TPA**

CONTRACT AWARDED TO LOWEST ADJUSTED BID

"It is vital to get this right.

Getting it wrong can result in hundreds of thousands, and possibly millions, of dollars wasted."

The reason we offer the extensive background regarding how Bid Evaluation Process works is simple. The thorough process jumpstarted fulfillment of Vested Outsourcing rule # 3, "Agree on clearly, defined, measurable outcomes."

For the I-35W St Anthony Falls Bridge Project, Flatiron Manson actually proposed the longest time for completion and the highest pricing. But, because their proposal demonstrated a firm understanding of the project's priorities and offered innovation and expertise, Flatiron Manson's score ultimately earned the prize. In fact – the firm with the lowest price actually had the worst overall score due to their low technical competencies.

Figure 8: Comparison of Bid Proposal

Comparison – St Anthony Falls Design-Build Proposals

Proposer	Technical Proposal Score	Days	Price	Adjusted Score
Ames Lunda	55.98	392	$ 178,489,561	4,588,953.50
McCrossan	65.91	367	$ 176,938,000	3,798,179.34
Walsh	67.88	437	$ 219,000,000	4,513,847.97
Flatiron-Manson	91.47	437	$ 233,763,000	3,511,129.37

RULE 4: OPTIMIZE PRICING MODELS

MnDOT estimated a total project cost between $300,000,000 and $350,000,000 and set a target date of December 24, 2008. But the budget was only one component that went into how MnDOT structured the pricing model with Flatiron Manson. The pricing model included several key elements that help ensure success for all parties and set forth a fair approach to how the companies would establish the price MnDOT would pay. A hallmark of a good Vested agreement is typified by the use of a hybrid pricing model that fairly aligns risk and reward. MnDOT's approach followed the Vested philosophies when creating their pricing model.

Bid Stipend

MnDOT, and the enabling bridge-design legislation, exemplified fairness when they paid each firm that submitted an unsuccessful proposal a stipend of $400,000. The money helped offset bidding expenses and provided an incentive to participate. All responsive shortlisted proposers received the fee in the event no award is made. When the proposing firm accepted the stipend, they automatically gave approval for MnDOT to use any ideas or innovations included in their proposal for future projects. The stipend arrangement provided a win for MnDOT by gaining proprietary interest in more Alternative Technical Concepts (ATC) and new ideas. The contractors won by receiving $400,000 in cash. Even if they lost the bid, they were paid for their ideas.

> ***Vested Outsourcing establishes explicit definitions for how relationship success will be measured.***

Firm Fixed Price Base Contract

MnDOT established that the base compensation model would firm fixed price. Flatiron-Manson Joint Venture's fee would be $233,763,000. The fee represented MnDOT's maximum cost liability and the only guaranteed payment for the Contractor. Flatiron Manson must complete the project for that amount, or less. Exceeding the budget would cost the Flatiron Manson, not MnDOT.

Using a firm fixed price approach enabled MnDOT to minimize their risk since there were so many unknowns in how the actual project would be developed. Chiglo's team carefully crafted the contract language as follows:

"Contractor agrees that it has full responsibility for the design of the Project and that Contractor shall furnish the design of the Project, regardless of the fact that certain conceptual design work occurred and was provided to Contractor prior to the date of execution of the Contract.
"Contractor specifically acknowledges and agrees that:

- The Preliminary Design Drawings that define the Basic Configuration are preliminary and conceptual in nature. If the Contractor believes that, the Basic Configuration is not constructible without material modification in the Scope of Work as contemplated in its Proposal, the Contractor may request a Change Order.
- The Contractor is not entitled to rely on and has not relied on (i) the Contract Documents. (Except where such Reference Information Documents (RID) or (ii) any other documents or information provided by MnDOT, except to the extent specifically permitted in errors are the result of the inability of the Contractor to conduct necessary site investigations prior to submission of the Proposal
- The Contractor is responsible for correcting any Errors therein through the design and/or construction process without any increase in the Contract Price or extension of a Completion Deadline.
- Contractor's Warranties and indemnities hereunder cover Errors in the Project even though they may be related to Errors in the RID."

Incentives and Penalties

Early Completion Incentive

While MnDOT established a firm fixed price contract – they knew that every day the bridge was not open cost both the economy and the public crucial time and hard expense. The Minneapolis Regional Chamber of Commerce claimed the daily cost to business exceeded half a million dollars. The State Department of Economic Development Impact Analysis believed the average net economic impact was an additional $113,000 daily reduction in the State's economic output. MnDOT's Office of Investment Management own estimate pegged the daily cost to motorists at $400,000. While exact cost estimates varied, everyone knew there was a cost associated with not having the bridge in place.

Considering the estimates of the cost to the taxpayers and state, the imperative was to move expediently. MnDOT used incentives as a key sourcing tactic whereby the chosen contractor would be rewarded for opening the bridge early and penalized for opening the bridge after an agreed-upon date. If the contractors could deliver a worthy bridge two months earlier than normal, the incentive arrangement more than paid for itself. The incentives prompted the firm to work around the clock, which meant good jobs and extra pay for workers. As long as safety and quality remained high, it represented a much-needed win for everyone.

Within the contract, clarity of expectations was evident. Flatiron Manson had 437 days from the date of contract signing to open the new Bridge to the public. MnDOT used a Locked-Incentive-Date clause as a way to clearly establish the project completion date of December 24, 2008. Flatiron Manson was in line to receive a $7 Million no-questions-asked-incentive if they completed the project on time and agreed to waive all claims. The clause also specified the

$200,000 per day incentive for early completion and, conversely, a $200,000 per day penalty for completion post target date.[26] In total, MnDOT set aside $27 million in incentives if Flatiron Manson finished early; completion after December 24, 2008 would **cost** Flatiron Manson $200,000 per day.

Flatiron Manson opened the project 90 days early and earned the tidy sum of $25 million – 92 percent of the incentive pool.

Safety Incentive

"When it comes to safety, actions speak louder than words," states the Flatiron Manson Bid Proposal. The commitment was clear and unequivocal – **NO lost time and a #1 safety site.** MnDOT established a Safety Incentive Award as part of the contract.

In turn, the Flatiron Manson pledged to share MnDOT Safety Incentive Awards with employees as well. Flatiron Manson established employee behavior and safety consciousness through a Safety Incentive Program that awarded a safety award to an employee each month. Objective evaluations of work formed the basis of judging, so favoritism could not enter into the decision.

Quality Incentive/Penalties

Flatiron Manson proposed a formal evaluation and reward process for the quality component of the Project entitled the Quality Bonus Program Measurement of Performance. If Flatiron Manson did not perform to quality standards, there was a penalty to be paid. Contract terms outlined consequences for unapproved performance. Non-conformance usually meant expensive and time-wasting re-work. If MnDOT, in its sole discretion, decided to accept nonconforming work, elaborate provisions spelled out a series of possible pay adjustments, reimbursements and liability to other parties.

Every two months, MnDOT used a jointly developed standard checklist to gauge the level that Flatiron Manson fell below, met or exceeded quality goals. The feedback brought to light any necessary improvements, assured consistent quality performance, and motivated Flatiron Manson to reach increased quality on items of particular importance to MnDOT.

The report was also used to reward the Flatiron Manson for Quality Performance, a mutually agreed part of the Contract Price to pay as a bonus if MnDOT's required level of quality was met. The bonus would not be paid if quality standards were not met.

[26] The road-user cost of $400K a day was the figure used to determine the $2m per 10 days ($200K a day.)

Over and Above is a Missed Opportunity

MnDOT also established a separate sum, over and above the Contract Price, which formed a second incentive bonus that applied only if the certain standards were exceeded. Three areas – public relations, safety and quality – were eligible for the additional bonus, but only if aggressive goals were met. It was another way for MnDOT to assure focus on their priority areas and the Contractor to reap a financial reward.

Having said all that, it's time to clarify. The speed with which the organizations developed the contract prohibited MnDOT and Flatiron Manson from ever fleshing out the second incentive bonus measures. Public Relations was the only area sufficiently defined to receive an additional $100,000. Even though the project clearly exceeded safety and quality specifications, the second incentive was not awarded because of a lack of definition. This point brings home a valuable lesson when structuring a Vested agreement on how important it is to develop clearly defined and measurable Desired Outcomes. Here, Flatiron Manson did not receive their incentive pay because of a lack of definition of how to calculate success.

Peter Sanderson, Flatiron Manson's Project Manager, holds a philosophical view about losing the second incentive, "We never managed to negotiate a measure…but we got paid anyhow, in many other ways. We were very glad to have the same goal in mind, particularly about quality and safety."

Cost and Risk Sharing Provision

Chiglo and other contractor professionals at MnDOT knew that using a firm fixed price agreement in an environment where there were so many unknowns would inherently cause bidders to bid high to cover their risk of unknowns. For this reason, MnDOT agreed to share some risks and, also, split costs savings if Flatiron came in under the agreed-upon $234 Million.

For example, one of the risk-sharing provisions was around contaminated soil that included an old coal plant and creosote. Neither MnDOT nor Flatiron knew the condition of the soil around where they would be digging. Unknown factors like this could dramatically drive up project bid estimates. Instead of requiring the Flatiron Manson to assume this risk, MnDOT employed a shared approach. Flatiron Manson performed excavation and made the decision as to how deep to dig. An abatement contractor then inspected and, if contamination was found, MnDOT agreed to pay for the contamination removal. Accepting the risk and costs associated with soil contamination ultimately saved MnDOT money because, otherwise, Flatiron Manson would have added risk multipliers to the contract bid. "If MnDOT paid $1.5 million, it can be assumed it saved 2 – 3 times that amount over what Flatiron Manson would have priced into their bid. It was simply a smart and fair business decision to take on these unknown risks," stated Jon Chiglo.

Besides the risk sharing, the contract included a unique cost sharing provision. Fairness decreed that if MnDOT created circumstances that increased costs,[27] in some instances, outside of Flatiron Manson's control, MnDOT would consider reimbursement. Payment followed submission and approval of appropriate forms. For example, if MnDOT could not provide access to property as anticipated, Flatiron Manson "worked around" the problem with actions to minimize cost or time impact. But, to the extent a delay to the "Critical Path"[28] was unavoidable, the delay became labeled a MnDOT Caused Delay, and, therefore, eligible for reimbursement.

Many circumstances could significantly delay project completion. For example, extensive contaminated materials, limited geotechnical exploration work prior to bidding, utilities, and difficulties dealing with the collapsed structure. Another type of a possible reimbursable expense involved something totally unexpected, such as the discovery of artifacts or a natural disaster that would delay the project through no fault of the contractor. The contract discussed and codified these examples, and others.

Payment Terms

Under the contract, Flatiron Manson was liable for the upfront costs of the project. To be fair, MnDOT agreed to pay Flatiron Manson a portion of their earned fee along with the reimbursed expenses using a formalized budget management process to manage disbursements. This allowed Flatiron Manson to have access to cash it needed to start and pay project expenses. A key aspect of the payment terms included MnDOT withholding $5,000,000 of the Contract Price until Flatiron Manson achieved Final Acceptance. Upon acceptance, MnDOT committed to making payment within 30 days.

Budget Management

Any project of any size has budget implications. Chiglo and Sanderson knew a project the size of St. Anthony's Bridge needed careful financial management. The team created a budget plan to estimate partial payment cash disbursements to Flatiron by month over the term of the project. Flatiron Manson created financial modeling with an assumed July 2008 completion date, with full incentive payout. Any delay in completion would reduce potential costs and financial impacts.

[27] Referred to as" MnDOT Caused Delay" and eligible for reimbursement consideration
[28] Using these values, Critical Path method (CPM) calculates the longest path of planned activities to the end of the project, and the earliest and latest that each activity can start and finish without making the project longer

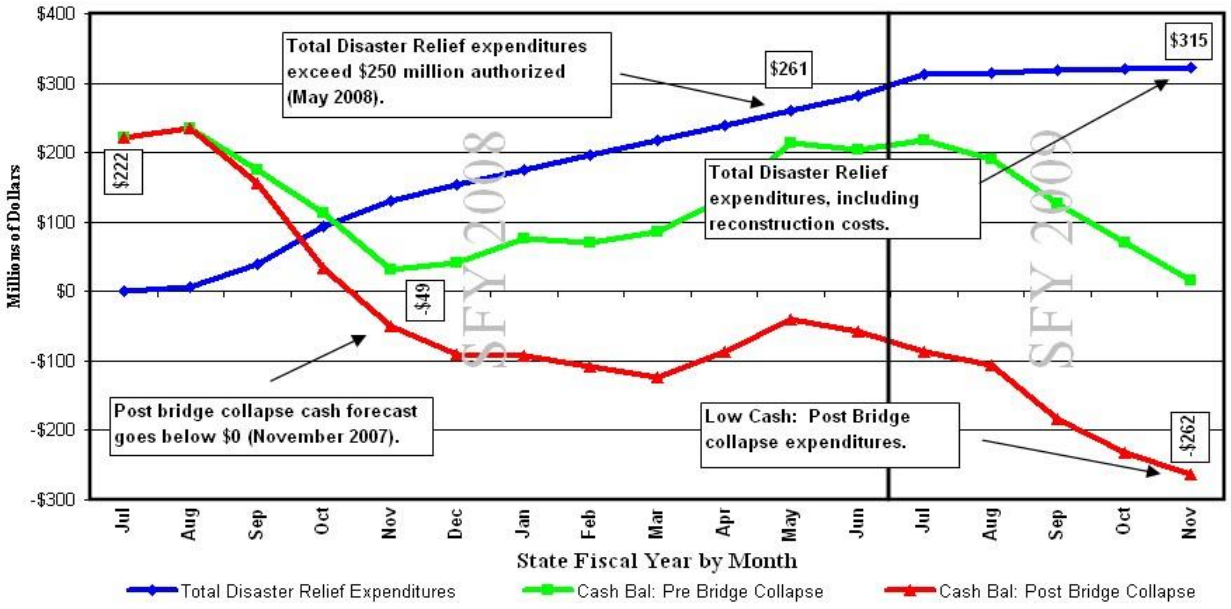


Figure 9: FMJV Financial projections I-35W St Anthony Falls Bridge replacement project

Because Flatiron was liable for the upfront costs of the Project, MnDOT requested what anticipated payout would be required. There were two options – one for an early finish, one for late. The submitted estimation served as a guide for MnDOT financial planning and managing cash flow. As the project proceeded, the estimates allowed MnDOT to set aside the necessary funds to reimburse Flatiron Manson's expense on a timely basis.

Rule 5: A GOVERNANCE SYSTEM THAT PROVIDES INSIGHT, NOT OVERSIGHT

As far back as 1979, Oliver E. Williamson, the 2009 Nobel Laureate economist, wrote that governance structure is “the framework within which the integrity of a transaction is decided.” The palpable need for the speedy restoration of public confidence and a viable transportation corridor required dedicated leaders who agreed to work within established parameters. It required a clear, flexible, and comprehensive approach.

MnDOT knew they needed to clearly establish expectations for governance early in the process. Chiglo’s team set rules right from the start by embedding governance expectations within the RFP itself. Flatiron Manson accepted the RFP expectations as the base of mutually desired outcomes.

- The top priority was quality
- Multiple layers of review were required throughout design and construction
- Quality approvals from contractors, state, federal government experts would be sought throughout the process

The project governance structure ultimately followed many of Vested Outsourcing's key elements of a sound governance structure. These include:

- Relationship and Stakeholder Management Framework
- Transformation and Change Management
- Provisions for Special Requirements Each of these is discussed in detail.

Relationship Management

Good governance starts with good working relationships. The nature of the St Anthony Falls I35W bridge rebuild meant that both MnDOT and Flatiron Manson needed to spend time working with key stakeholders of various kinds and levels. A good working relationship was established at the highest level between MnDOT's Jon Chiglo and Flatiron Manson's Peter Sanderson. They led MnDOT and Flatiron Manson to create a governance structure for managing the project – jointly.

"Jointly" is the key attribute. To achieve success, each man relied on the entire team to work collaboratively to manage the daily changes. Conventional hierarchical approaches would have created a bottleneck and slowed the process.

A solid Vested Outsourcing relationship builds on trust and collaboration. It helped that FIGG and Flatiron Manson had a successful history of working together on past projects. For the I-35W St Anthony Falls Bridge, personnel worked together as an integrated team when they drafted the Team's response to the RFP. They developed synergies and strong lines of communication. In addition, Linda Figg remained active (and frequently physically present) during the entire building process, checking quality, directly reporting to the Project Manager and Flatiron Manson, and leading the community involvement process.

Co-Location Is Key To Managing Relationships

Personal proximity is a common, effective strategy in Vested Outsourcing success stories. Jon Chiglo believes the co-location of the key partners in projects paid big dividends. It enables communication to be simplified, conflicts are resolved quickly, and misunderstandings avoided.

Chiglo insisted, “Phone conversations and emails aren’t sufficient. Communication works better when you’re face-to-face. You can read body language, see facial expressions, and just know the other person better. Direct interaction minimizes misunderstandings and saves time.”

Flatiron Manson’s Pete Sanderson and their design counterpart Linda Figg agreed. Not only did they agree to open a joint office on site, but the space also included MnDOT project managers, FHWA officials, and OSHA. As the site was small, other key players were located in offices within walking distance to the construction site. The objective was to ensure the free flow of information, non-stop collaboration, and timely response to a situation that may arise.

Flatiron Manson and FIGG, in consultation with MnDOT, infused daily routine with checks, rechecks and widespread reporting. These efforts facilitated catching and fixing any “glitches” early, baselines for continuous improvement, and necessary documentation.

“On a traditional job, when there are issues out in the field, typically the contractor comes to MnDOT and says, ‘What do you want us to do?’” said Terry Ward, MnDOT's deputy manager for construction of the bridge. “On this job, when issues come up, we get together in a room and we talk about it -- from the construction side, from the design, from our side -- and we resolve it."[29] Because the project was Design-Build, MnDOT's role was mainly to oversee and advise. The non-stop collaboration helped the work flow more smoothly.

The non-stop collaboration also built trust, an absolute necessity within any Vested Relationship. Peter Sanderson explains simply, “It’s the walk as opposed to the talk. Right from the very beginning, when we had quality problems, we called MnDOT right away. This is the problem. This is what we’re going to do about it. We were proactive. We made sure we didn’t hide anything. Mistakes were made. We rectified them. We fixed it straight off the bat.” The transparent approach built trust with the MnDOT team that facilitated progress.

Building Relationships Goes Beyond the Management Team

Even on small projects, stakeholder buy-in can be a tough challenge. But the challenges for the large St. Anthony’s Bridge Rebuild were particularly challenging. There were multiple types of relationships from federal, state, and community elected officials, day-to-day management and decision teams, labor unions and local citizens.

Flatiron Manson started the buy-in by getting subcontractors and employees on board with the project goals from the beginning. They did this by putting their money where their mouth was. Exceeding quality standards and meeting safety goals (No Incidents – No Lost Time) earned additional pay for both sub-contractors and outstanding individual employees.

MnDOT and Flatiron Manson also shared determination to honor the strong public sentiment to provide employment for local workers. It was imperative that employment remain stable to

[29] *Mixing Social and Structural Skills, Project Leaders Guided Historic Rebuild in Minnesota.* EMR.com Cho, A. (2009, January 7).

assure continuous progress. Flatiron Manson and the Minneapolis Building Trades Council held discussions to reach a Project Labor Agreement, a covenant that provided certain guarantees to the unions in exchange for a no-strike pledge.

For Flatiron Manson Project Manager Peter Sanderson, getting alignment with the subcontractors and employees was paramount to success. The reality was, between the Fast Track Construction and the frigid Minnesota winters, workers experienced extreme duress. “We were working 20 hours a day, six days a week,” said Peter Sanderson, Project Manager for Flatiron Manson. “That’s two ten-hour shifts a day.” The workforce peaked at about 600 by April 2008 and the peak lasted several months.

In addition to a stable workforce, MnDOT and Flatiron Manson knew it was important to get the buy-in from the local community as well. The collapse had put MnDOT under scrutiny from the public. Sometimes, it felt more like a goldfish bowl than a regular construction site. Flatiron Manson resolved early to be proactive with the rebuilding of the bridge. Both Chiglo and Sanderson could see the headlines in the news if they did not manage community perception. This was especially important since MnDOT was taking the bold approach to allow Flatiron Manson the leeway to control the decisions regarding the actual type and design of the bridge.

Linda Figg devised a masterful plan to get community involvement early. After the initial design gained approval from MnDOT, FIGG and Flatiron Manson opened up the process to the public. FIGG’s copywritten “Charette” process provided an all-day community hearing on October 24, 2007 to give the public a chance to make choices between various design elements. A total of 88 interested residents, business people, government officials, representatives of the cultural arts, UofM, and others gathered. Linda Figg led a highly interactive, highly visual process in which the community voted for its favorite design preferences including a curved pier shape, open railing for new vistas, bridge color of white,[30] native stone gabion walls, and feature lighting.

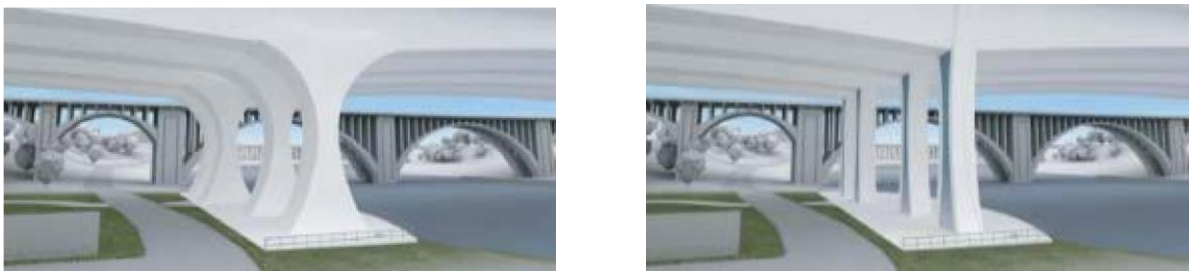


Figure 14
Left: Option A Pier shape, Selected by 74% of Charette Right: Option B

[30] With, perhaps a bit of Architect humor, the actual color is called “Snow-Bound White.”

But community involvement did not just happen at the beginning of the project. MnDOT assigned Communications Manager Kevin Gutknecht to be the Public Affairs Manager specifically for the Project. This was a highly unusual step for MnDOT to take – but essential because of the unique circumstances. He led a communications team that included a public affairs representative from Flatiron and members from a public relations firm hired by FIGG. Just like the rest of the building of the actual bridge, MnDOT and the Flatiron Manson team worked jointly together on community outreach.

The joint team made a conscious effort to respond to public concerns and engage the public throughout the decision-making process. Specific actions are spelled out later in this Governance section.

Establishment of a Sound Performance Management Program

While building the relationship for how the parties worked together was important, quality and safety were critical. If Flatiron Manson failed on quality and safety, MnDOT failed – on the most basic level. Together they would need to ensure quality and safety. Chiglo knew the best way to ensure quality was not just to write standards into an RFP and micromanage inspections; he knew he needed to create accountability for quality and safety. Under the contract, Flatiron Manson assumed responsibility for Quality Control (QC) and Quality Assurance (QA) of the project and MnDOT provided basic regulation guidance and verification. However, they approached it with a spirit of teamwork and insight, rather than oversight.

As stated in the Bid Proposal Flatiron Manson committed to creating an "ongoing, defined Integrated Quality Approach."

1) *"The integrity of the Flatiron-Manson Quality Management Plan will be ensured by having Mr. Frank Mydlinski, Quality Manager, report directly to the Joint Venture Executive Committee in order for him to focus on managing design and construction quality on every level of the Flatiron-Manson Team.*

2) *"Quality is every team member's responsibility regardless of discipline. We take both a top-down and bottom-up approach to ensure the highest quality in design and construction.*

3) *"Flatiron-Manson will employ experienced quality inspectors who will inspect the work in the field. Two FIGG team members will support the field inspection efforts. In addition, independent testing, located on or near the project site, will accomplish all lab tests.*

4) *"Our quality philosophy for the entire team is "Do it Right the First Time!" because we realize that high quality in design and construction will result in efficiencies and cost savings"*

Sometimes, it seemed to the observer's eye, that Flatiron Manson's Quality efforts considerably slowed down progress. For example, quality inspections for a concrete pour could take days instead of hours as it normally would. Over 20 signatures were required and redundant inspections were conducted before the actual pour. However, Flatiron Manson and MnDOT knew that doing it wrong would cause an even longer delay to fix or, worse yet, create a future safety concern. So, they took their time to get it right and it paid off.

Incorporating a formal, overarching process, as well as MnDOT regular checks, provided a self-regulating guarantee of quality throughout the project.

A similar philosophy applied to Safety. Flatiron Manson's commitment was NO lost time and a #1 safety site.[31] Flatiron Manson created an extensive set of procedures to ensure a proper rhythm of the business was set to manage safety. A key success factor in Flatiron Manson's safety procedures walking the talk with their "Don't Walk By Program." Under the program, employees were responsible for "not walking past" any unsafe practices and bringing them to management's attention.

Because of MnDOT's underlying commitment to safety, MnDOT participated in inspections at all levels. Weekly and daily inspections helped set the tone that Flatiron Manson was serious. Using a standard inspection check sheet ensured all involved knew what to expect. The check sheets provided a key tool that evaluated safe working practices and rated exemplary work for the Safety Incentive Program. In addition, Flatiron Manson relied on an independent Safety Manager's Inspections and Reports to serve as audits and show overall reporting. Results were shared with Flatiron Manson's and MnDOT management.

Keeping the emphasis on safety and quality ensured orderly, constant progress to goals and early project completion at below Target price. Having confidence that standard inspection and reporting was routine diminished MnDOT's obligation to perform extensive oversight.

On the surface, it might look like Flatiron Manson's extensive procedures created overhead and costs. However, making safety a top priority was something important to both MnDOT and Flatiron Manson, which had reputations to uphold.

At the project close, Flatiron Manson met their goal of NO safety issues for the project. In 1995, Flatiron Manson received a First Place Finish in the Associated General Contractors of America (AGCA) Safety Excellence Award honoring over One Million Highway Division safe work hours. When giving the award, AGCA observed, "Flatiron has found that the key to a successful safety and health program is engaging its employees on all levels and constantly improving company policies. An example of this is its stand-down policy for safety. Flatiron will not hesitate to close a project if it is not safe enough. Not only does the company self-evaluate, but it also enlists the help of outside companies to provide unbiased safety advice for maximum safety."

[31] They were successful. There were NO safety issues for the Project.

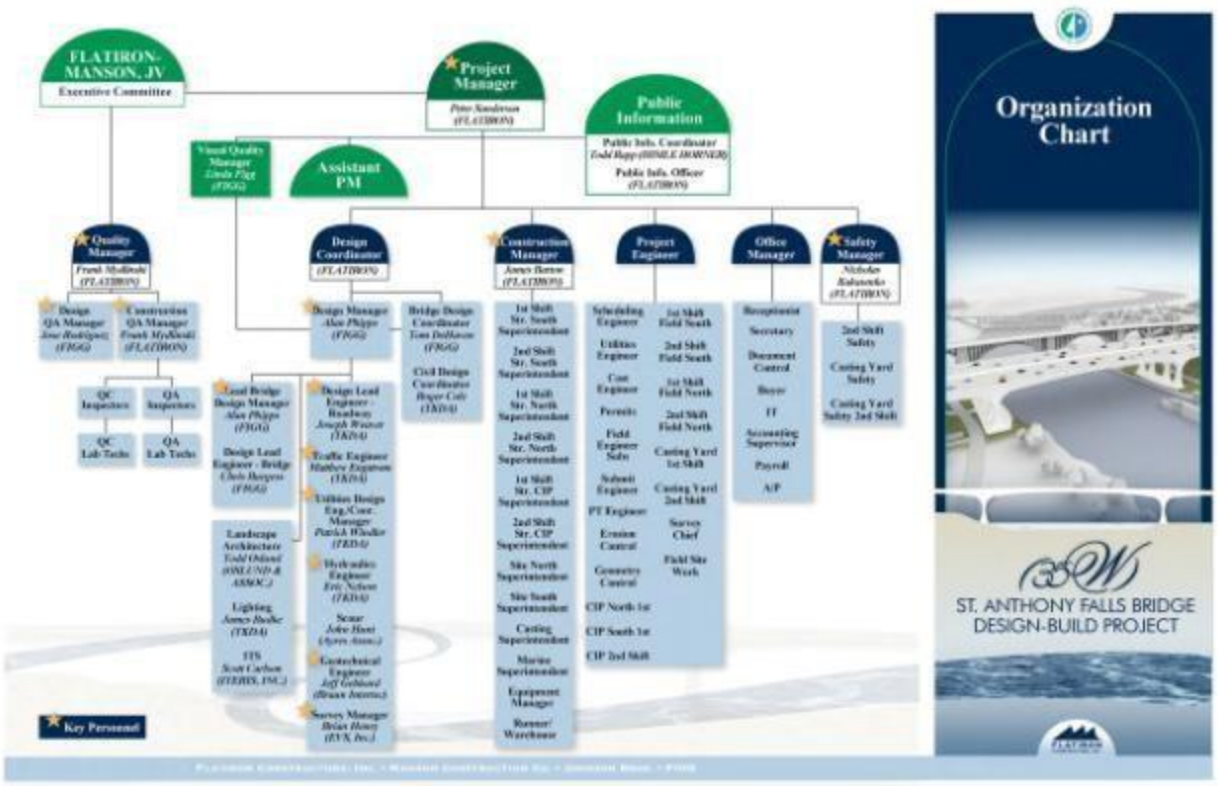
Transformation and Change Management

From the onset, this project was different from others. To succeed, it meant most people involved in the project needed to challenge the status quo daily. A critical success factor was the change management component built into the process. As promised in their bid document, Flatiron Manson hired experienced people to help manage the communication process, create regular, standardized reporting, and build safeguards into the system. The end goal sought to fully inform and satisfy all parties with construction progress.

Flatiron Manson also established a governing committee, referred to as the Executive Joint Venture Committee.

Establishment of these crucial committees, comprised of professionals deeply committed to the project's success and willing to dedicate their time and energy to not only respond to situations as they arose – but to bring an anticipatory lens to the project.

Figure 10: As depicted in FMJV Bid Proposal, EFVC structure



Change Management

The importance of change management was embedded into the overall philosophy from Day 1. Starting with the RFP, MnDOT allowed bidders to self-select up to 8 of their best ideas for deviations in the form of Alternate Technical Concepts (ATC). This meant that Flatiron Manson could submit concepts that did not meet the requirements of a regular contract. Doing this enabled these ideas to move forward without the decision-making process being encumbered and delayed by questionable or less effective ideas.

But change management was not limited to just ATCs. The complicated site yielded the unexpected, such as artesian water in the bottom of a 100-foot test shaft, or rock showing up close to the surface in an area where piles would be driven. The contract says it's "all our responsibility, whatever we find out there, or almost everything that we find out there," Sanderson said. "And it's up to us to handle it all-- without charging the government more money." Through the aggressive schedule and seemingly endless surprises at the construction site, Sanderson continually learned what it took to get this bridge built. Having other leaders nearby and the freedom to pursue unusual pathways aided Flatiron Manson to get the job done.

As the Project Manager for Flatiron Manson, Peter Sanderson valued the flexibility to address issues as they came up. The nature of their Vested agreement required MnDOT and Flatiron Manson to form a true partnership, and an agreement to operate in “Good Faith” to reach mutually established goals. By design, the organizations made decisions dynamically. Decisions came on a daily basis and Sanderson conferred with Jon Chiglo 8 to 10 times a day as they consistently aligned approaches, solutions, and decisions to ensure the team was adhering to the standards. Misalignment would certainly lead to shortchanging which could have disastrous consequences, and, at the very least, disrupt orderly progression.

Provisions for Special Requirements

While good governance requires good relationships and day-to-day performance management, MnDOT had many special requirements that needed to be met. Two of the most interesting were compliance with regulatory requirements and community involvement. Each is discussed below.

Regulatory Compliance

Regulation of bridge design relied not just on what MnDOT wanted, but also on the Federal Government, City of Minneapolis, OSHA, Coast Guard and, lest we forget, Homeland Security. Actual contract language gave parties, designated by MnDOT, rights of inspection, testing, and oversight. MnDOT itself was first on the list. MnDOT retained its absolute right of Final Approval. Others included oversight regulatory agencies and parties responsible for paying part of the cost. Some of those conducting third party inspections included:

- Utility Owners
- United States Coast Guard
- Minnesota Department of Natural Resources
- United States Army Corp of Engineers
- Minnesota Pollution Control Agency
- Railroad owners, and
- Any other Persons other than MnDOT, as applicable

While Flatiron-Manson was responsible for meeting the regulatory and other special requirements, Chiglo realized it was a team effort. MnDOT would need to not just point their fingers to the regulations – but also play a critical advisory role regarding compliance. This was especially true when there were overlaps or competing requirements that needed to be resolved. MnDOT developed prioritizations for managing compliance requirements in the order of precedence for the following most important regulations:

- Mn/DOT Special Provisions*
- Mn/DOT Technical Memoranda
- Mn/DOT *Standard Specifications for Construction**
- Mn/DOT *LRFD Bridge Design Manual**
- Mn/DOT *Bridge Details Manual, Parts I and II**
- Mn/DOT *Bridge Construction Manual**
- AASHTO *LRFD Bridge Design Specifications*
- AASHTO *LRFD Bridge Construction Specifications*
- AASHTO *Guide Design Specifications for Bridge Temporary Works*
- AASHTO *Construction Handbook for Bridge Temporary Works*
- AASHTO/NSBA *Steel Bridge Fabrication Guide Specification*
- AASHTO/NSBA *Guide Specification for Application of Coating Systems with Zinc-Rich Primers to Steel Bridges*
- FHWA *Post-Tensioning Tendon Installation and Grouting Manual*

- Post Tensioning Institute (PTI) *Guide Specification - Acceptance Standards for Post Tensioning Systems*
- CEB-FIP Model Code for Concrete Structures (For Time Dependent Behavior of Concrete)

The remaining standards were set forth in “Book 3.”

It is important to notice the small asterisks next to some regulations. MnDOT was aware existing regulation or policy might need to change if Flatiron Manson was to be successful. For this reason, some of the special provisions were modified to enable MnDOT and Flatiron Manson to meet time and budget goals. The regulations noted with asterisks were modified so they did not conflict with the goals of the project.

An interesting twist to these third-party reviews was the University of Minnesota Center for Transportation Studies. MnDOT hired them to act as a third-party observer and advisor to the instrumentation process. With the close campus proximity, professors led classes to the 10th Street Bridge for observation and real-time construction experience. Rather than resenting yet another group of folks scrutinizing their business, Flatiron Manson welcomed the University of Minnesota’s involvement. They partnered together regarding the Bridge Smart technology, during construction and continuing after as the University analyzes data.

Community Involvement is Required by Contract

It may be said that MnDOT released control to the local community when the bridge collapsed. Minnesotans were more than saddened; they were angry. The public had much to say. They wanted a quality bridge; they did NOT want to worry about another bridge falling down. They wanted the bridge built safely. Neighborhoods wanted the least disruption possible and effective noise mitigation, especially at night. They wanted the river valley respected and they wanted the bridge to be aesthetically pleasing. They wanted local men and women to have jobs and minorities to be well represented. They wanted information.

Jon Chiglo’s response was Done! Done! And Done! Then he, Kevin Gutknecht (MnDOT Communications Manager) and Flatiron Manson proved it by engaging the public early and often.

Perhaps, the most impressive community outreach was the daylong “Charette” process invented and copywritten by architect Linda Figg. The systematic, high tech, interactive process reached consensus on features such as bridge pier type, retaining walls, gateway monuments, railing, bridge color, and bridge lighting. Getting to actually choose design – now, that’s public engagement!

While the public appreciated efforts of engagement, they remained concerned. "The public and the legislature came to us frequently concerned about safety and quality," says Chiglo. "They were worried we were building it too fast to get good quality, so those were top concerns for us. In this project, there was a common goal of making sure the bridge was done right the first time."

Figure 11; Peter Sanderson at a Saturday Sidewalk Superintendent Talk

It was difficult to convince the world-at-large that building quickly did not mean building poorly – that speed did not equal less quality. The first thing was to ensure state-of-the-art technology and dogged attention to detail that would guarantee quality at all levels and each and every activity.

Gutknecht organized public interaction through innovative technologies and face-to-face encounters. The Internet was a handy tool. MnDOT created a special website that provided photos, timelines and process transparency. About 6,000 citizens signed up to get email alerts[32] and information automatically. A webcam mounted at the construction site cyber-cast real-time activity 24 hours a day. Clever animations portrayed[33] an overview as though riding in an airplane and the under-view as though riding in a boat. PowerPoint presentations were online. Proposals and actual contracts were easily accessible as soon as it was legal to disclose them. Touchscreen kiosks[34] provided fingertip access to a wealth of information about the bridge, including a photo gallery, a link to the project's webcam, an explanation of the schedule and virtual tours showing the finished bridge from the vantage point of a helicopter, a boat and a car.

A pedestrian walkway was built on the 10th Avenue Bridge that ran parallel to the collapsed Bridge #9432. At any given time, citizens stopped to watch construction progress. Every Saturday at 11:00 AM, Flatiron Manson Project Manager Peter Sanderson hosted Sidewalk Superintendent Talks to keep the public informed of the project's progress.

Attendance ranged from 30 people to hundreds of people. Large crowds divided into smaller groups, handheld microphones and posters helped tell the story. They came during the heat of

[32] One of the duties of a local public relations firm hired to help
[33] And still are available! Go to http://projects.dot.state.mn.us/35wbridge/sidewalkTour.html
[34] located in the lobby at Mill City Museum and the main mall of the Minneapolis airport

summer and dead of winter. “Minnesotans are used to it,” laughed one woman during a cold-weather interview by a teeth-chattering, shivering national reporter.

Sanderson relished the Saturday morning talks and quickly became a favorite of the local citizens. Some attendees showed up regularly; one woman brought him fresh-baked cookies. He met really interesting people. “When you’re working 13 or 14 hours a day, it’s nice to do something else for a while. It was enjoyable,” Sanderson relates.

A series of efforts provided opportunities for public interaction, including:

- Open houses
- Legislative hearings
- Neighborhood association and community group meetings
- Speakers Bureau presentations/listening sessions
- Meetings with numerous city, county, state, and federal agencies/offices
- Email alerts/notifications

A 24-hour hot-line provided direct access for community concerns. Calls that came in overnight were addressed within the first fifteen minutes of the workday. Active listening paired with immediate response built public support. Gutknecht tells the story of a high-rise apartment building on the southern side. One of the regular listening meetings uncovered complaints about lights shining into windows. MnDOT repositioned the lights to point down, instead of up. Problem solved. Happy public! Giving citizens opportunities to have meaningful input created buy-in and pride and was worth the investment of directed resources.

Many of these meetings were presided over by the principal players, like Jon Chiglo, Peter Sanderson, Linda Figg and Kevin Gutknecht, which conveyed the serious intent of MnDOT and Flatiron Manson. They also spent time with legislators and City Officials – appearing before formal hearings, giving personal tours, and holding monthly

> “Flatiron Manson, on paper, was the most expensive bid. But they brought skills to the table that were NEEDS, NOT WANTS. Things like the Charette process outreach to school kids, understanding of community buy-in. Some contractors allowed for a week to get this done; it took more like six months and was ongoing throughout the project. We could not ignore public perception/Sensitivity to public relations/ Flatiron understood. At the end, 94% approved of the project and were happy with result.
>
> We needed the innovations, needed the Smart Bridge, needed the beauty. This was a Business Investment that paid Big Dividends for the Minnesota Citizen”
>
> Jon Chiglo

information breakfasts.[35] Project representatives led tour groups across the 10th Avenue Bridge overlooking the construction site. They provided an overview of the project and answered questions. Signs describing the design-build process displayed on the railing along the 10th Avenue Bridge.

FIGG Engineering, subcontractor Cemstone, and Lakes and Plains Regional Council of Carpenters and Joiners co-led "Casting the Future" was a hands-on educational outreach to 1,800 middle school students. Students visited the site and learned about concrete and careers in construction. Then, each child made a personalized 16" X 6" crushed glass aggregate tile. North of the bridge, FIGG installed these tiles made by Twin City students on a major walkway leading to the University of Minnesota.

[35] Legislative breakfasts happened in September, October, November and December of 2007. By January 2008, the Legislators were comfortable enough with the progress; the need for monthly reports was eliminated.

SUMMARY

It's time to remind ourselves of the grisly situation within which all the pressurized activities ensued. The tragic bridge failure collapsed public confidence as well as a structure. Political and moral forces were at work, shining a spotlight on each and every move that was made.

MnDOT and their partner Flatiron Manson maneuvered the perilous path of multiple governments, over-reaching regulation, a skeptical community, and their own, aggressive ambition to create a stunning, quality-laden bridge, worthy of accolade and built to last 100+ years.

Construction of the $234 Million I-35W St Anthony Falls Bridge was done in record time[36] - three months ahead of a schedule many thought impossible to achieve. In fact, Flatiron Manson built an entire replacement bridge in a shorter amount of time than the National Transportation Safety Board took to complete the study of why the collapse happened.

The team challenged traditional procurement and project management principles to drive innovation and meet the unheard-of timeline – without jeopardizing quality and safety. In less than 18 months, Flatiron Manson delivered what some call the smartest bridge in the world and others call the most beautiful. While Flatiron Manson had the highest price – their bid represented the best overall total value in terms of valuing price, quality and time.

To suggest the completed I-35W St Anthony Falls is a winner is the ultimate understatement. The following lists the project awards that were won.

- Federal Highway Administration - Award of Excellence, 2010
- Portland Cement Association - Bridge Design Award of Excellence, 2010
- American Association of State Highway and Transportation Officials - America's ○ Transportation Awards, Grand Prize, 2009
- Associated General Contractors of America/Aon - Grand Award, 2009
- Associated General Contractors of America/Aon - Build America Award, 2009
- American Segmental Bridge Institute - Bridge of Excellence Award, 2009
- American Public Works Association - Project of the Year, 2009
- Deep Foundations Institute - Special Recognition Award, 2009

[36] Thirteen and a half months from the time of collapse

- Design-Build Institute of America - National Design-Build Institute of America Award, 2009
- Design-Build Institute of America - Best Overall Award, 2009
- Engineering Society of Western Pennsylvania - Project of the Year, 2009
- FIATECH - Celebration of Engineering and Technology Innovation Award, 2009
- International Bridge Conference - George S. Richardson Medal, 2009
- National Council of Structural Engineers Associations - Excellence in Structural Engineering Award, 2009
- Northwestern University's Infrastructure Technology Institute - David Schultz Award, 2009
- American Society of Civil Engineers - Outstanding Civil Engineering Achievement (OCEA) Award of Merit, 2009
- American Society of Civil Engineers - Outstanding Projects and Leaders (OPAL) Award (Finalist), 2009
- American Council of Engineering Companies (Colorado) - Honor Award, Bridge Hydraulic Analysis, 2009
- American Council of Engineering Companies - Merit Award for Calming the Waters, 2009
- American Road & Transportation Builders Association - Globe Award for Environmental Protection and Mitigation, 2009
- American Road & Transportation Builders Association - Pride Award for Public Media Relations/Education, 2009

Adhering to Vested principles made the award-winning result possible. Minnesota Department of Transportation, coming together with Flatiron Manson and the other players in their joint venture, defined mutually desired outcomes and committed to each other's success. The parties shared reward and risk within a clearly designed quality and safety process.

Statements found while researching this study provide evidence the bonds went beyond surface "working relationships" and embraced apparent regard and appreciation for one another.

"Peter (Sanderson) was probably one of the best project managers I've worked with," says Jon Chiglo, his counterpart at the Minnesota Dept. of Transportation.

"Jon was extremely exacting, but helpful; it enabled us to get going. MnDOT reviewed drawings and designs and there was no obstruction."

In reference to the contracting team,

"When you look at the people [the design-build team] brought in, they left their lives behind. They sacrificed quite a bit. There was no ability to go home very frequently. I really admire and appreciate that sacrifice. They did it because of the circumstances. It's very encouraging when you see that kind of commitment."

- Peter Sanderson, FMJV Project Manager

"MnDOT's vision proved to be achievable, demonstrating the power of creativity and innovation."

- Architect Linda Figg

Giving each other credit, rather than grabbing it for him or herself is a certain sign of a true Vested partnership. Jon Chiglo has the last word in quotes as he summed up his feelings about meeting the incredible challenge:

"But nothing could beat the feeling that came on September 18th, Day 339 of the contract, when MnDOT officials spent the pre-dawn hours of the day parking cars. Hundreds had gathered to be the first to cross the milestone."

"I was a little anxious trying to get everything set up. As people started approaching the crossing of the bridge, horns were honking, flags were waving and people were cheering and yelling

"Thank You!"

- Jon Chiglo

LESSONS LEARNED

"Any intelligent fool can make things bigger and more complex...It takes a touch of genius - and a lot of courage to move in the opposite direction."

- Albert Einstein

Perhaps no quote is quite as relevant as Albert Einstein's words of wisdom when it comes to the St. Anthony's Bridge Rebuild project. Critics often point to the fact that it takes a crisis to get momentum to drive change. While the collapse of the bridge surely propelled the change – it is still a testament to the courage of MnDOT and Jon Chiglo to move away from conventional low price and design-bid to more progressive best value and design-build approaches. While these approaches laid the foundation for success – success was really founded when MnDOT and Flatiron Manson institutionalized the concepts embedded in a true Vested partnership.

Moving to a Design-Build approach enabled MnDOT to apply Vested's Rule #2 - Focus on the **what**, not the **how**. It encouraged innovation that paid dividends not only for the project – but for future projects as well. For example, MnDOT now regularly uses the concrete silica formulation discovered during this project. Smart Bridge design has become a matter of course, along with other innovations that are not as sexy but really important to continued safety improvements. For example, covers for gussets easily accessible for inspection.

MnDOT officials, with experience in the Vested Outsourcing experience, are advocates. They appreciate innovations, cost savings and compressed construction schedules. Of the many lessons learned from the project, the most obvious is that creating a business agreement where interests are aligned works. Win-win is not just another form of "Minnesota Nice" – it drives the desired behaviors. The I-35W St Anthony Falls Bridge rebuild used a Vested strategy that produced a bridge in a short period of time with the overall total lowest cost—and incentivized the contractor to get it done fast.

A second key lesson learned is people and organizations' self-limiting natures that dismiss Vested approaches as an anomaly. While highly successful for the I-35W St Anthony Falls Bridge rebuild Project, the State of Minnesota is still overly cautious in allowing MnDOT to deploy Vested principles widely. For example, the Minnesota State Legislature restricts MnDOT from deploying Design-Build approaches to no more than 10 percent of projects. Design-Build is crucial to Vested's Rule #2 – Focus on the What, not the How. While Design-Build may not be the right answer for every situation, it makes little sense for the Legislature to actually prohibit consideration of the methodology that is often the best win for the state, private business and taxpayers. In addition, the legislature and state authorities have a bureaucratic process in order to use Design-Build options.

As future governments consider and debate approvals to adapt Vested Outsourcing-type alternatives such as Design-Build public/private partnerships, cadres of lobbyists are not

required. All officials need is an institutional memory of the catastrophic circumstances of Minnesota Bridge #9340 failure and a short car trip over the amazing success story: the I-35W St Anthony Bridge.

To the intelligent observer, the path is clear. Vested Outsourcing works!

ACRONYMS

AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
AGCA	Associated General Contractors of America
ATC	Alternative Technical Concept
CCTV	Closed Circuit Television System
CM at Risk	Construction Management at Risk
DBE	Disadvantaged Business Enterprises
DPBS	Design & Price Based Selection
EEO	Equal Employment Opportunities
FHWA	Federal Highway Administration
FLIR	Forward Looking Infrared
FMJV	Flatiron-Manson Joint Venture
ITS	Intelligent Transportation System
MnDOT	Minnesota Department of Transportation
MnSCU	Minnesota State Colleges and Universities
NTSB	National Transportation and Safety Board
PCI	Progressive Contractors Inc
PM	Project Manager
QBS	Qualification Based Selection
RFP	Request For Proposals
RFQ	Request For Qualifications
RTMC	Regional Treatment Management Center
SOQ	Statement of Qualifications
TC	Technical Committee
TRC	Technical Review Committee
WIIFME	What's In It For ME
WIIFWE	What's In It For We

BIBLIOGRAPHY

(n.d.). Retrieved May 5, 2011, from Johnson Brothers Construction: http://www.johnsonbros.com/index.htm

Innovative Contracting Standards. (2005, December). Retrieved December 20, 2010, from Minnesota Department of Transportation: http://www.dot.state.mn.us/const/tools/documents/Guidelines_005.pdf

The Construction Law Briefing Paper 05-05. (2005, September). Retrieved December 12, 2010, from FABYANSKE, WESTRA, HART & THOMSON, P.A.: http://www.fwhtlaw.com/files/pdf/New_MN_Statutes_Allow_Design_Build.pdf

Flatiron-Manson begins construction of new 35W bridge (2007, November 15). Retrieved December 26, 2010, from Minneapolis Regional Labor Federation, AFL CIO: http://www.minneapolisunions.org/mlr2007-11-15_35W_bridge.php

Flatiron-Manson Proposal. (2007, September 13). Retrieved December 20, 2010, from Minnesota Department of Transportation: http://www.dot.state.mn.us/i35wbridge/rebuild/award/FlatironManson1.pdf

Flatiron-Manson proposal Form 3. (2007, August 27). Retrieved December 20, 2010, from Minnesota Department of Transportation: http://www.dot.state.mn.us/i35wbridge/rebuild/award/FlatironManson3.pdf

I35W Bridge Replacement – Rebuild Plans (8/29/07). (2007, August 29). Retrieved May 6, 2011, from MnDOT: http://www.dot.state.mn.us/i35wbridge/rebuild/pdfs/bridgereplacement-overview-aug30.pdf

Interstate Bridge over I-35W Mississippi. (2007, September 13). Retrieved December 23, 2010, from Minnesota Department of Transportation: http://www.dot.state.mn.us/i35wbridge/rebuild/award/FlatironManson1.pdf

Minneapolis begins municipal consent process for swift, responsible consideration for new I35W Bridge. (2007, August 25). Retrieved December 2007, 18, from Minneapolis, City of Lakes: http://www.ci.minneapolis.mn.us/mayor/news/20070821newsmayor_mplsmcp.asp

Minneapolis I-35W Bridge; Municipal Consent Hearing. (2007, September 20). Retrieved December 18, 2010, from Minnesota Department of Transportation: http://www.dot.state.mn.us/i35wbridge/rebuild/municipal-consent/slideshow.pdf

St Anthony Falls (35W) Design-Build Project Proposal Evaluation Plan. (2007, September 13). Retrieved December 19, 2010, from Minnesota Department of Transportation: http://www.dot.state.mn.us/i35wbridge/rebuild/award/evaluationplanforposting.pdf

St. Anthony Falls (I-35W) Bridge Replacement Project. (2007, October 8). Retrieved December 26, 2010, from Minnesota Department of Minnesota, Material Management Admin: http://www.admin.state.mn.us/documents/Protest_determination.pdf

Technical Review Committee Summary of Findings Ames/Lunda. (2007, September 2007). Retrieved December 2010, 2010, from Minnesota Department of Transportation: http://www.dot.state.mn.us/i35wbridge/rebuild/award/AmesLundaeval.pdf

Technical Review Committee Summary of Findings Flatiron Manson. (2007, September 27). Retrieved December 20, 2010, from Minnesota Department of Transportation: http://www.dot.state.mn.us/i35wbridge/rebuild/award/FlatironMansoneval.pdf

Technical Review Committee Summary of Findings McCrossan. (2007, September 27). Retrieved December 20, 2010, from Minnesota Department of Transportation: http://www.dot.state.mn.us/i35wbridge/rebuild/award/CMMcCrossaneval.pdf

Technical Review Committee Summary of Findings Walsh American Bridge. (2007, September 9). Retrieved December 20, 2010, from Minnesota Department of Transportation: http://www.dot.state.mn.us/i35wbridge/rebuild/award/walsheval.pdf

Accelerated Construction; Faster Than Ever. (2008, August). Retrieved December 21, 2010, from Roads and Bridges Magazine: http://www.flatironcorp.com/assets/pdf/08-2008RoadsandBridges-I-35W(web).pdf

Build the Best; Be The Best. (2008, April 10). Retrieved December 21, 2010, from Flatiron Corporation: http://www.flatironcorp.com/assets/ProjectSheets/1040-I-35(W)Bridge.pdf

Collapse of I-35W Highway Bridge, Minneapolis, Minnesota August 1, 2007, (2008, August 3). Retrieved December 13, 2010, from National Transportation Board: http://www.ntsb.gov/publictn/2008/HAR0803.pdf

From Tragedy to Triumph. (2008, September 15). Retrieved December 21, 2010, from Engineering-News Record: http://www.flatironcorp.com/assets/pdf/09-15-2008-ENR-I35W.pdf

I-35W Bridge Work moves forward. (2008, February 13). Retrieved December 26, 2010, from Minnesota Department of Transportation; Newsline: http://www.newsline.dot.state.mn.us/archive/08/feb/13.html#Z1

Yearly Listing of all Executed Design-Build Contracts. (2008, August 27). Retrieved December 12, 2010, from Minnesota Department of Transportation Building: http://www.leg.state.mn.us/docs/2008/mandated/080639.pdf

Concrete is Remixed with Environment In Mind. (2009, March 31). Retrieved December 24, 2010, from New York Times: http://www.nytimes.com/2009/03/31/science/earth/31conc.html?pagewanted=1&_r=2

Mixing Social and Structural Skills; Leaders Guided Historic Rebuild Project. (2009, January 7). Retrieved December 21, 2010, from ENR: http://enr.construction.com/people/awards/2009/0107-PeterSanderson.asp

New Minnesota Bridge's Super Sensors Scan Tragedy Before It Strikes. (2009, October 1). Retrieved December 19, 2010, from Popular Mechanics: http://www.popularmechanics.com/science/4258306

The Bridge to Smart technology. (2009, February 19). Retrieved December 21, 2010, from Bloomberg Business Week: http://www.businessweek.com/magazine/content/09_09/b4121042656141_page_4.htm

2010 Minnesota Statutes 161.3412 Design-Build Authority. (2010). Retrieved December 12, 2010, from Minnesota Office of the Revisor of Statutes: https://www.revisor.mn.gov/statutes/?id=161.3412

America's Transportation Awards. (2010, December 16). Retrieved December 16, 2010, from American Transportation Award.org: http://www.americastransportationaward.org/Default.aspx

i-35W (St Anthony) Bridge. (2010, April 14). Retrieved December 16, 2010, from Build the Best Be The Best Flatiron: http://www.flatironcorp.com/assets/ProjectSheets/1040-I35(W)Bridge.pdf

I-35W Mississippi River Bridge. (2010, November 16). Retrieved December 13, 2010, from Wikipedia: http://en.wikipedia.org/wiki/I-35W_Mississippi_River_bridge

(August 23, 2007). *Instructions To Proposers; St. Anthony Falls (35W) Bridge Design Project.* Minneapolis: Minnesota Department of Transportation.

Chiglo, J. (2008, November/December). *I-35 St Anthony Falls Bridge.* Retrieved December 18, 2010, from HPC Bridge View, see: http://test.hpcbridgeviews.com/i52/Article1.asp

Chiglo, J., & Figg, L. (2008, Winter). *The New St Anthony Falls Bridge.* Retrieved December 19, 2010, from www.aspirebridge.org: http://www.aspirebridge.org/pdfs/magazine/issue_05/I-35W_win08.pdf

Chiglo, J. (2008, November 25). *Transportation Task Force.* Retrieved February 4, 2011, from MnDOT: http://www.dot.state.mn.us/updates/pdf/nov25/Design%20Build%20Best%20Practices.pdf

Chiglo, J. (2011, February 4). MnDOT Project Manager. (J. Kling, Interviewer)

Cho, A. (2009, January 7). *Mixing Social and Structural Skills, Project Leaders Guided Historic Rebuild in Minnesota.* Retrieved March 7, 2011, from ENR.com: http://enr.construction.com/people/awards/2009/0107-PeterSanderson.asp

Collapse of the I-35 Bridge – August 1, 2007 - Cause Map. (n.d.). Retrieved December 15, 2010, from Think Reliability: http://www.thinkreliability.com/CM-I35.aspx

Completion of I-35 Comes with Long Line of Accomplishments. (n.d.). Retrieved December 24, 2010, from Roads and Bridges magazine: C:\Users\precious flower\Desktop\RoadsBridges.com and Roads and Bridges magazine - Road Construction & Maintenance.mht

DeHaven, T. A. (n.d.). *I-3 Bridge Replacement Design-Build Project.* Retrieved December 20, 2010, from http://www.pwri.go.jp/eng/ujnr/tc/g/pdf/24/24-7-1thomas.a.dehaven.p.e.pdf

Design-Build. (n.d.). Retrieved from http://www.pwri.go.jp/eng/ujnr/tc/g/pdf/24/24-7-1thomas.a..dehaven.p.e.pdf

Design-Build on I-35 Bridge. (n.d.). Retrieved December 18, 2010, from Minnesota Department of Transportation: http://www.dot.state.mn.us/designbuild/35wbrproject.html

Economic Impact of the Collapse of the I-35W Bridge. (n.d.). Retrieved December 16, 2010, from Positively Minnesota, Department of Employment and Economic Development: http://www.dot.state.mn.us/i35wbridge/rebuild/municipal-consent/economic-impact.pdf

Figg, L. (2008). *Bridging The Mississippi: The New I-35W Bridge.* Twin Cities, MN: Figg Engineering.

Figg, L., & Phelps, A. R. (2008, Fall). *Soaring Across the Mississippi River.* Retrieved December 20, 2010, from Flatiron-Manson: http://www.flatironcorp.com/assets/pdf/i35_aspire_fall08.pdf

Flatiron-Manson, a Joint Venture. (n.d.). Retrieved December 16, 2010, from MN Department of Transportation: http://www.dot.state.mn.us/designbuild/documents/Flatironfactsheet9.5.07.pdf

Foti, J. (2007, November 27). *He brings world of experience to bridge project.* Retrieved March 7, 2011, from MnDOT: http://projects.dot.state.mn.us/35wbridge/pdfs/StarTribune1.pdf

French, C. (2011, February 9). Professor of Civil Engineering at the University of Minnesota. (J. Kling, Interviewer)

French, C. (2011, February 23). University of Minnesota Professor. (J. Kling, Interviewer)

Fuhrman, K., & Desens, V. (2006, June). *Fracture Critical Bridge Report In Depth Study.* Retrieved December 13, 2010, from Minnesota Department of Transportation: http://www.dot.state.mn.us/i35wbridge/pdfs/06fracture-critical-bridge-inspection_june2006.pdf

Garrison, T., & Evey, L. (2008, September 25). *Design Build Radio Network*. Retrieved March 2, 2011, from www.jackstreet.com: http://www.jackstreet/WCON.DBA.SandersonCFM

Gutknecht, K. (2011, February 15). MnDOT Public Information. (J. Kling, Interviewer)

I-35 St Anthony Falls Bridge, Sidewalk Tour and Animations. (n.d.). Retrieved December 20, 2010, from Minnesota Department of Transportation: http://projects.dot.state.mn.us/35wbridge/sidewalkTour.html

Innovative Contracting - Pay for Performance. (n.d.). Retrieved December 22, 2010, from Minnesota Department of Transportation: http://www.dot.state.mn.us/const/tools/payforperformance.html

Kennedy, T., & McEnroe, P. (2007, August 18). *Phone call puts brakes on bridge repair.* Retrieved December 26, 2010, from Minneapolis star and tribune: http://www.startribune.com/local/11593791.html

Lam, P. T., Kumaraswamy, M. M., & NG, S. T. (n.d.). *THE MULTIPLE ROLES OF SPECIFICATIONS IN LEAN CONSTRUCTION.* Retrieved December 22, 2010, from http://cic.vtt.fi/lean/singapore/Lametal.pdf

Legus, G., & Olsen, K. (2008). *Bridges Don't Fall Down: stories from the I-35W Bridge Collapse.* Apple Valley: The Snowy Owl Press.

Miller, P. (2010, October 25). *Minnesota Counties Begin Design-Build for Highways.* Retrieved December 12, 2010, from Design-Build Board: http://www.designbuildboard.com/category/design-build_legislation_policy/

Morrisey, E. (2007, August). *Bridge Collapse Archives.* Retrieved December 15, 2010, from Edward Morrisey's Captain's Quarters: http://www.captainsquartersblog.com/mt/archives/cat_bridge_collapse.php

Nasvik, J. (2008, September 1). *Bridge to the Future.* Retrieved December 24, 2010, from CONCRETE CONSTRUCTION Online Resources for contractors and specifiers including construction methods, materials and equipment.htm: CONCRETE CONSTRUCTION Online Resources for contractors and specifiers including construction methods, materials and equipment.htm

O'Connell, H. M., P.E., D. R., & Bergson, P. M. (2001, March). *Fatigue Evaluation of the Deck Truss of bridge 9340.* Retrieved December 14, 2010, from Minnesota Department of Transportation: http://www.lrrb.org/pdf/200110.pdf

P 3 Defined. (n.d.). Retrieved December 26, 2010, from FHWA Office of Innovative Delivery: http://www.fhwa.dot.gov/ipd/p3/defined/design_build.htm

Rebuilding St Anthony Falls I-35W Bridge. (n.d.). Retrieved December 16, 2010, from Minnesota Department of Transportation: http://www.americastransportationaward.org/I35W_Bridge_Final_Submittal_040510.pdf

Sanderson, P. (2011, March 4). Project Manager Flatiron Manson. (J. Kling, Interviewer)

VIII. Bridge Design and Performance. (n.d.). Retrieved December 13, 2010, from 1998 Catalog of Practical Papers: http://onlinepubs.trb.org/Onlinepubs/am/bridge.html#981038

Rochester Highway 52 (ROC52) Design-Build Project. (Volume 6, Issue 2). Retrieved December 18, 2010, from RECO NEWS The Reinforced Earth Company: http://www.recocanada.ca/files/pdf/V6I2.pdf

Ward, T. P., & Jackson, D. P. (2005, November). *PAVING A NEW ROAD: MnDOT explores Best-Value Design-Build Delivery.* Retrieved December 12, 2010, from Design Build Dateline Conference Issue: http://www.dot.state.mn.us/designbuild/background/ward.pdf

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