Value Services Workshop

Value Study

PRESENTATION REPORT

PROJECT:

Commercial Street Grade Crossing
Braintree, MA

DATE: February 27, 2004

Conducted Under Cooperative Agreement with:
SAMI, LLC
Evergreen, CO 80437

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VALUE STUDY TEAM ACKNOWLEDGMENT OF ACTIVITY TEAM AND CONSULTANTS

The value study team wishes to express thanks and appreciation to the activities team who were always professional, readily available, and unfailingly helpful. The success of the study team effort could not have been possible without the assistance of the project members.

The team wishes also to express thanks and appreciation to those listed on the Consultation Record of this report. The cooperation and helpfulness of those consulted contributed greatly to the technical foundation and support of the team's deliberations and proposals.

The aim of using the Value Method is to achieve the best worth for the cost (value) for the project. It is only with the full team effort, as shown by all involved, that this goal can be achieved. This study represents the product of such an effort.

GENERAL DISCUSSION OF THE VALUE METHOD PROCESS, ITS PURPOSE, AND THIS VALUE STUDY

The Value Method is a highly effective decision-making process. It consists of a series of procedures that occur in a preplanned sequence. Larry Miles originally developed it in 1943. In general, it is a Asystematic and organized process to creatively develop alternatives that secure essential functions at the greatest worth as opposed to their life-cycle cost (highest value).@ It has many applications but is most often used as a management and problem-solving tool.

A job plan is used throughout the value study activity. In brief, the component features from a process, program, project, process, or activity are examined to determine pertinent functions, governing criteria, and associated costs. Next, using creativity techniques; ideas, concepts, and potential proposals are generated. Then through an analysis process, priorities for due diligence activities are identified and pur forward for development of the remaining best ideas. Those alternative methods that fully meet necessary requirements at a lower cost, or with an increase in the long-term values, are proposed for adoption by the parties responsible for the project.

This report is the result of a "formal" Value Study Team effort. A formal value study team is comprised of people with the desired expertise and independence. They have an understanding of the needs of the organization they represent, and can take an open and independent view of the project being studied. Ideally, they have not been notably involved in the project prior to the value study. Using the Value Method applied to the current collected data, the study team takes a "fresh look" at the project to create alternatives that fulfill the client needs at the greatest recognized attainable value.

The Value Method has many common names. These mainly relate to the historical features, the timing of its application, or type of process, program, project, or activity studied. It is often referred to as Value Analysis (VA), Value Management (VM), Value Engineering (VE), and Value Planning (VP).

The application of the process has been highly successful for more than 60 years for both private and governmental entities. As a result, the Federal government has mandated its use in all Federally funded operations. This value study report demonstrates the required substance that quality Value Method procedures were used throughout this value study, as stipulated under the mandated governmental Value Program oversight authorities and the recommendations of the Value Method profession.

Value Services Workshop

EXECUTIVE SUMMARY

PROJECT: Commercial Street Grade Crossing, Braintree, MA

General:

The value study as part of the Certified Module I Workshop in Evergreen, CO. The study was of a proposed grade crossing reconstruction project sponsored by the Massachusetts Water Resources Authority (MWRA) in conjunction with its railroad operating entity the Fore River railroad Corporation (FRRC).

Summary of Proposals:

The value study resulted in eight major alternative proposals of which five were presented and furthered for consideration. (These are alternative methods that were developed during the value study to the point that they were complete enough for decision-making and comprehensive presentation "alternative recommendation"). The total estimated initial expenditure savings of the evaluations completed during the value study, if all independent monetary savings proposals are accepted, are estimated at about $**13,275**.

The process also generated **value-added** features to the concepts. (Value added features are defined as attributes that the study team believes will improve the final product in non-monetary or hard to quantify ways, e.g., time, quality, and safety. Increased initial or Life-Cycle Costs (LCC), if any, are expected to be more than offset by the apparent added non-monetary value, and/or have undetermined cost savings that will exceed the projected increased proposal cost.)

A brief description and an estimate of the minimum potential value of the proposals are:

Proposal No. 1. Panelized Crossing Construction. The study team determined that the use of this method of construction would reduce the the time to construct the crossing with associated reductions in labor costs. This method would require closing the road (via a detour) and setting back trains. If the road cannot be closed, then a temporary crossing outside the crossing limits is proposed (Proposal No. 2) to provide for continued EMS traffic. The potential **savings** with this proposal is estimated to be $2,650.

Proposal No. 2. Temporary EMS Crossing. The study team determined that by providing a temporary crossing for EMS traffic, a general detour would be permitted to allow for the "panel method" of construction. Excluding the cost of possible easements for the temporary crossing, a potential **cost** of this proposal is estimated to be $14,375.

Proposal No. 3. Use Relay track Material. The study team determined that, by using acceptable relay rail (AREMA #1), a cost savings could be generated. Also, relay rail may be more readily available than new rail, which could delay construction if there is much of a backlog. The potential **savings** with this proposal is estimated to be $2,650.

Proposal No. 4. Less Expensive Crossing Surface. The study team determined that, by using a less expensive crossing surface (rubber guard rail/paved vs. full depth rubber) a cost savings could be generated without sacrificing safety and "rideability". The potential **savings** with this proposal is estimated to be $23,000.

Proposal No. 5. Install Solar Power to Supplement for Crossing Signals. The study team determined that the relaibiltiy of the grade crossing signals would be enhanced by the installation of solar cells/system on the signal case. This was recommend because of the weather related power outages typical in New England. The potential **cost** of this proposal is estimated to be $3,000.

EXECUTIVE SUMMARY

PROJECT: Commercial Street Grade Crossing, Braintree, MA

Summary of Additional Items for Further Study.

The three concepts not recommended for further development and presentation should be explored further considering the conditions at the grade crossing. These concepts are out of the scope of this and a normal grade crossing reconstruction project, but may have positive impacts on the operations at and approaching the crossing. A brief description of the design concepts are:

Concept A2. Better Define Roadway Approaching the Grade Crossing. The study team determined that this concept would increase the safety of the crossing by better defining the roadway limits approaching the crossing. It would also help channel and direct the surface runoff so as not to adversely impact the crossing, which is a sag curve (of the roadway). The additional **cost** of this proposal above what is proposed in the project design l is estimated to be $14,444.

Concept A3. Upgrade the Track Approaching the Crossing. The study team determined that this concept would enhance the operations of the trains approaching the crossing reducing the derailment potential. The potential **cost** of this proposal is estimated to be $45,000.

Concept A5. Improve Roadway Geometry at and Approaching the Crossing. Like Concept A2, this concept would widen the roadway approaches to the crossing to better define the roadway and install sidewalks to enhance pedestrian safety approaching and over the crossing. The additional **cost** of this proposal above what is proposed in the project design is estimated to be $27,394.

The total cost of these project enhancements is estimated to be $86,838.

VALUE STUDY

PROJECT:
Commercial Street Grade Crossing
Braintree, MA

VALUE STUDY TEAM MEMBERS

NAME	TITLE/DISCIPLINE	CONTACT INFORMATION
	Value study team leader, Certified Value Specialist (CVS), Certified Value Consultant (CVC)	
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ALTERNATIVE EVALUATION FOR PROPOSAL NO. 1

PROJECT:	Commercial Street Grade Crossing, Braintree, MA		
COMPONENT:	Panelized Crossing Construction	**FUNCTION:**	Satisfy OUS

ALTERNATIVE DESCRIPTION

PROPOSAL NO. 1 INSTALL CROSSING VIA THE PANEL METHOD
Construct the crossing panel offsite on the ROW and install in 1-2 days, rather than the 4-5 days for constructing it (the crossing) one-half at a time, keeping the road open. **(Design Concept C4)**

ADVANTAGES / BENEFITS	DISADVANTAGES
• Reduce construction time and costs • 1-2 day installation • Better constructed crossing	• Need to detour road • May not have sufficient ROW to construct panel

IDENTIFIED RISKS:

- Delays could extend road closure

COST COMPARISON FOR PROPOSAL NO. 1

PROJECT:	Commercial Street Grade Crossing, Braintree, MA

ORIGINAL CONCEPT	VALUE STUDY CONCEPT
• Construct crossing one-half at a time over 4-5 days	• Panelize crossing and install in 1-2 days

COST ITEMS	FIRST YEAR	LIFE CYCLE
ORIGINAL CONCEPT	$ 14,750	
VALUE CONCEPT (-)	$ 12,100	
SAVINGS	$ 2,650	
NUMBER OF UNITS (X)	1	
TOTAL SAVINGS	$2,650	
IMPLEMENTATION COSTS(-)	$0	
NET SAVINGS	**$2,650**	**$**

ORIGINAL CONCEPT

Labor & Equipment Only: Construction Crew (8 person @ $1,950/DAY), Equipment @ $500/DAY and Police/Flagging @ $500/DAY

5 DAYS x ($1,950 + $500 + $500) = $14,750

VALUE ENGINEERING CONCEPT

4 DAYS x ($1,950 + $500 + $500) = $11,800

Misc. Detour Signs = $300

Total VE Concept - $12,100

Figure 2. Proposal 1 - Commercial Street Grade Crossing

No sketch involved. Crossing design will not change.

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DESCRIPTION- VALUE STUDY PROPOSAL NO. 1

PROJECT:	Commercial Street Grade Crossing, Braintree, MA

Background:

Grade crossings can be constructed in place or via the panelized method, where the crossing panel is constructed on the ROW adjacent to the crossing and installed in one day. Installing grade crossings via the panel method saves time, and resulting labor and equipments costs, provides for a better constructed track panel, and eliminates the need to field weld the rail in the middle of the crossing. This method is preferred in the railroad industry where a road closure of 1-2 days can be accommodated and trains can be set back to accommodate the track outage.

Proposal:

The proposal is to install the grade crossing by the panel method, rather than one-half at a time, with the building of the crossing panel occurring in the northeast quadrant of the crossing.

Assumptions:

It is assumed that:

- the Town of Braintree will allow detouring the roadway traffic,
- the MWRA/FRRC can set back the trains to allow the track outage,
- construction can occur during a weekend with long days, and
- there is sufficient room on the ROW to build the panel.

ALTERNATIVE EVALUATION FOR PROPOSAL NO. 2

PROJECT:	Commercial Street Grade Crossing, Braintree, MA		
COMPONENT:	Temporary EMS Crossing	**FUNCTION:**	Satisfy OUS

ALTERNATIVE DESCRIPTION

PROPOSAL NO. 2 INSTALL A TEMPORARY ROAD FOR EMS
Install a 10' wide emergency bypass road for EMS to allow for panelized crossing construction. Goes with panelized crossing (Proposal No. 1) if detour not allowed. **(Design Concept C5)**

ADVANTAGES / BENEFITS	DISADVANTAGES
• Continued EMS services	• Slows construction of crossing • Will impact ROW of abutters • Cost

IDENTIFIED RISKS:

COST COMPARISON FOR PROPOSAL NO. 2

PROJECT:	Commercial Street Grade Crossing, Braintree, MA

ORIGINAL CONCEPT	VALUE STUDY CONCEPT
• No temporary road in design, as crossing to be constructed one-half at a time leaving the road open	• Construct a temporary road for EMS

COST ITEMS	FIRST YEAR	LIFE CYCLE
ORIGINAL CONCEPT	$ 0	
VALUE CONCEPT (-)	$ 14,375	
SAVINGS	-$14,375	
NUMBER OF UNITS (X)	1	
TOTAL SAVINGS	-$14,375	
IMPLEMENTATION COSTS(-)	$0	
NET SAVINGS	**-$14,375**	**$**

ORIGINAL CONCEPT

Not in original design – no costs.

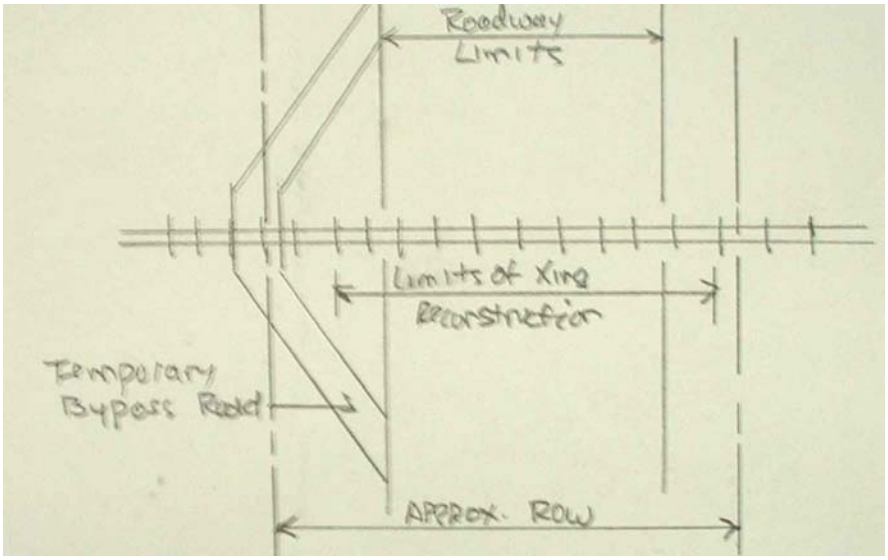
VALUE ENGINEERING CONCEPT

EMS roadway – 200 LF x 15 FT (10 FT paved section)

Earthwork – 115 CY x $50/CY = $5,750, Paving – 225 SY x $25/SY = $5,625, Remove EMS roadway = $3,000, Easement costs - TBD

Total VE Concept - $14,375

Figure 2. Proposal 2 - Commercial Street Grade Crossing



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DESCRIPTION- VALUE STUDY PROPOSAL NO. 2

PROJECT:	Commercial Street Grade Crossing, Braintree, MA

Background:

A temporary (bypass) road is not proposed, as the design calls for reconstructing the crossing one-half at a time always leaving a portion of the road open for vehicles including EMS. Temporary roads are used when the road must be closed to accommodate the crossing construction where a general detour is not allowed or is too long.

Proposal:

The proposal is to construct a 10’ wide road to accommodate EMS, while requiring a detour for normal roadway traffic. This will allow a form of road closure to construct the crossing by the panel method.

Assumptions:

It is assumed that:

- the Town of Braintree will allow a detour for normal traffic,
- there will be no significant ROW impacts, and
- Town of Braintree EMS accepts this proposal.

ALTERNATIVE EVALUATION FOR PROPOSAL NO. 3

PROJECT:	Commercial Street Grade Crossing, Braintree, MA		
COMPONENT:	Track Material	**FUNCTION:**	Support trains

ALTERNATIVE DESCRIPTION

PROPOSAL NO. 3. USE RELAY TRACK MATERIAL
Use No. 1 AREMA relay rail in the crossing. **(Design Concept B1)**

ADVANTAGES / BENEFITS	DISADVANTAGES
• Reduce material costs • Material may be more readily available	• Reduced Life of rail • Need to replace rail sooner • More inspection and maintenance required • May not be desired rail (weight and section)

IDENTIFIED RISKS:

- Premature rail defects and resulting failures.

COST COMPARISON FOR PROPOSAL NO. 3

PROJECT:	Commercial Street Grade Crossing, Braintree, MA

ORIGINAL CONCEPT	VALUE STUDY CONCEPT
• Use new 115# rail	• Use #1 AREMA relay rail

COST ITEMS	FIRST YEAR	LIFE CYCLE
ORIGINAL CONCEPT	$ 6,900	
VALUE CONCEPT (-)	$ 4,600	
SAVINGS	$ 2,300	
NUMBER OF UNITS (X)	1	
TOTAL SAVINGS	$2,300	
IMPLEMENTATION COSTS(-)	$0	
NET SAVINGS	**$2,300**	**$**

ORIGINAL CONCEPT

300 TF = 600 LF of rail, 115# rail is 115#/YD = 38.33 #/FT

(600 LF of rail x 38.33#/FT)/2000 = 11.5 TONS

11.5 TONS x $600/TON = $6,900

VALUE ENGINEERING CONCEPT

Assume we can get 115# AREMA relay rail.

11.5 TONS x $400/TON = $4,600

Total VE Concept - $4,600

Figure 2. Proposal 3 - Commercial Street Grade Crossing

No sketch needed.

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DESCRIPTION- VALUE STUDY PROPOSAL NO. 3

PROJECT:	Commercial Street Grade Crossing, Braintree, MA

Background:

The design calls for the use of new rail, ties and other track material (OTM).

Proposal:

The proposal calls for the use of good relay (prior used) rail that meets the quality requirements set forth by the American Railway Engineering and Maintenance of Way Association (AREMA) for No. 1 relay.

Assumptions:

It is assumed that there is a sufficient quantity (length) of the proper section of 115# AREMA No. 1 relay rail available.

ALTERNATIVE EVALUATION FOR PROPOSAL NO. 4

PROJECT:	Commercial Street Grade Crossing, Braintree, MA		
COMPONENT:	Grade Crossing Surface	**FUNCTION:**	Permit Crossing of Tracks

ALTERNATIVE DESCRIPTION

PROPOSAL NO. 4. LESS EXPENSIVE CROSSING SURFACE
Install a rubber guard rail/paved crossing surface instead of a full rubber crossing surface. **(Design Concept B2)**

ADVANTAGES / BENEFITS	DISADVANTAGES
• Reduced construction costs • Easier to install	• May not protect rail as well • Maintenance of track structure components in crossing will be more difficult

IDENTIFIED RISKS:

- Damage to rail and track structure from snow plows

COST COMPARISON FOR PROPOSAL NO. 4

PROJECT:	Commercial Street Grade Crossing, Braintree, MA

ORIGINAL CONCEPT	VALUE STUDY CONCEPT
• Install a full rubber crossing surface	• Install a rubber guard rail/paved crossing surface

COST ITEMS	FIRST YEAR	LIFE CYCLE
ORIGINAL CONCEPT	$ 60,000	
VALUE CONCEPT (-)	$ 37,000	
SAVINGS	$ 23,000	
NUMBER OF UNITS (X)	1	
TOTAL SAVINGS	$23,000	
IMPLEMENTATION COSTS(-)	$0	
NET SAVINGS	**$23,000**	**$**

ORIGINAL CONCEPT

60 LF x $500/LF = $60,000

VALUE ENGINEERING CONCEPT

Gauge Side Rubber Flangeway Protector – 2 x 60 LF x $100/LF (installed) = $12,000

Field Side Rubber Impact Rail – 2 x 60 LF x $100/LF (installed) = $12,000

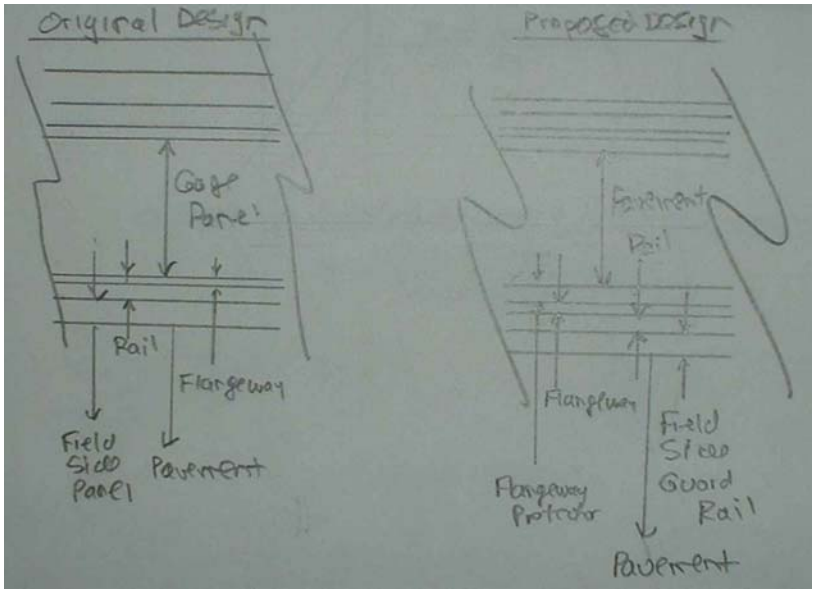
Pave Base Course (3 ½") in crossing area - [60 FT (wide) x 30 FT (15 FT either side of CL of track)]/9 x 25/ SY = $5,000

Pave Wearing surface (2 ½") in crossing area - [60 FT (wide) x 30 FT (15 FT either side of CL of track)]/9 x 25/ SY = $5,000

Subgrade Preparation – 200 SY @ $15/SY = $3,000

Total VE Concept - $37,000

Figure 2. Proposal 4 - Commercial Street Grade Crossing



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DESCRIPTION- VALUE STUDY PROPOSAL NO. 4

PROJECT:	Commercial Street Grade Crossing, Braintree, MA

Background:

The design calls for the use of a full depth rubber crossing surface.

Proposal:

To replace the full depth rubber crossing surface with a rubber guard rail/flangeway system and paved crossing surface.

Assumptions:

It is assumed that the MWRA/FRRC and Town of Braintree will accept other than a full depth rubber crossing surface.

ALTERNATIVE EVALUATION FOR PROPOSAL NO. 5

PROJECT:	Commercial Street Grade Crossing, Braintree, MA		
COMPONENT:	Grade Crossing Signals	**FUNCTION:**	Assure Dependability

ALTERNATIVE DESCRIPTION

PROPOSAL NO. 5. INSTALL SOLAR POWER SUPPLEMENT FOR CROSSING SIGNALS
Install solar power cells to supplement municipal power with solar power. **(Design Concept C6)**

ADVANTAGES / BENEFITS	DISADVANTAGES
• Reduce power costs • Signals will operate during power outages • Supplement battery power	• Need proper positioning • Maintenance issue

IDENTIFIED RISKS:

COST COMPARISON FOR PROPOSAL NO. 5

PROJECT:	Commercial Street Grade Crossing, Braintree, MA

ORIGINAL CONCEPT	VALUE STUDY CONCEPT
• Municipal provided power only	• Install solar cells to supplement municipal power

COST ITEMS	FIRST YEAR	LIFE CYCLE
ORIGINAL CONCEPT	$ 0	
VALUE CONCEPT (-)	$ 3,000	
SAVINGS	-$3,000	
NUMBER OF UNITS (X)	1	
TOTAL SAVINGS	-$3,000	
IMPLEMENTATION COSTS(-)	$0	
NET SAVINGS	**-$3,000**	**$**

ORIGINAL CONCEPT

No cost, as not considered in design.

VALUE ENGINEERING CONCEPT

Install 1 solar cell system with wiring = $3,000

Total VE Concept - $3,000

Figure 2. Proposal 5 - Commercial Street Grade Crossing

No sketch needed.

FPAG.VER

DESCRIPTION- VALUE STUDY PROPOSAL NO. 5

PROJECT:	Commercial Street Grade Crossing, Braintree, MA

Background:

The power for the grade crossings is provided by the Town of Braintree with battery backup in the signal case.

Proposal:

The proposal is to install solar cells on the signal case to supplement the municipal power supply and battery back. This option will be helpful with extended or other power outages (i.e. ice and snow, and nor'easters).

Assumptions:

It is assumed that the solar cells can be positioned to be of benefit (considering the trees and adjacent residences).

ADDITIONAL CONCEPTS FOR FURTHER STUDY

(A LISTING OF ITEMS WITH POTENTIAL FOR COST OR OTHER VALUE IMPROVEMENT)

PROJECT: Commercial Street Grade Crossing, Braintree, MA		
DESCRIPTION	**ESTIMATE OF DOLLARS INVOLVED**	**REMARKS**
Concept A2	$14,444	Better roadway operations and crossing safety
Concept A3	$45,000	Safer train operations at and approaching crossing
Concept A5	$27,394	Better roadway operations and crossing safety

VALUE STUDY - DISPOSITION OF IDEAS

PROJECT: Commercial Street Grade Crossing, Braintree, MA

VALUE STUDY ELEMENTS CONSIDERED AS POTENTIAL PROPOSALS AND THEIR DISPOSITION

IDEA	DISPOSITION
OPERATIONS: A1 Widen Road Advantages: Better control traffic, Better control drainage, Sidewalks Disadvantages: Cost, Row issues	Not selected for development because of inadequate ROI
A2 Define Road Within Existing Row Advantages: Lesser cost, no row impact, control traffic, control drainage Disadvantages: No SW's, Pedestrians in road	Selected for evaluation for future consideration
A3 Upgrade Track Approaching Advantages: Better operations, more stable approach to crossing, eliminate speed restrictions? Disadvantages: Impact wetlands, impact bridge, impact row	Selected for evaluation for future consideration
A4 Stronger Track Structure Advantages: Minimize derailment potential, Minimize damage from vehicles, support crossing surface, material better, minimize impact at crossing Disadvantages: Run trains faster, vehicles operate faster	Other concept for further consideration
A5 Improve Roadway Sag Curve At Crossing Advantages: Improve operations (rail & road), Improve drainage Disadvantages: May impact row, increase vehicular speed at crossing, impact stone marker, may impact wetlands	Selected for evaluation for future consideration
A6 Install Gates With Signal Gates (new) Advantages: Reduce accident potential Disadvantages: Increase maintenance, increase costs	Not selected for development because of inadequate ROI
A7 Install Gates Using Relay Material Advantages: Reduce accident potential Disadvantages: Increase maintenance, increase costs, reduces reliability, may not be current technology	Not selected for development because of inadequate ROI
MATERIAL: B1 Use Relay Materials Advantages: Lesser weight rail, material more readily available, reduce costs Disadvantages: Reduced life, replace sooner, more maintenance, may not be what is specified (no real effect)	Design Proposal 3
B2 Less Expensive Crossing Surface Advantages: Reduced costs, easier to install (except concrete) Disadvantages: May not protect track structure sufficiently, maintenance may be more difficult depending on type, damage to track structure	Design Proposal 4
B3 Order Materials In Advance Advantages: On site when needed Disadvantages: Early initial outlay of cash	Other concept for further consideration
C1 Elevate Railroad Advantages: Eliminates point of conflict Disadvantages: Requires 20 Ft clearance over road, severely impact row on large walls, impact bridge, impace wetlands, land in curve, costly, extensive track walk	Not selected for development because of inadequate ROI
C2 Tunnel Railroad	Not selected for

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VALUE STUDY - DISPOSITION OF IDEAS

PROJECT: Commercial Street Grade Crossing, Braintree, MA

VALUE STUDY ELEMENTS CONSIDERED AS POTENTIAL PROPOSALS AND THEIR DISPOSITION	
IDEA	**DISPOSITION**
(See tunnel railroad Advantages and Disadvantages)	development because of inadequate ROI
C3 Grade Separated Roadway Structure Advantages: Eliminate point of conflict, virtually eliminate sag curve Disadvantages: Need extensive land taking and /or walls, public acceptance, impacts residential neighborhood, costly including land taking	Not selected for development because of inadequate ROI
C4 Panelize Crossing Advantages: Minimize construction time and cost, 1-day installation, better constructed crossing Disadvantages: Need to detour for 1-2 days, may not have sufficient row to construct panel	Design Proposal 1
C5 Temporary EMS Crossing Advantages: Continused services Disadvantages: Slows construction, construct temp bypass or abuttress, cost, bottom up each night, cost time and dollars	Design Proposal 2
C6 Solar Power to Supplement Signals Advantages: Reduce power costs Disadvantages: Need to avail of sunlight position, maintenance issue	Design Proposal 5
C7 Minimize Paving Advantages: Reduces cost and time Disadvantages: Poor quality interface, increased maintenance, reduced life, cause plan to catch xing surface higher probability, allow water into crossing	Not selected for development because of inadequate ROI

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CONSULTATION RECORD

CONSULTANT/CONTACT INFO (Name,Title,Company,Address,Phone,e-mail)	MAIN TOPIC DISCUSSED AND INFORMATION RECEIVED
NONE	NA

INFORMATION/DATA DOCUMENTS CONSULTED

DOCUMENT (Name, Author, Dates, etc.)	INFORMATION RECEIVED/USED
Request for Proposals	Existing conditions and design approach

GLOSSARY OF PERTINENT STANDARD VALUE METHOD TERMS

Annual Costs. The annual expenditure of funds or other resources to ensure the product's satisfactory continued functioning during its economic life.
Alternative Analysis Matrix. A process using the results of the criteria weighting to determine the apparent relative rank for various identified alternatives.
Alternative Value Increment Comparison. A comparison procedure used to evaluate the comparative incremental worth versus its incremental cost for a series of alternatives that meet the identified essential needs relatively equally.
Benefits, Disadvantages, and Risk Analysis. An assessment identifying the benefits, disadvantages, and possible associated risks related to pursuing a particular alternative to its final conclusion.
Basic Function. The main function(s) that meets the essential needs of the process, procedure, or activity that the product must achieve.
Certified Value Specialist. A person who has been certified to have all the qualifications to conduct, monitor, guide, and instruct people in the practice of the Value Method process from SAVE International.
Component. An identified portion of the process, procedure, or activity under study. These may be a physical feature or "mission" type features such as the stated purposes for the activity.
Cost Model. An illustrative diagram that shows the relationship of expenditures as they relate to the functions and components.
Criteria Weighting. A procedure applied to the governing criteria to determine the relative weight of specific criteria as it relates to the other criteria.
Criteria/Limits Analysis. An evaluation of the criteria and limits that govern the process, procedure, or activity; the cost and worth of them in time, money, or other measurement scales; and the flexibility for changing them (hard=not possible to economically change, soft=may be possible to economically change).
Final Report. Value study report with editorial, and other modifications done with respect to the feedback received during presentations, made to the Presentation Report basic results.
Functional Analysis. A process using a two word definition of the purpose or affect of a particular component. To promote understanding and facilitate value study activities, functions are limited to an active verb and measurable noun.
Function-Logic-Diagram. A diagram of the functions that lays out the purposes behind each function and its interrelationship with other functions. The most common type of diagram is the Functional Analysis System Technique (FAST).
Higher-Order Function. The function(s) that the entire product must achieve to meet the ultimate purpose for the process, procedure, or activity.
Implementation. The suggested process identified by the value study as an appropriate means to implement a specific value study proposal.
Involved Parties. The owners, users, and stakeholders that have a concern in the Program, Project, or Activity, or its final outcome product.
Life-Cycle Costs. The true economic cost of an alternative stated in present worth terms that uses a specified time value of money and economic life and includes all cost (non-recurring, recurring, annual, and any potential salvage capacity).
Non-Recurring Costs. The initial outlay of funds or other resources to obtain the product.
Presentation Report. Value study report used for presenting the results of the value study activity. The end result commodity for a process, procedure, or activity.
Proposal. An alternative means identified within the confines of the value study to achieve the purpose for the product that satisfactorily meets the specified criteria and limits.
Recurring Costs. The periodic expenditure of funds or other resources to ensure the product will satisfactory continue to function during its economic life.
Job Plan. The activity plan which is used in every value study.
Value. The worth of a product to the involved parties as it is related to its cost (monetary and non-monetary).
Value Added. A feature that does not increase the value of the product monetarily, but increases the worth of the product to the involved parties.
Value Analysis. The Value Methodology process as it is usually applied to an activity for a process, procedure, or repetitive activity.
Value Engineering. The Value Methodology process as it is typically applied to an engineering type application. Often conducted during the 25 to 40 percent design (concept phase) and consists of a completely independent team.

Value Method. An organized, systematic effort directed at analyzing functions for the purpose of achieving the essential functions at the lowest life-cycle cost.

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GLOSSARY OF PERTINENT STANDARD VALUE METHOD TERMS
Value Mismatch. An observed disparity identified in the function-logic-diagram, or other procedures, between the apparent worth of the function and its cost. **Value Study**. An investigation of a specified process, problem, procedure, activity, or product using the Value Methodology process for the purpose of ensuring and/or improving the value of the final product for involved parties.
GLOSSARY OF OTHER TERMS AND ACROYNYMS

Supporting Documentation

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GENERAL DISCUSSION OF VALUE METHOD PROCEDURES USED IN THE VALUE STUDY PROCESS

General

The study team used a six-phase Value Method job plan for all value study operations. Short descriptions of the six basic Value Method phases and their operations are:

Phase 1. Information Phase

All possible information on the process and operational features within the scope of the study are collected, disseminated, and analyzed. The components making up the features, their functions, and costs are determined. The criteria and limits affecting the project or projects are identified, and if necessary, ranked and/or assigned values. A Function Analysis System Technique (FAST) diagram is generated which shows the "why" and "how" and "supporting" functions being performed. The results are categorized and assigned to functions of note. Items for potential concentration of study team effort are identified.

Phase 2. Creativity Phase

Creativity methods such as "focused brainstorming" and AaffinityA procedures are used to generate the maximum quantity of ideas for consideration by the study team. This phase is also often referred to as the "speculation phase."

Phase 3. Analysis Phase

Ideas generated in the creativity phase are ordered, collected into concepts with similar features, solidified into potential alternatives for proposal, and ranked using one of a variety of techniques. The most common two techniques used for ranking are criteria weighting matrix and evaluation analysis ranking, and performance of the function determination and study team consensus potential versus difficulty ranking. The resulting ranked potential alternatives are then evaluated with regard to their benefits, advantages, and risks. This phase is also often referred to as the "evaluation phase."

Phase 4. Development Phase

Team members "champion" concepts or are assigned concepts that have the best potential for further evaluation and development into viable, efficient, and cost-effective alternative proposals. Each developed concept, that is carried to completion, is an alternative proposal that has an expectation of increasing the value for the client and/or owner of the product or process.

The development process includes, but is not limited to, using team member expertise; consultation with staff performing the project or process; experts and outside vendors; polling others by survey or other means; consultations with the client and/or owner; and review of information resources (libraries, catalogs, and other materials). Recommendations for methods to implement the proposals are identified, and methods to resolve identified potential problems are determined. During this phase, a determination to drop a process from further consideration usually requires unanimous acceptance by the study team.

Phase 5. Presentation Phase

Concepts that are fully developed by the study team which display apparent added value, by monetary or non-monetary measurements, are placed in report form for documentation and presentation as alternative proposals. Generally, these are concepts that have sufficient projected benefits that outweigh their potential disadvantages and risks. During this phase, concepts that are recommended as alternative proposals must, generally, receive unanimous acceptance by the entire team before report presentation and recommendation as an alternative value study concept.

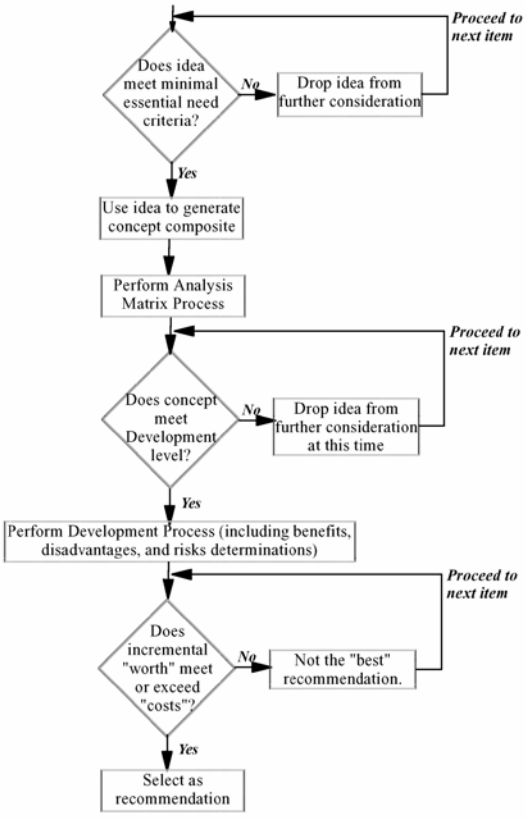
GENERAL DISCUSSION OF VALUE METHOD PROCEDURES USED IN THE VALUE STUDY PROCESS

Some study team concepts or results may be identified to be of potential benefit to the client and/or owner, but cannot be sufficiently developed within the confines of the study time available. Alternatively, some concepts were studied but were not considered to have study team consensus, or in some situations, insufficient benefits to warrant their development when compared to other potentially higher value concepts that could be developed. Such concepts, that demonstrate a potential for added value, are presented as additional items recommended for further study. These items may, on occasion, require extensive additional development activities beyond that available to the study team to determine if the items actually demonstrate the anticipated added value.

Phase 6. Implementation Phase

The owner, users, client, and other project or process parties take the value study recommendations into consideration and evaluate them for implementation. The staff coordinating the value study activity, and if needed, study team members, assist and monitor the evaluation to help all parties in implementing the added value features. An estimate for the final resolution for the value of recommendations is established. The status of the final determination of the accepted recommendations and their estimated added value are reported to the coordinating staff as: accepted, partially accepted, or "withdrawn" due to the acceptance of another preferred proposal. If a proposal is rejected, the rejection and the reason for the rejection are reported to the coordinating staff. Statistics and value study activity results are compiled and reported to organizational management and oversight authorities.

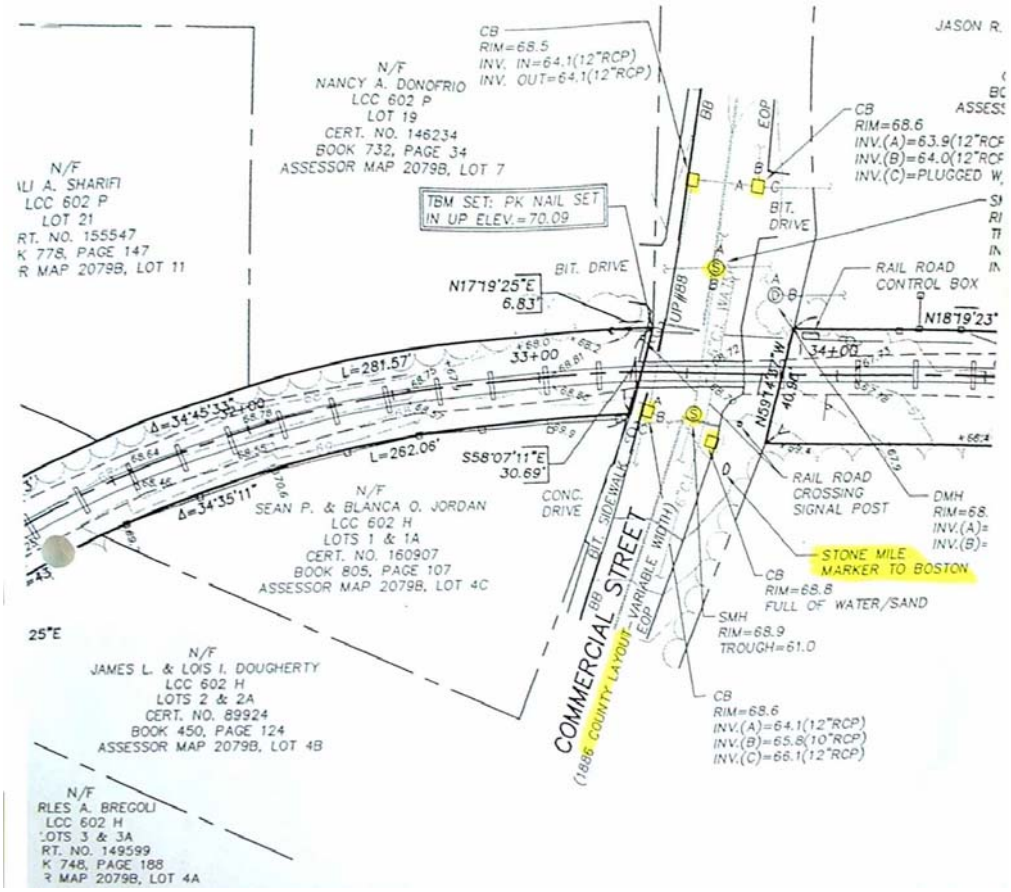
Figure 10. Value Method Decision Process



GENERAL DESCRIPTION

PROJECT: Commercial Street Grade Crossing, Braintree, MA
The proposed grade crossing project is located in the Town of Braintree, MA at the intersection of the FRRC main line and Commercial Street. The crossing is at the bottom of a sag curve (east-west) with significant roadway gradient away from the crossing. This creates drainage problems at the crossing, which could accelerate the deterioration of the track components (of the crossing). The track approaches are relatively flat with a right-hand curve approaching from the south. To the north along the railroad are wetlands and a small undergrade structure (bridge) both of which could impact track construction should it extend more than 200'-300' north of the crossing. Residences abut the tracks in all four quadrants. The proposal is to reconstruct the grade crossing to include new signals and crossing gates.

Figure 2. Location Map/Project Plan



DESCRIPTION OF PRESENT ACTIVITY PLAN

PROJECT: Commercial Street Grade Crossing, Braintree, MA
The value study was conducted at the end of Task 2 of the project, which was the Conceptual and Preliminary Design phase. The plans were at the 30% design stage and required design documentation (environmental, geotechnical, etc.) were included in the design report.

DISCUSSION OF CRITERIA AND LIMITS ANALYSIS

The parties and interests involved are identified and reviewed during the Owner, User, and Stakeholder (OUS) Analysis. Several approaches are common. This value study team used a listing approach to highlight the concerns and parties involved. Then a criteria weighting and alternative matrix analysis procedure was used. It was determined by the study team facilitator that the team was balanced enough to allow a one person, one vote technique for the matrix computations to determine the importance of the criteria and the selection of potential alternatives.

SPECIAL CRITERIA SUMMARY

PROJECT: Commercial Street Grade Crossing, Braintree, MA
USERS:
The roadway was required to remain open during construction.
The disruption to train service was to be minimzed.
Construction was limited to weekday daytime.
CODES:
Manual for Railway engineering, AREMA; MUTCD, FHWA; FRA Track Safety Standards,;
MWRA/FRRC operating and design standards; Town of Braintree, MA dewsign and constructin standards; and railroad industry standards.
RESTRICTIONS:
No weekend and night work, and provide for continued vehicular traffic during construction.
HISTORY: (RESPONSIBILITIES, COMMITMENTS, STATUS, ETC.)
NA

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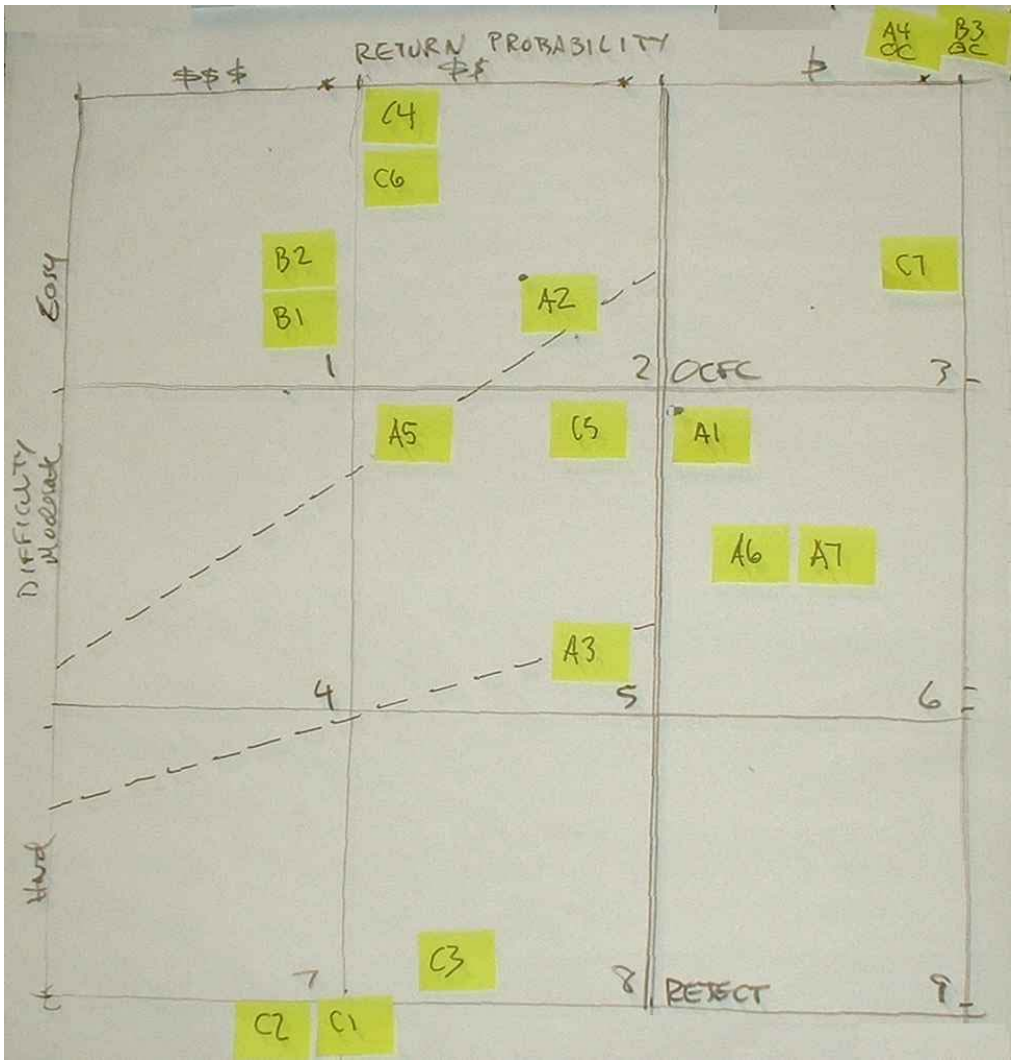
PROJECT: Commercial Street Grade Crossing, Braintree, MA
Using standard Value Method procedures, the value study team identified the more crucial factors in serving the basic function. Using a nine square system defining the ease of obtaining (by team members, project members, clients, and others) and potential value enhancement (to the owner, users and stakeholders), the team determined an initial priority ranking for each concept. As a result this ranking, concepts were identified as priority one (immediate development attention), priority two (develop if at all possible) and priority three (develop if time permits). Concepts not meeting these criteria, and those that that time does not permit further development, are then broken into three major areas: 1. Deemed as worthy of mention as another concept for further consideration (but not studied due to other higher potential of other concepts or insufficient expertise and/or time to study within confines of team efforts), 2. Not deemed worth further effort, and 3. Discarded for cause.



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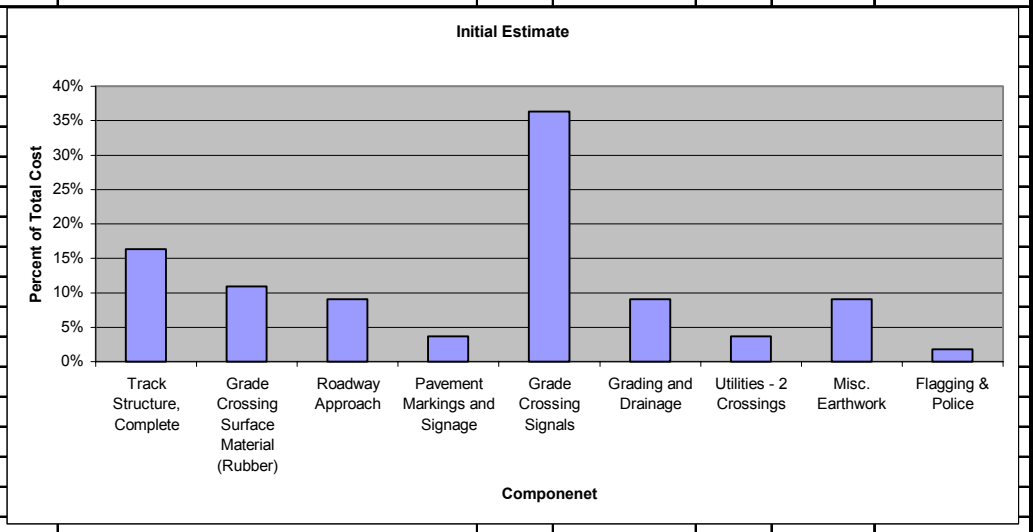
ESTIMATE WORKSHEET SHEET 2F _1 OF 2F _

FEATURE: 27-Feb-04 **Project:** **Case:** **VST Alt. Proposal No.**	**PROJECT:** **Commercail Street Grade Crossing, Braintree, MA** **DIVISION:** **UNIT:**

PLANT ACCT.	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		Track Structure, Complete		300	LF	150	45,000	16%
		Grade Crossing Surface Material (Rubber)		60	LF	500	30,000	11%
		Roadway Approach		1	LS	25,000	25,000	9%
		Pavement Markings and Signage		1	LS	10,000	10,000	4%
		Grade Crossing Signals		1	LS	100,000	100,000	36%
		Grading and Drainage		1	LS	25,000	25,000	9%
		Utilities - 2 Crossings		100	LF	100	10,000	4%
		Misc. Earthwork		1	LS	25,000	25,000	9%
		Flagging & Police		1	LS	5,000	5,000	2%
		Total					**275,000**	100%



QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
DATE PREPARED	**APPROVED**	**DATE**	**PRICE LEVEL**

COST MODEL AND ESTIMATE INFORMATION

The team's cost model was based on the conceptual estimates provided by the design (or process) team for the preferred concept that was presented to the study team. It was used to focus on features with the greatest potential for savings, and to highlight potential instances of value mismatch. (Areas that have low worth in comparison to their projected cost.)

To ensure reliability and applicability, all unit prices were reviewed by both estimators and the study team. Estimator(s) were independent from both the study team or design and process team. Value study proposal and original concept estimates are of the same general level of development. It should be recognized that unit costs and estimates might vary as final activities are pursued and refined.

FUNCTION ANALYSIS SYSTEM TECHNIQUE (FAST) DIAGRAM

The value study team used the function-analysis process to generate a function-logic diagram. It is often referred to as a Function Analysis System Technique (FAST) diagram. A FAST diagram shows the "why" and "how", and "supporting" functions being performed. Items for potential concentration of study team effort were identified through the FAST. These functional tools aided the team in identifying crucial features that are pivotal to meeting requirements that support critical issues (basic function and critical-path functions). It also highlights those functions that meet the activities less critical objectives (supporting or secondary functions). The development of the FAST assists the team in identifying any potential value mismatches and expedites the team's efforts in generating a common understanding of the activity's purposes and applicable governing criteria.

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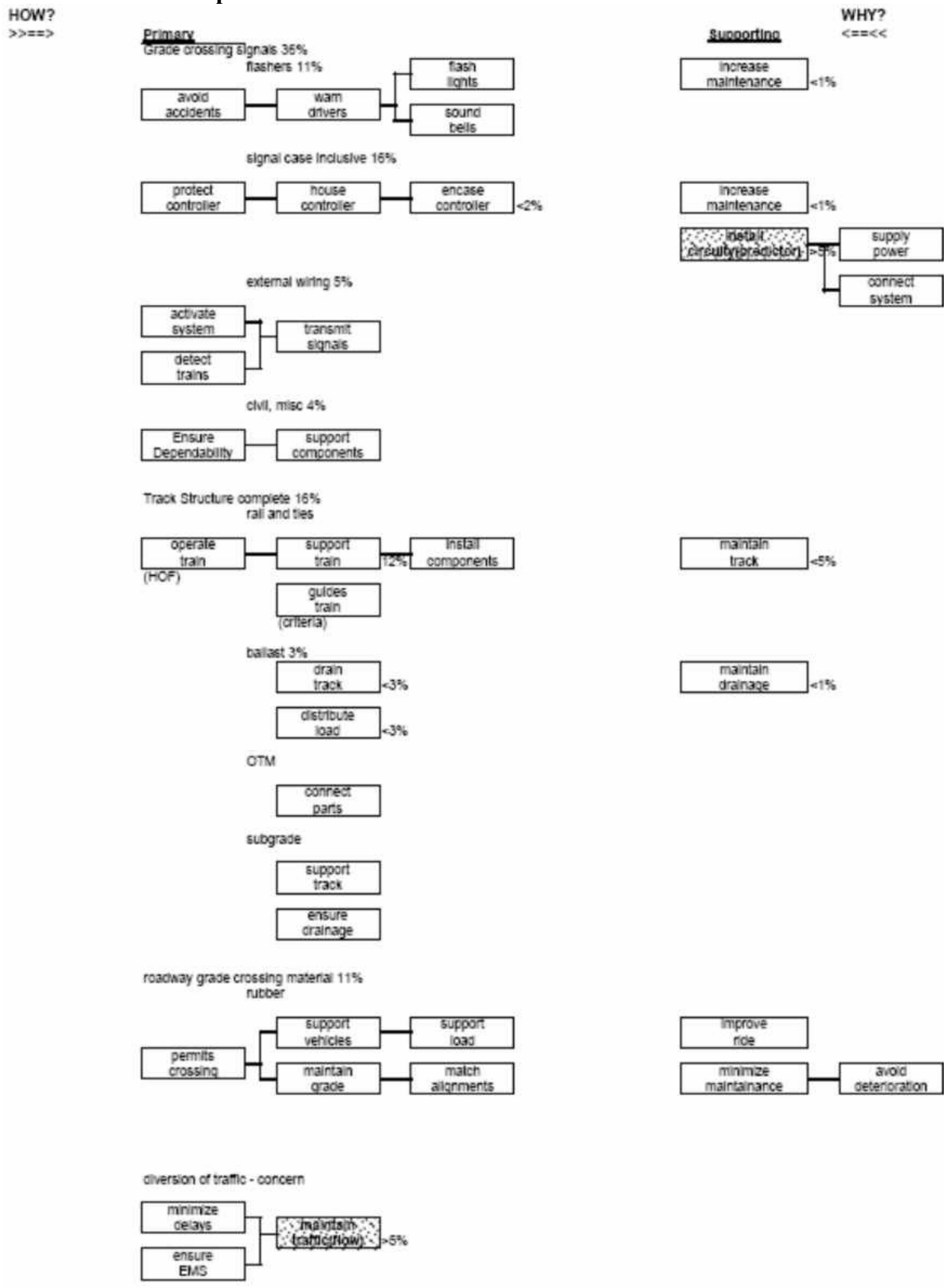

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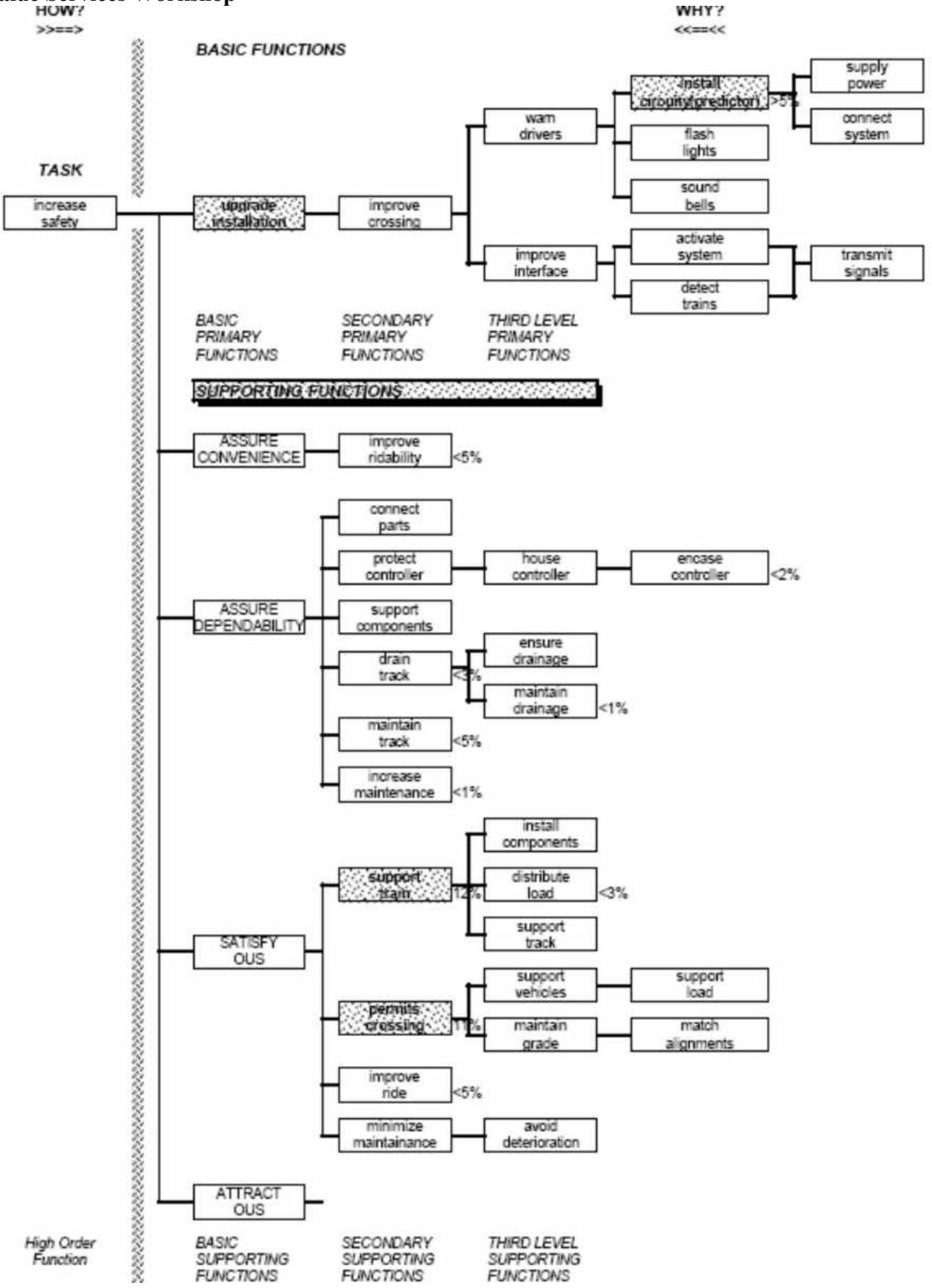

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EXPLANATION OF ALTERNATIVE EVALUATION

PROJECT:	Commercial Street Grade Crossing, Braintree, MA

General Discussion:

Using the identified basic function(s) shown in the FAST diagram, the value study team generated over 30 ideas for discussions and evaluations. Next, the team evaluated applicability and potential to meet the basic functions and governing criteria on a pass/fail basis. As a result, about eight of these ideas were analyzed and evaluated further. After collection and processing, ppp of these ideas were identified for possible refinement through further study team investigations. A ranking procedure was used to guide the team's efforts on these ideas. During that process, the team decided that five of the eight ideas received a rating high enough to warrant team development into potential alternatives. These five ideas were then combined, removed, and/or added to other additional ideas and options identified during the Development Phase (due to refinement of the initial ideas), and the results were ultimately presented as Alternative Proposals.

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VERBAL PRESENTATION MEETING ATTENDANCE LIST

Commercial Street Grade Crossing, Braintree, MA
VALUE STUDY
2:00 PM, February 27, 2004
Location: SAMI LLC Training Center, Evergreen, CO

NAME	CODE/OFFICE	PHONE
Sam Martin	SAMI, LLC	(303) 674-6900
Gary Gordon	Hanson Professional Services Inc.	(978) 686-0200

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INITIAL BRIEFING MEETING ATTENDANCE LIST

Commercial Street Grade Crossing, Braintree, MA
VALUE STUDY
2:00 PM, February 27, 2004
Location: SAMI LLC Training Center, Evergreen, Co Xxx

NAME	CODE/OFFICE	PHONE
Sam Martin	SAMI, LLC	(303) 674-6900
Gary Gordon	Hanson Professional Services Inc.	(978) 686-0200