STATE OF WASHINGTON

OFFICE OF FINANCIAL MANAGEMENT

Insurance Building, PO Box 43113 ı Olympia, Washington 98504-3113 ı (360) 902-0555

June 13, 2012

The Honorable Mary Margaret Haugen, Chair
The Honorable Curtis King, Ranking Minority Member
Senate Transportation Committee
P.O. Box 40482
Olympia, WA 98504-0482

The Honorable Judy Clibborn, Chair
The Honorable Mike Armstrong, Ranking Minority Member
House Transportation Committee
P.O. Box 40600
Olympia, WA 98504-0600

Dear Senators Haugen and King, and Representatives Clibborn and Armstrong:

Pursuant to Section 103(1) of the 2011-13 transportation budget, Engrossed Substitute House Bill 1175, the Office of Financial Management completed a budget evaluation study for the new Northwest Regional Traffic Management Center proposed by the Department of Transportation.

The BEST (Budget Evaluation Study Team) final report is available on our web site at http://www.ofm.wa.gov/reports/nwregtrafficmgmtctr.pdf.

We appreciate the opportunity to provide this information.

Sincerely,

/s/

Marty Brown
Director

cc: Kelly Simpson, Staff Coordinator, Senate Transportation Committee
Mark Matteson, Coordinator, House Transportation Committee
Paula Hammond, Secretary, Washington State Department of Transportation
Robin Rettew, Senior Budget Assistant, Office of Financial Management
Paul Ingiosi, Budget Assistant, Office of Financial Management

OFFICE OF FINANCIAL MANAGEMENT
NORTHWEST REGIONAL TRAFFIC MANAGEMENT CENTER
BEST STUDY
21 MAY 2012

FINAL REPORT

BEST Team:

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I. INTRODUCTION

EXECUTIVE SUMMARY

Purpose and Goals of the Study

This study is presented to the Washington State Office of Financial Management (OFM) to assist in decision-making at the pre-design budgeting level. WSDOT (Washington Department of Transportation) has completed a predesign (concept) study for a new traffic management facility to be located adjacent to the existing WSDOT Regional office building in Shoreline, Washington. The goals for this BEST (Budget Evaluation Study Team) study were to review the programmatic basis of design, and to evaluate the feasibility of three specific options for the project:

1. Design a new 22,000 S.F. facility adjacent to the existing WSDOT Northwest Regional Headquarters Building (Dayton Building) in Shoreline. This is the current Predesign Concept Proposal.

2. Renovate space in the Dayton Building for a new Traffic Management Center.

3. Relocate the Traffic Management Center to the Wheeler State Data Center in Olympia. Build out a new Traffic Management Center within the Wheeler Building.

Project Planning Elements

For each of these concepts the BEST Study Team reviewed six project planning elements, modeling the current design relative to local and national standards:

- Traffic Management Functions
- Functional activities and staffing
- Space allocations and utilization
- Site and building systems
- Equipment and infrastructure

All of these factors were modeled over a range – from lower to higher, resulting in several sub alternatives for each of the three basic concepts. These are evaluated from both an initial capital as well as long term operating cost perspective, and summarized in the table on page 6.

Basis of Costs

For this study, the unit costs developed for the predesign study were reviewed and found to be reasonable for a concept level analysis, the only exception being estimated costs for technical equipment. Accordingly these costs (with adjusted equipment costs) were used for base case scenario. Costs for the Dayton renovation and the Wheeler building options were developed separately by the BEST study team, using similar levels of quality and finish as the base case.

The project markups and contingencies used in the predesign study however were conservative (high) by as much as 10%. Given the conceptual and uncertain level of the project options; the BEST team decided to retain these conservative allowances for all of the options presented herein.

In any location, this project will be higher than normal operations and office facilities due to the concentrated amount of expensive technical equipment needed to support the basic functions.

	FEASIBILITY SUMMARY						
	Office of Financial Management						
	WSDOT Northwest Region Traffic Management Facility						
	BEST Study	20-Apr-12					
	Feasibility Option	Description	New facility S.F.	Tot. Size (S.F.)	$ / SF average	Tot. Project Cost $	Present Value Life Cycle Cost $ (20 year)
Pre design	**New Facility Dayton Full TMC program.**	Base Case. Predesign. Includes new Control Room, ITS equipment space, and support and office space for TMC staff.	21,898	**21,898**	$ 913	**$ 20,000,000**	**$ 22,700,000**
1a	**New Facility Dayton Full TMC program - reduce viewing and emergency ops.**	Minor revisions to base case. Includes new Control Room, ITS equipment space, and support and ofice space for TMC staff.	20,000	**20,000**	$ 915	**$ 18,300,000**	**$ 20,700,000**
1b	**New Facility Dayton Site Control Rm and Equipment. Other TMC programs in Dayton Building.**	Reduces Control room viewing area and emergency ops. areas New: 11,500 SF Minor Renovate: 7,500	11,500	**19,000**	$ 742	**$ 14,100,000**	**$ 18,400,000**
2a	**Renovated Dayton Building. Major renovation of 2 floors w/ minor renovation of 3rd floor.**	Renovate portion of Dayton Building. Full renovation to essential standards for Control Room and equipment space , and interior finishes upgrade of support and office space.	0	**18,600**	$ 709	**$ 13,200,000**	**$ 15,500,000**
2b	**Renovated Dayton Building. Major renovation of 3 floors.**	Renovate portion of Dayton Building. Full renovation to essential standards for Control Room and equipment space, and reconfiguration and full renovation of support and office space.	0	**18,600**	$ 779	**$ 14,500,000**	**$ 16,800,000**
3a	**Renovated Wheeler Building - Olympia. No new fiber infrastructure.**	Relocate TMC program to Wheeler building. Full build out of existing shell (full Bay) plus some leased office and support space outside of bay . Assume fiber will be built out by others in time for project, with some leasing for redundancy.	0	**20,500**	$ 852	**$ 17,500,000**	**$ 28,200,000**
3b	**Renovated Wheeler Building - Olympia. 10 miles new fiber infrastructure.**	Relocate TMC program to Wheeler building. Full build out of existing shell (full Bay) plus some leased office and support space outside of bay . New fiber from Marvin Rd. to Olympia.	0	**20,500**	$ 1,156	**$ 23,700,000**	**$ 34,500,000**

Summary

This study evaluated three basic concepts for upgrading the Northwest Region Traffic Management Center. All three concepts are within a reasonable (feasible) project cost and operating cost range.

Any of the options at the Dayton site are reasonable and will meet operational growth for several decades. The ultimate decision here should take into consideration the long term plans for the existing building; and the final recommendations below do consider that factor. If the Dayton building will remain a home for the Northwest Region, it will most likely require renovation in the future; so starting with the TMC renovation would be a logical and prudent alternative, and preferable to adding yet additional space if the Dayton Building is not filled by Northwest Region functions. If Northwest Region growth fills the Dayton Building beyond current utilization (low); then a new TMC facility would be a logical place to start for expansion, with a focus on the control room and IT equipment spaces.

The Wheeler Building options are more expensive than the Dayton options, but still cost feasible. Those options, however present serious operational changes – mostly due to the location, severely compromising the ability for TMC staff to communicate and access field personnel and situations in the Northwest Region. With the current organization of statewide regional centers, this option does not meet functional objectives for the Northwest region; and is not recommended.

New Dayton TMC

<u>Predesign Proposal</u>
The proposed concept for a new facility adjacent to the existing facility is a prudent approach that would allow for expansion of the Northwest Region traffic management functions over the next several decades. This study reviewed the current and projected staffing and space allocations, and found them to be reasonable relative to the traffic operations monitored and managed by this region. Two areas in the proposed program should be further reconsidered. The public viewing and media setup area can be reduced and still provide comfortable media access. The traffic management control room, most likely will need to support additional operators in order to support the growing infrastructure (e.g. freeway miles, signals, tunnels, traffic information systems; but this can be accomplished by reconfiguring the shape to be more efficient within the programmed square footage.

New Dayton Facility – Reduced scope

The heart of this facility is the traffic management control room and the associated ITS equipment space. This is the part of the current facility that is in most need of upgrade and expansion, and is the most difficult to fit into the existing building. One alternative that can provide the most critical expansion needs with a smaller capital expense would be to provide only the control room and equipment functions (along with modest viewing area) in a new facility with the office and support areas remaining in the adjacent existing Dayton Building.

Renovated Dayton TMC

Dayton Building - Partial renovation of 2 floors

This option creates a new TMC in a renovated portion of the Dayton Building. This includes a full renovation to essential standards for the Control Room and equipment space, and life safety, HVAC, and architectural support and office spaces on the first and second floors, and minor finish upgrades on the third floor. This option takes advantage of currently unused space in the Dayton Building, allowing the current control room and equipment to remain in operation until the new space is completed. Seismic and life safety upgrades are completed in this portion of the building – not the entire facility; but will allow the center to continue operation in the event of emergencies. In this option life safety systems are upgraded on the entire first two floors.

By vertically stacking the control room above the ITS equipment, height can be gained for the desired larger projection screens in the control room.

Dayton Building – Partial Renovation of 3 floors

This option is similar to the partial Dayton renovation, but includes a more complete reconfiguration and renovation of the office and support space. The Control Room and equipment spaces are all upgraded to essential standards, but the seismic, HVAC, and architectural upgrade is extended up an additional story to support the office areas. In this option life safety systems are upgraded on the entire first three floors.

The renovation proposals can meet the desired project goals, with only some minor compromises on the height of the control room viewing screens. Depending on where the other support staff are located in the facility, there may be some inconvenience in moving between the control room and the office areas on the floors above for those that need to do so frequently. Spatial relationships to other Regional functions and staff are improved by keeping the TMC center in the main headquarters building.

Wheeler Data Center Building – Olympia

This option relocates the TMC program to the Wheeler building in Olympia. This includes full build out of an existing shell (full Bay) plus some already finished office and support space outside of the bay. All spaces would be leased. One cost option assumes that fiber will be built out by others in time for the project, since various agencies are currently working towards that; and the other option (3b) assumes that fiber would have to be completed as part of this project for the last 10 mile segment that currently does not have fiber.

The Wheeler Building has the space to accommodate a new TMC and support staff. The costs for this option must be reviewed from both capital as well as lease funds, and are more expensive (but still within reach) than the Dayton options, primarily due to lease rates in the Wheeler Building. The TMC only requires a small IT equipment area of approximately 2000 square feet; so use of the already built out space designed for data equipment is not feasible, due to the cost and difficulty of separating that from other secure Data Center clients. (As well as the lease rates for that area of the Wheeler Data Center.

The balance of the TMC can be constructed in the currently shelled high bay space, but access to that space for the WSDOT program need not be at the same high security level for which the Wheeler building was constructed. Access in and out of the TMC for both staff and public would therefore be difficult and disruptive to normal operations.
The largest issue from an operational perspective is the longer distance from the Northwest region, with current staff frequently requiring access to field personnel and situations and to other Northwest Region engineering and operations staff located in the Dayton Building.

Recommendations

This study recommends that the Northwest Region TMC remain at the Dayton site; either in a renovated facility, or in a smaller new facility that houses the control room and the supporting ITS equipment. The decision to renovate or to construct new should be made based on future plans for the Dayton building. At current vacancy of around 25%, it would be prudent to locate an updated, state of the art TMC within the Dayton Facility; and to complete the seismic and life safety measures that will eventually need to be accomplished anyway, if the Northwest region stays in this facility long term.

If the State has other plans for the use of the existing Dayton facility, then a new stand alone TMC is a prudent approach; with a focus on the specialized control and equipment facilities in the new building and the other administrative and support functions remaining in the Dayton building nearby.

The Wheeler building options are not recommended, due not only to cost feasibility, but also to basic operational liabilities.

PROJECT DESCRIPTION AND PLANS

Cost: $ 20,000,000 Total Project cost

Size: 22,000 Square feet

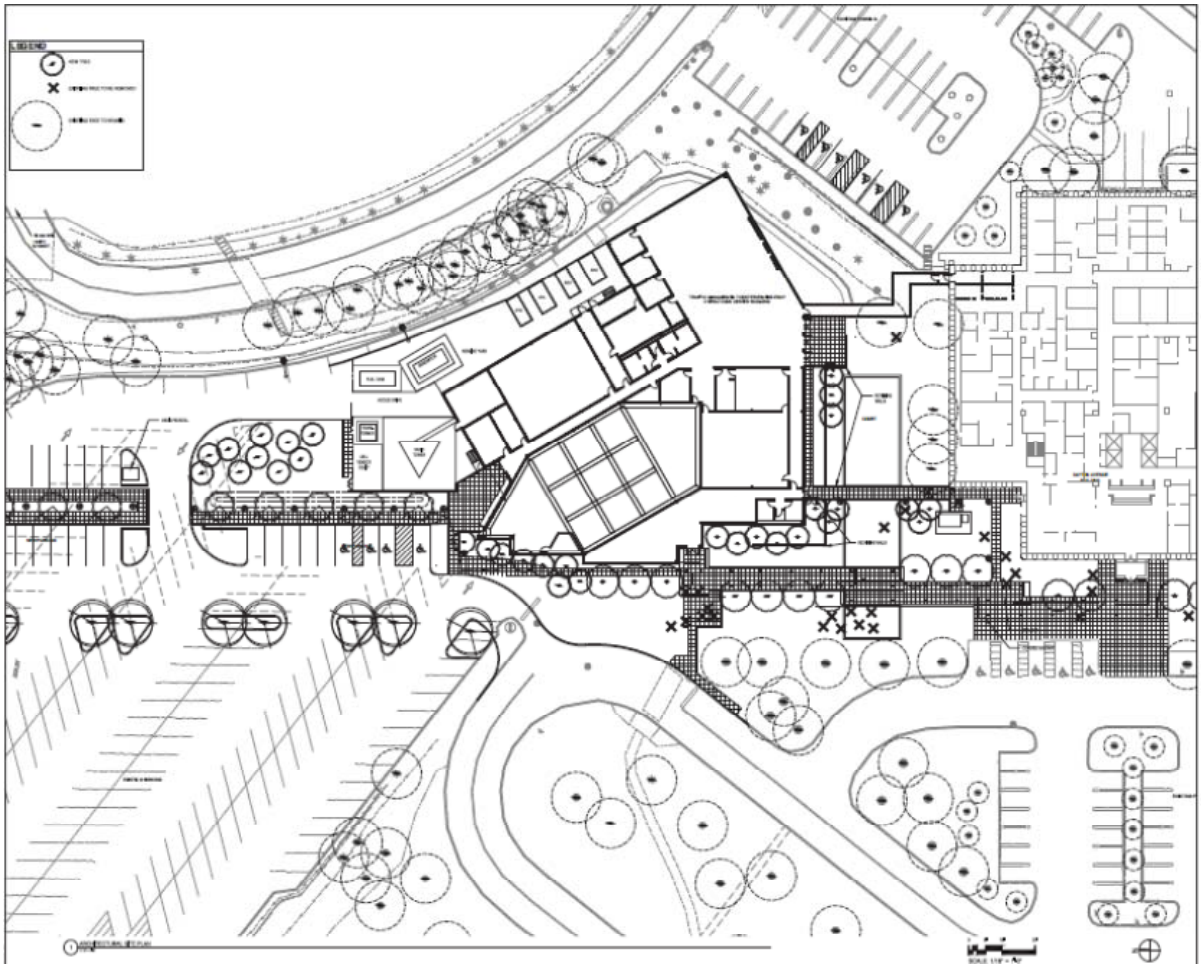
Location: **Seattle, Washington**

Schedule: **Construction: 2013 - 2014**

Description: (excerpted from the Predesign Study Report)

The Washington State Department of Transportation (WSDOT) currently operates the Northwest Region Traffic Management Center (TMC) and Emergency Operations Center (EOC) from the NW Region Headquarters at Shoreline, Washington. The department proposes to build a new Northwest Region Traffic Management Center and Emergency Operations Center (TMC/EOC) in the north parking lot adjacent to the existing headquarters building. The existing TMC/EOC functions and staff, as well as staff with day-to-day interaction with the TMC, would be housed in the new facility.

The preferred alternative is a 22,000-square-foot TMC/EOC with a 21-station control room, 20-station emergency operations room, 165-foot radio tower and equipment room, combined information technology/intelligent transportation systems equipment room, equipment storage room, three enclosed offices and 32 open workstations, restrooms, conference room, break room, locker room, copy room, and mechanical and electrical rooms. Approximately 40 people would be located in the new facility.



Dayton Site

II. FEASIBILITY ANALYSIS

	FEASIBILITY SUMMARY											
	Office of Financial Management											
	WSDOT Northwest Region Traffic Management Facility											
	BEST Study	**20-Apr-12**										
Option #	**Feasibility Option**	**Description**	**New facility S.F.**	**Full renovate complete interiors, incl MEP S.F.**	**Minor Renovate facility (architectural finishes) S.F.**	**Leased - (no contruction cost) S.F.**	**Tot. Size (S.F.)**	**$ / SF average**	**Tot. Project Cost $**	**Annual operating cost**	**Tot. Operating Cost $ 20 year**	**Present Value Life Cycle Cost $ (20 year)**
Pre design	**New Facility Dayton Full TMC program.**	Base Case. Predesign. Includes new Control Room, ITS equipment space, and support and office space for TMC staff.	21,898	0	0		**21,898**	$ 913	**$ 20,000,000**	163,000	3,260,000	**$ 22,700,000**
1a	**New Facility Dayton Full TMC program - reduce viewing and emergency ops.**	Minor revisions to base case. Includes new Control Room, ITS equipment space, and support and ofice space for TMC staff.	20,000	0	0		**20,000**	$ 915	**$ 18,300,000**	148,000	2,960,000	**$ 20,700,000**
1b	**New Facility Dayton Site Control Rm and Equipment. Other TMC programs in Dayton Building.**	Reduces Control room viewing area and emergency ops. areas New: 11,500 SF Minor Renovate in Dayton: 7,500 SF	11,500	0	7,500		**19,000**	$ 742	**$ 14,100,000**	138,000	2,760,000	**$ 18,400,000**
2a	**Renovated Dayton Building. Major renovation of 2 floors w/ minor renovation of 3rd floor.**	Renovate portion of Dayton Building. Full renovation to essential standards for Control Room and equipment space , and interior finishes upgrade of support and office space.	0	11,200	7,500		**18,600**	$ 709	**$ 13,200,000**	138,000	2,760,000	**$ 15,500,000**
2b	**Renovated Dayton Building. Major renovation of 3 floors.**	Renovate portion of Dayton Building. Full renovation to essential standards for Control Room and equipment space, and reconfiguration and full renovation of support and office space.	0	18,600			**18,600**	$ 779	**$ 14,500,000**	138,000	2,760,000	**$ 16,800,000**
3a	**Renovated Wheeler Building - Olympia. No new fiber infrastructure.**	Relocate TMC program to Wheeler building. Full build out of existing shell (full Bay) plus some leased office and support space outside of bay . Assume fiber will be built out by others in time for project, with some leasing for redundancy.	0	14,700	0	5,800	**20,500**	$ 852	**$ 17,500,000**	654,000	13,080,000	**$ 28,200,000**
3b	**Renovated Wheeler Building - Olympia. 10 miles new fiber infrastructure.**	Same as 3a, but adds 10 miles of new fiber infrastructure.	0	14,700	0	5,800	**20,500**	$1,156	**$ 23,700,000**	654,000	13,080,000	**$ 34,500,000**
Present Value Calculation based on 3% escalation and 5% discount over 20 year cycle.												

	PROPOSAL	1A
COMPONENT: TMC Facility – reduced viewing area.	**AUTHOR**	BEST
CURRENT CONCEPT: The current concept was recommended in the Predesign Study from February 2012. A new 22,000 S.F. building would be constructed next to the existing Dayton Building.		
BEST CONCEPT: This approach provides a new 20,000 S.F. building at the Dayton site, with revisions in specific space assumptions based on the BEST study team observations and recommendations.		

FUNCTIONS		
Improve TMC	Expand TMC	House TMC support operations

ADVANTAGES:	**DISADVANTAGES:**
• Meets all "essential" facility requirements • Refines space for functional needs per the BEST study assessments • Stays with other NW Region operations • Can use common spaces in existing Dayton Building	• May replicate some space with existing Dayton • Expense of new construction • Increases WSDOT facility maintenance by adding space

DISCUSSION: This approach constructs a revised, stand-alone building connected to the existing Dayton Building with a secure corridor. The new building will be designed to meet all code requirements for an essential facility to be totally functional after a significant seismic event.

The approach adjusts the space needs program both based on the observations and recommendations of the BEST study team.

- The proposed size of "public viewing" was reduced from 1670 nsf to 500 nsf.
- The design of the control room was originally laid out to accommodate 21 work stations, but with some reconfiguration can accommodate up to 36 by the year

	PROPOSAL	1A
COMPONENT: TMC Facility – reduced viewing area.	**AUTHOR**	BEST

2035, without adding S.F. to the program.

- Most "EOC" functions would remain at the existing Dayton Building, and a smaller "event coordination room" would be provided for those activities directly associated with the staff in the TMC control room (900 nsf)

This location would maintain the existing relationships with NW Region operations, management, and real response assets. It would maintain existing working relationships between TMC and other WSDOT staff. It would maintain existing communication connections to facilities monitored and controlled from Dayton.

This location allows some use of common building components, such as cafeteria, storage, receiving, office space, and conference rooms.

Staffing

Staffing is the same as the predesign base case.

The control room is designed to house 21 workstations immediately and 36 workstations in the future. This BEST study projects long term TMC staff at 91 – some of which can be housed in the Dayton Building.

Mechanical/Electrical/Plumbing (MEP) systems

- All MEP systems / functions in new building.
- Mechanical systems are complex for IT and Control spaces. Fairly simple HVAC for office spaces. Preaction Fire Protection system in IT and Control spaces. Standard wet sprinklers in office spaces.
- Full restrooms in new building.
- Electrical installation for new 19,000 sf including backup generator for complete facility.

Equipment

In this review we compared the numbers of existing equipment and components against the numbers used in the pre-design and updated the totals accordingly. Regardless of whether the ultimate project results in new construction or remodeling at the Dayton site, the equipment will still need to be moved from its present location and reconnected at the

	PROPOSAL	1A
COMPONENT: TMC Facility – reduced viewing area.	**AUTHOR**	BEST

new. The equipment cost will be the same regardless of the choice.

Advantages:

No need to upgrade existing field devices and equipment

Maximizes the use of existing Dayton Bldg. equipment especially the SONET Network

Cheapest option among alternatives considered (same as remodel option)

Familiarity with current setup and equipment from an O&M point of view

Disadvantages:

Ultimately will have to transition to an all-digital IP solution in the future which leads to more costs in the future

Need more racks which means more space

Communications Systems

If a new facility were to be constructed as proposed, not only would the WSDOT radio system be moved, the current location proposed by WSDOT would require the removal of an existing cellular mono-pole tower, antenna, and radio shelter be moved or completely removed. WSDOT proposes to relocate the cellular antennas to the proposed new tower leaving the cost of the relocation of the cellular shelter and radio equipment to the cellular company to absorb. Costs would include a 160' tower constructed on site (estimated at $137,208.50), and relocation of the radio, antenna, and dispatch location (estimated at $145,000.00). A proper site ground grid would need to be installed around the tower and extended to the radio equipment location (estimated at $42,000.00) and would need to be included in the estimated cost of construction. Tower construction is already included in the tower estimate above.

Maintenance and operations

Maintenance and operations costs are based on actual costs in the neighboring Dayton HQ building. These costs are approximately $7.41 a square foot and are broken down as follows:
Utilities $1.89 per square foot,
Custodial $1.00 per square foot,
Maintenance $2.50 per square foot,

	PROPOSAL	1A
COMPONENT: TMC Facility – reduced viewing area.	**AUTHOR**	BEST

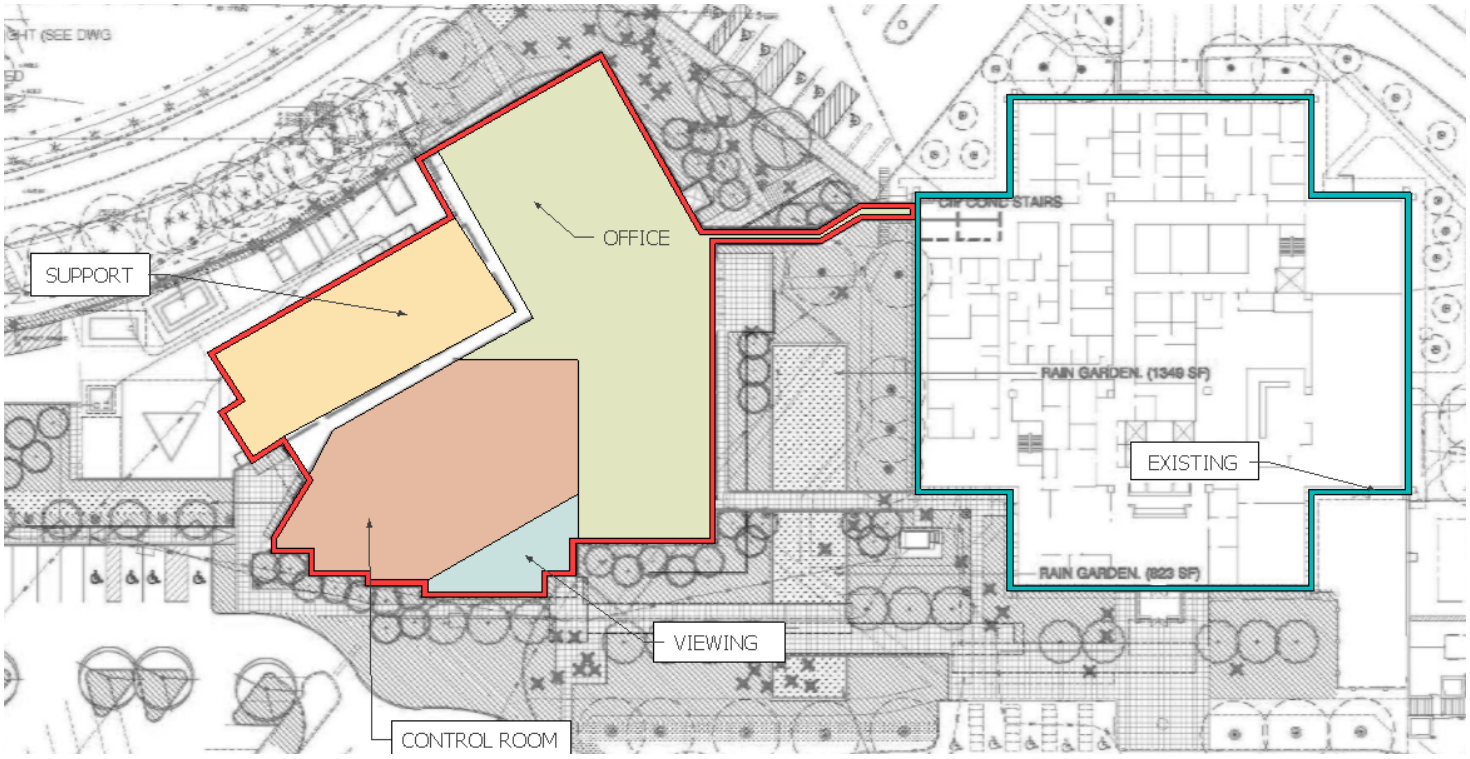
Security $0.25 per square foot,
Landscaping and Ground Maintenance $0.50 per square foot,
Management Fees $0.75 per square foot,
Telephone $0.36 per square foot,
Information Technology $0.16 per square foot.

These costs are conservative because the TMC will be new construction and maintenance and operations should be less than the 40 year old neighboring building. Even though they are conservative they should be relatively close to what actually will occur.

Predesign Cost O&M Costs $163,020 per year
Best Proposed O&M Costs $138,589 per year

BEST STUDY

OPTION 1A



	PROPOSAL	1B
COMPONENT: New Control rm. and equipment facility – Dayton site.	**AUTHOR**	BEST

CURRENT CONCEPT: The current concept was recommended in the Predesign Study from February 2012. A 22,000 S.F. new building would be constructed next to the existing Dayton Building.

BEST CONCEPT: This approach would provide a smaller new 11,500 S.F. building which only accommodates the TMC Control Room and limited support spaces. All other space would be accommodated in the existing Dayton Building.

FUNCTIONS		
Upgrade TMC	Expand TMC	House TMC support functions

ADVANTAGES:	**DISADVANTAGES:**
• Meets all "essential facility" requirements for the Control Room • Stays with other NW Region operations • Shares common and unused spaces in existing Dayton Building • Allows future expansion	• Not all office spaces may be operational after a significant seismic event • Separating operations may affect efficiencies • Increases WSDOT facility maintenance by adding space

DISCUSSION: This approach constructs a smaller standalone building connected to the existing Dayton Building with a secure corridor. The new building will be designed to meet all code requirements for an essential facility to be totally functional after a significant seismic event.

The new building would accommodate the Control Room, and emergency response coordination room, press and public viewing, toilets, computer equipment rooms, and associated mechanical and electrical support spaces.

The existing building is not designed to current standards for "essential" public facilities and may not be functional after a major seismic event; unless the facility is upgraded. The predesign approach separates the new building from the existing building in order to avoid damage to the new building from falling debris from the existing. This distance

	PROPOSAL	1B
COMPONENT: New Control rm. and equipment facility – Dayton site.	**AUTHOR**	BEST

would limit interaction between staff in the control room and support space in the existing building. This Approach One B locates the new construction immediately adjacent to the existing building and provides a strengthened roof to protect from falling debris.

This location would maintain the existing relationships with NW Region operations, management, and real response assets. It would maintain existing working relationships between TMC and other WSDOT staff. It would maintain existing communication connections to facilities monitored and controlled from Dayton.

This approach requires extensive use of common building components, such as cafeteria, storage, receiving, office space, and conference rooms.

Since the new construction extends out into a larger potential building area, the new addition could be expanded to meet any future needs.

Staffing

This alternative locates the essential functions—the control room, ITS equipment, and associated support space in a facility immediately adjacent to the existing Dayton Building, where the balance of the transportation management staff and functions will remain in moderately remodeled space. Staffing moves between these two areas on a regular basis.

The control room is designed to house 21 workstations immediately and 36 workstations in the future.

Separating the operations between the new control room facility and the existing office space should not require additional staffing, given that the new facility is located immediately adjacent to the existing building.

Mechanical/Electrical/Plumbing (MEP) systems

- All MEP systems / functions stand alone in new building.
- Mechanical systems are complex for IT and Control operations. Preaction Fire Protection system in IT and Control spaces. Standard wet sprinklers in office spaces.
- Minor restrooms in new facilities.
- Electrical installation for new 11,500 sf including backup generator for entire facility.

	PROPOSAL	1B
COMPONENT: New Control rm. and equipment facility – Dayton site.	**AUTHOR**	BEST

Equipment

New ITS equipment and control room equipment provided in new facility.

Advantages:

No need to upgrade existing field devices and equipment

Maximizes the use of existing Dayton Bldg. equipment especially the SONET Network

Cheapest option among alternatives considered (same as remodel option)

Familiarity with current setup and equipment from an O&M point of view

Disadvantages:

Ultimately will have to transition to an all-digital IP solution in the future which leads to more costs in the future

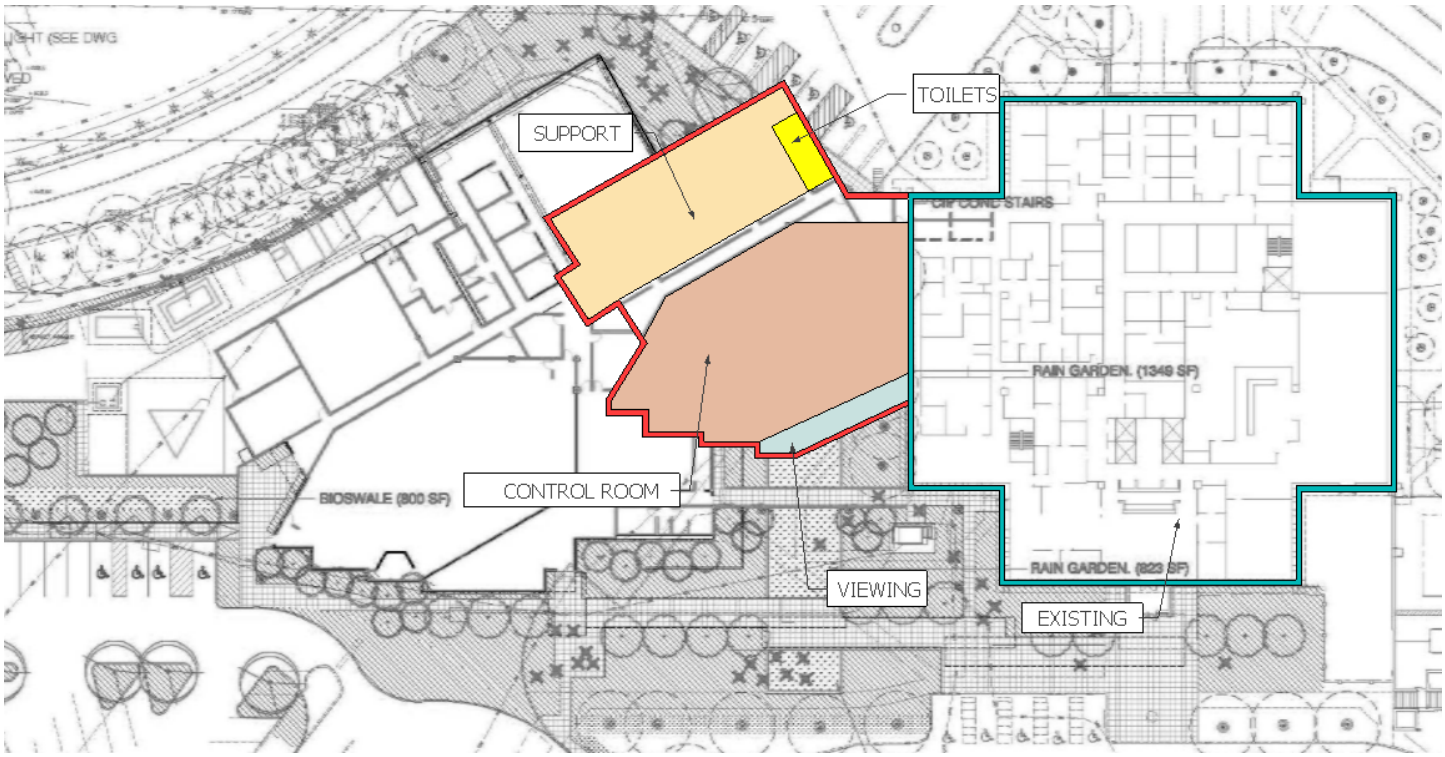
Need more racks which means more space

Communications Systems

This proposal includes a new radio tower, same as the predesign option. If a new facility were to be constructed as proposed, not only would the WSDOT radio system be moved, the current location proposed by WSDOT would require the removal of an existing cellular mono-pole tower, antenna, and radio shelter be moved or completely removed. WSDOT proposes to relocate the cellular antennas to the proposed new tower leaving the cost of the relocation of the cellular shelter and radio equipment to the cellular company to absorb. Costs would include a 160' tower constructed on site (estimated at $137,208.50), and relocation of the radio, antenna, and dispatch location (estimated at $145,000.00). A proper site ground grid would need to be installed around the tower and extended to the radio equipment location (estimated at $42,000.00) and would need to be included in the estimated cost of construction. Tower construction is already included in the tower estimate above.

BEST STUDY

OPTION 1B



	PROPOSAL	2A
COMPONENT: Renovated Dayton Bldg – partial renovation	**AUTHOR**	BEST

CURRENT CONCEPT: The current concept was recommended in the Predesign Study from February 2012. A new 22,000 S.F. building would be constructed next to the existing Dayton Building.

BEST CONCEPT: No new building. Only uses space within the existing Dayton Bldg. New Control Room and equipment spaces are developed within existing bldg. Full seismic, life safety, HVAC and architectural upgrades for first and second floors, with minor finish upgrades on the third floor.

FUNCTIONS		
Upgrade TMC	Expand TMC	House TMC support functions

ADVANTAGES:

- The TMC control and equipment functions would be protected from major seismic events.
- Refines space for functional needs per the BEST study assessments
- Stays with other NW Region operations
- Used vacant space in Dayton Building

DISADVANTAGES:

- Offices not "essential" facility
- Compromises control room ultimate screen size
- Uses some space now used for other activities
- Allows no space for expansion

DISCUSSION: This approach accommodates all TMC functions within the existing Dayton Building. Only those portions of the building accommodating the Control Room and adjacent meeting and office space, and the mechanical an electrical support spaces would be upgraded to be operational after a major seismic event.

The building was constructed in 1972 and is in good condition. Though it was not designed to current standards, or to essential building standards, it is not expected to collapse or totally fail with a major seismic event. The building may not be functional, and there may be failures and collapses in limited areas – except in the areas "hardened" for control room and equipment in this alternative.

	PROPOSAL	2A
COMPONENT: Renovated Dayton Bldg – partial renovation	**AUTHOR**	BEST

A 2001 study identified an approach to strengthening the building which is adopted in this analysis. Exterior concrete shear walls, L shaped in plan, will be installed at 4 locations around the building. . Columns would be reinforced to the same level with carbon fiber wraps. In order to limit the height of these walls, TMC core functions will be located on portions of the lower two floors, so the new concrete shear walls will have to go to the bottom of the third floor. The new TMC can then be constructed while the existing TMC remains operational.

The Control Room and the press and public viewing area will be located on the "2nd" floor, with direct ground access from the main building entry. Other activities which cannot easily be relocated off of the floor leave approximately 7,000 sf of space for the TMC. In addition to the Control Room and viewing area, there is room for about 3,000 sf of offices. Additional offices would be located on the third floor.

The computer server rooms and supporting mechanical and electrical spaces would be located on the "1st" floor below the control room. This will allow wiring and HVAC to be provided through holes in the floor, negating the need for a raised floor structure for wiring.

The floor to bottom of concrete structure height is about 11 ft 8 inches. This is considerably less than the 18 ft height desired in a new structure, and limits the size of TV monitors desired for normal operations; but it is still feasible to provide good viewing angles with the layout of the consoles

With this approach, office and support spaces outside of the control room and viewing areas would not be improved; except for life safety systems on the first two floors.

Existing toilets, copy rooms, and other support spaces would not be replicated.

Seismic

General Discussion of Seismic Upgrade

The existing Dayton building is a six story concrete structure constructed in 1973. The detailing of the concrete elements has changed significantly since the original construction.

	PROPOSAL	2A
COMPONENT: Renovated Dayton Bldg – partial renovation	**AUTHOR**	BEST

In addition the seismic design criteria have increased since the original design to meet life/safety performance level (building may be damaged beyond use after a major earthquake and should still be standing and allow occupants to exit the building). To upgrade the facility to an “essential” facility (operational or minor damage after a major earthquake) will require designing to a higher standard than the original design.

Basis of Structural Scope of Work

The seismic study in 2001 has taken this into account and the summary of structural scope of work to seismically upgrade the Dayton Building noted below is extrapolated from the 2001 structural report. The structural design concept of the seismic upgrade is to add reinforced concrete shear walls at the four corners of the building, foundations and diaphragm (floor) collectors that are stiff enough to attract seismic loads and minimize modification of the existing structural concrete elements (concrete beams, columns and slabs). The report also noted that similar upgrades are required to bring the building up to current life/safety requirements.

Ideally the entire building would be seismically upgraded for the best performance of the structure. For this study we are assuming a partial seismic upgrade where the building will be seismically upgraded from the foundation to the level above the floor occupied for Traffic Management Center use. (This BEST study did estimate the cost of full height upgrade, and noted it is still feasible within the predesign budget estimate) With a partial upgrade the space above the seismic upgrade may be significantly damaged and not occupiable, however the space below should be operational/functional. To this end the minimum scope is to upgrade or extend the work to the third floor level (third floor level acts as a roof above the second floor occupied space) and the maximum is extending the work to the fourth floor. The new shear walls are designed for the entire mass of the building and as noted above only extend to the level above the floor occupied by the Traffic Management Center.

Summary of Structural work

Provide reinforced concrete wall and infill existing openings at the four corners of the building. Each shear wall is 35 feet in each direction at the corner (for supplemental information see 2001 Structural Report). The walls may be located on the interior; however

	PROPOSAL	2A
COMPONENT: Renovated Dayton Bldg – partial renovation	**AUTHOR**	BEST

they will distribute the use of the existing spaces. Foundations for the shear walls will be located at the existing foundation level and diaphragm collectors (rebar extending through existing beams and cast in concrete) will be provided at each floor level lining up with the new concrete shear walls. Some openings, less than 10% and punched openings, may be provided in the proposed shear walls. As noted above for the minimum scope of work the concrete shear walls and collectors will extend to the third floor and in the maximum they extend to the fourth floor.

Staffing

Total staffing is the same as for a new facility, except retaining the TMC in the headquarters building provides more immediate access to other support staff.

The control room is designed to house 21 workstations immediately and 36 stations in the future. This BEST study projects a long term TMC staff of 91 – which would be housed in the rest of the building, similar to current configurations.

Mechanical/Electrical/Plumbing systems

- MEP systems are complex for IT and Control operations. Will be new stand- alone system for those spaces. Fairly simple HVAC upgrades for office spaces. Preaction Fire Protection system in IT, Control, and EOC spaces. Standard wet sprinklers in balance of first and second floors.
- Uses existing restrooms.
- Electrical installation for approx 8,000 S.F Control and equipment spaces including backup generator.

Equipment

Regardless of whether the ultimate project results in new construction or remodeling at the Dayton site, the equipment will still need to be moved from its present location and reconnected at the new. The equipment cost will be the same regardless of the choice.

The total cost of the option translates to $3,462,112.

<u>Advantages:</u>

	PROPOSAL	2A
COMPONENT: Renovated Dayton Bldg – partial renovation	**AUTHOR**	BEST

No need to upgrade existing field devices and equipment

Maximizes the use of existing Dayton Bldg. equipment especially the SONET Network

Cheapest option among alternatives considered

Familiarity with current setup and equipment from an O&M point of view

Disadvantages:

Ultimately will have to transition to an all-digital IP solution in the future which leads to more costs in the future

Need more racks which means more space

Communications Systems

If the facility was remodeled, it would be prudent to include the repositioning of the radio equipment located on the roof of the building to a ground floor location located close to a proposed site location of a new 160' self-supported tower. The reason for change in configuration is for the safe and proper site grounding of the radio equipment and antennas as well as the safety of the operator and technician of the radio equipment from the potential of lightning strikes. Costs would include a 160' tower constructed on site (estimated at $137,208.50), and relocation of the radio, antenna, and dispatch location (estimated at $145,000.00). If a location to house the radio equipment in the first floor location of the existing building could not be located, a separate communication hut could be purchased (estimated at $135,000.00 turn-key). A proper site ground grid would need to be installed around the tower and extended to the radio equipment location (estimated at $42,000.00).

Maintenance and operations

Maintenance and operations costs are based on actual costs to maintain and operate the existing Dayton HQ building in which the remodeling is occurring. They are identified above. These costs are approximately $7.41 a square foot. The building is currently being maintained and operated.

Renovation O&M Costs $138,000

	PROPOSAL	2B
COMPONENT: Renovated Dayton Bldg – partial renovation	**AUTHOR**	BEST
CURRENT CONCEPT: The current concept was recommended in the Predesign Study from February 2012. A new 22,000 S.F. building would be constructed next to the existing Dayton Building.		
BEST CONCEPT: No new building. Only uses space within the existing Dayton Bldg. New Control Room and equipment spaces are developed within existing bldg. Full seismic, life safety, HVAC and architectural upgrades for first, second, and third floors.		

FUNCTIONS		
Upgrade TMC	Expand TMC	House TMC support functions

ADVANTAGES:	**DISADVANTAGES:**
• The TMC control and equipment functions would be protected from major seismic events. • Refines space for functional needs per the BEST study assessments • Stays with other NW Region operations • Used vacant space in Dayton Building	• Offices not "essential" facility • Compromises control room ultimate screen size • Uses some space now used for other activities • Allows no space for expansion

DISCUSSION: This approach accommodates all TMC functions within the existing Dayton Building. Only those portions of the building accommodating the Control Room and adjacent meeting and office space, and the mechanical and electrical support spaces would be upgraded to be operational after a major seismic event.

The building was constructed in 1972 and is in good condition. Though it was not designed to current standards, or to essential building standards, it is not expected to collapse or totally fail with a major seismic event. The building may not be functional, and there may be failures and collapses in limited areas – except in the areas "hardened" for control room and equipment in this alternative.

A 2001 study identified an approach to strengthening the building which is adopted in this

	PROPOSAL	2B
COMPONENT: Renovated Dayton Bldg – partial renovation	**AUTHOR**	BEST

analysis. Exterior concrete shear walls, L shaped in plan, will be installed at 4 locations around the building. . Columns would be reinforced to the same level with carbon fiber wraps. In order to limit the height of these walls, TMC core functions will be located on portions of the lower two floors, so the new concrete shear walls will have to go to the bottom of the third floor. The new TMC can then be constructed while the existing TMC remains operational.

The Control Room and the press and public viewing area will be located on the "2nd" floor, with direct ground access from the main building entry. Other activities which cannot easily be relocated off of the floor leave approximately 7,000 sf of space for the TMC. In addition to the Control Room and viewing area, there is room for about 3,000 sf of offices. Additional offices would be located on the third floor.

The computer server rooms and supporting mechanical and electrical spaces would be located on the "1st" floor below the control room. This will allow wiring and HVAC to be provided through holes in the floor, negating the need for a raised floor structure for wiring.

The floor to bottom of concrete structure height is about 11 ft 8 inches. This is considerably less than the 18 ft height desired in a new structure, and limits the size of TV monitors desired for normal operations; but it is still feasible to provide good viewing angles with the layout of the consoles

With this approach, office and support spaces outside of the control room and viewing areas would not be improved; except for life safety systems on the first two floors.

Existing toilets, copy rooms, and other support spaces would not be replicated.

Seismic

General Discussion of Seismic Upgrade

The existing Dayton building is a six story concrete structure constructed in 1973. The detailing of the concrete elements has changed significantly since the original construction. In addition the seismic design criteria have increased since the original design to meet life/safety performance level (building may be damaged beyond use after a major earthquake and should still be standing and allow occupants to exit the building). To

	PROPOSAL	2B
COMPONENT: Renovated Dayton Bldg – partial renovation	**AUTHOR**	BEST

upgrade the facility to an “essential” facility (operational or minor damage after a major earthquake) will require designing to a higher standard than the original design.

Basis of Structural Scope of Work

The seismic study in 2001 has taken this into account and the summary of structural scope of work to seismically upgrade the Dayton Building noted below is extrapolated from the 2001 structural report. The structural design concept of the seismic upgrade is to add reinforced concrete shear walls at the four corners of the building, foundations and diaphragm (floor) collectors that are stiff enough to attract seismic loads and minimize modification of the existing structural concrete elements (concrete beams, columns and slabs). The report also noted that similar upgrades are required to bring the building up to current life/safety requirements.

Ideally the entire building would be seismically upgraded for the best performance of the structure. For this study we are assuming a partial seismic upgrade where the building will be seismically upgraded from the foundation to the level above the floor occupied for Traffic Management Center use. (This BEST study did estimate the cost of full height upgrade, and noted it is still feasible within the predesign budget estimate) With a partial upgrade the space above the seismic upgrade may be significantly damaged and not occupiable, however the space below should be operational/functional. To this end the minimum scope is to upgrade or extend the work to the third floor level (third floor level acts as a roof above the second floor occupied space) and the maximum is extending the work to the fourth floor. The new shear walls are designed for the entire mass of the building and as noted above only extend to the level above the floor occupied by the Traffic Management Center.

Summary of Structural work

Provide reinforced concrete wall and infill existing openings at the four corners of the building. Each shear wall is 35 feet in each direction at the corner (for supplemental information see 2001 Structural Report). The walls may be located on the interior; however they will distribute the use of the existing spaces. Foundations for the shear walls will be located at the existing foundation level and diaphragm collectors (rebar extending through existing beams and cast in concrete) will be provided at each floor level lining up with the new concrete shear walls. Some openings, less than 10% and punched openings, may be

	PROPOSAL	2B
COMPONENT: Renovated Dayton Bldg – partial renovation	**AUTHOR**	BEST

provided in the proposed shear walls. As noted above for the minimum scope of work the concrete shear walls and collectors will extend to the third floor and in the maximum they extend to the fourth floor.

Staffing

Total staffing is the same as for a new facility, except retaining the TMC in the headquarters building provides more immediate access to other support staff. This option still includes a new control room, ITS equipment space, and support and office space for 69 staff.

The control room is designed to house 21 workstations. These 21 workstations will be used by 25 staff. This BEST study projects the need for 36 work stations and an overall TMC staff of 91 – which would be housed in the rest of the building, similar to current configurations.

Mechanical/Electrical/Plumbing (MEP) systems

- MEP systems are complex for IT and Control operations. Will be new stand- alone system for those spaces. Fairly simple HVAC upgrades for office spaces. Preaction Fire Protection system in IT and Control spaces. Standard wet sprinklers in balance of first and second floors.
- Uses existing restrooms.
- Electrical installation for approx 8,000 S.F Control and equipment spaces including backup generator.

Equipment

Regardless of whether the ultimate project results in new construction or remodeling at the Dayton site, the equipment will still need to be moved from its present location and reconnected at the new. The equipment cost will be the same regardless of the choice.

The total cost of the option translates to $3,462,112.

<u>Advantages:</u>

No need to upgrade existing field devices and equipment

	PROPOSAL	2B
COMPONENT: Renovated Dayton Bldg – partial renovation	**AUTHOR**	BEST

Maximizes the use of existing Dayton Bldg. equipment especially the SONET Network

Cheapest option among alternatives considered

Familiarity with current setup and equipment from an O&M point of view

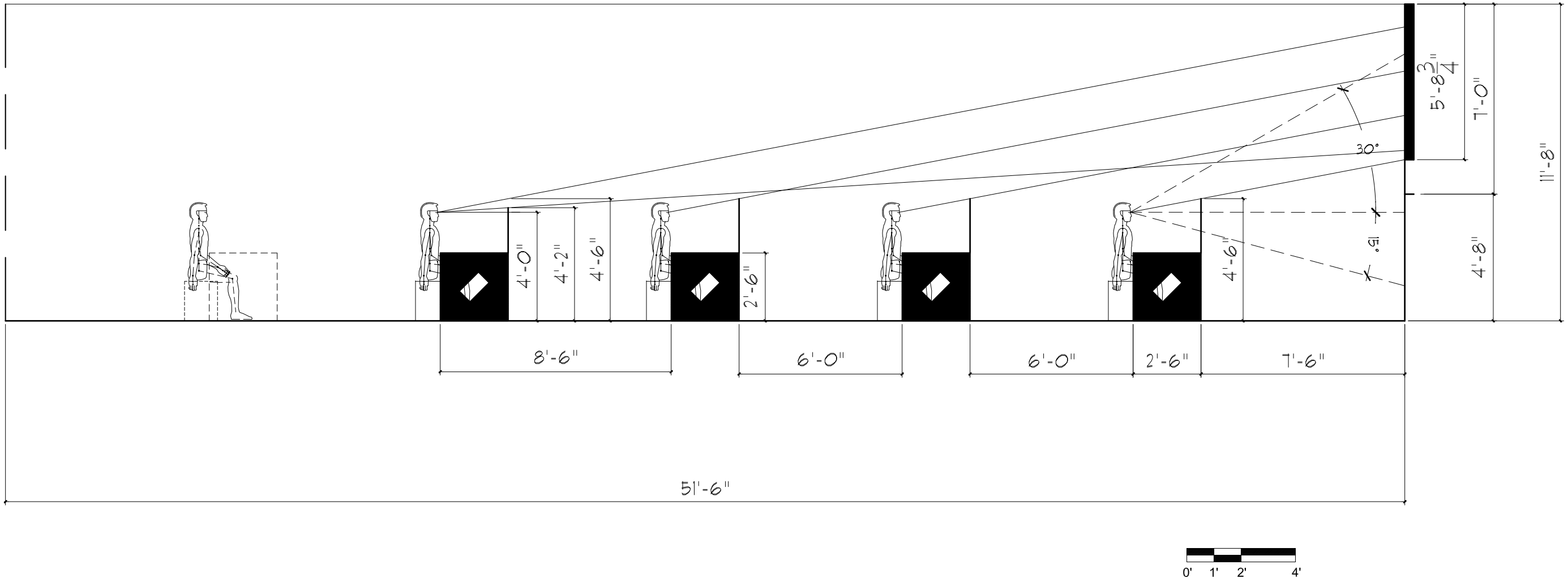
Disadvantages:

Ultimately will have to transition to an all-digital IP solution in the future which leads to more costs in the future

Need more racks which means more space

Communications Systems

If the facility was remodeled, it would be prudent to include the repositioning of the radio equipment located on the roof of the building to a ground floor location located close to a proposed site location of a new 160' self-supported tower. The reason for change in configuration is for the safe and proper site grounding of the radio equipment and antennas as well as the safety of the operator and technician of the radio equipment from the potential of lightning strikes. Costs would include a 160' tower constructed on site (estimated at $137,208.50), and relocation of the radio, antenna, and dispatch location (estimated at $145,000.00). If a location to house the radio equipment in the first floor location of the existing building could not be located, a separate communication hut could be purchased (estimated at $135,000.00 turn-key). A proper site ground grid would need to be installed around the tower and extended to the radio equipment location (estimated at $42,000.00).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8'-6"
6'-0"
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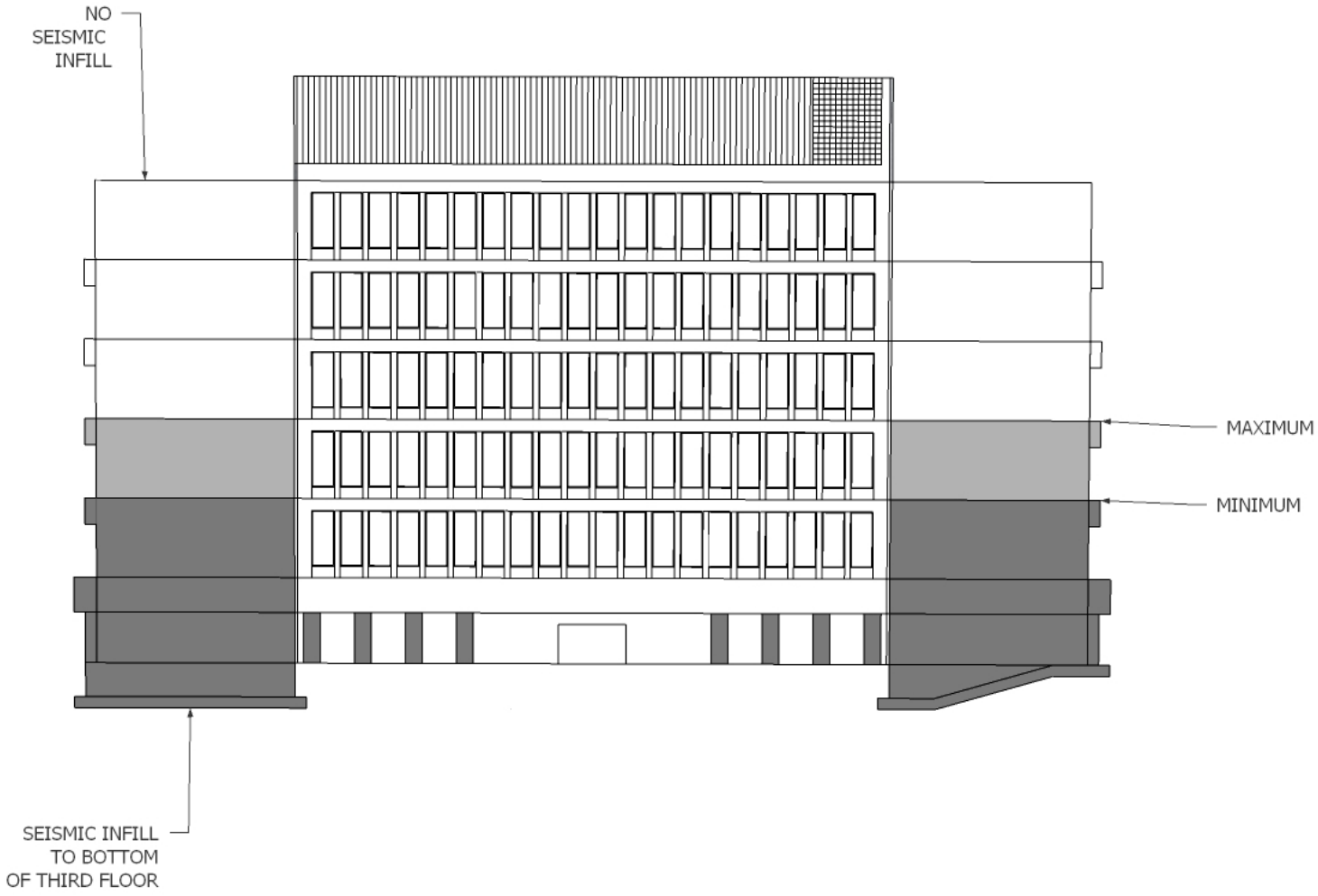
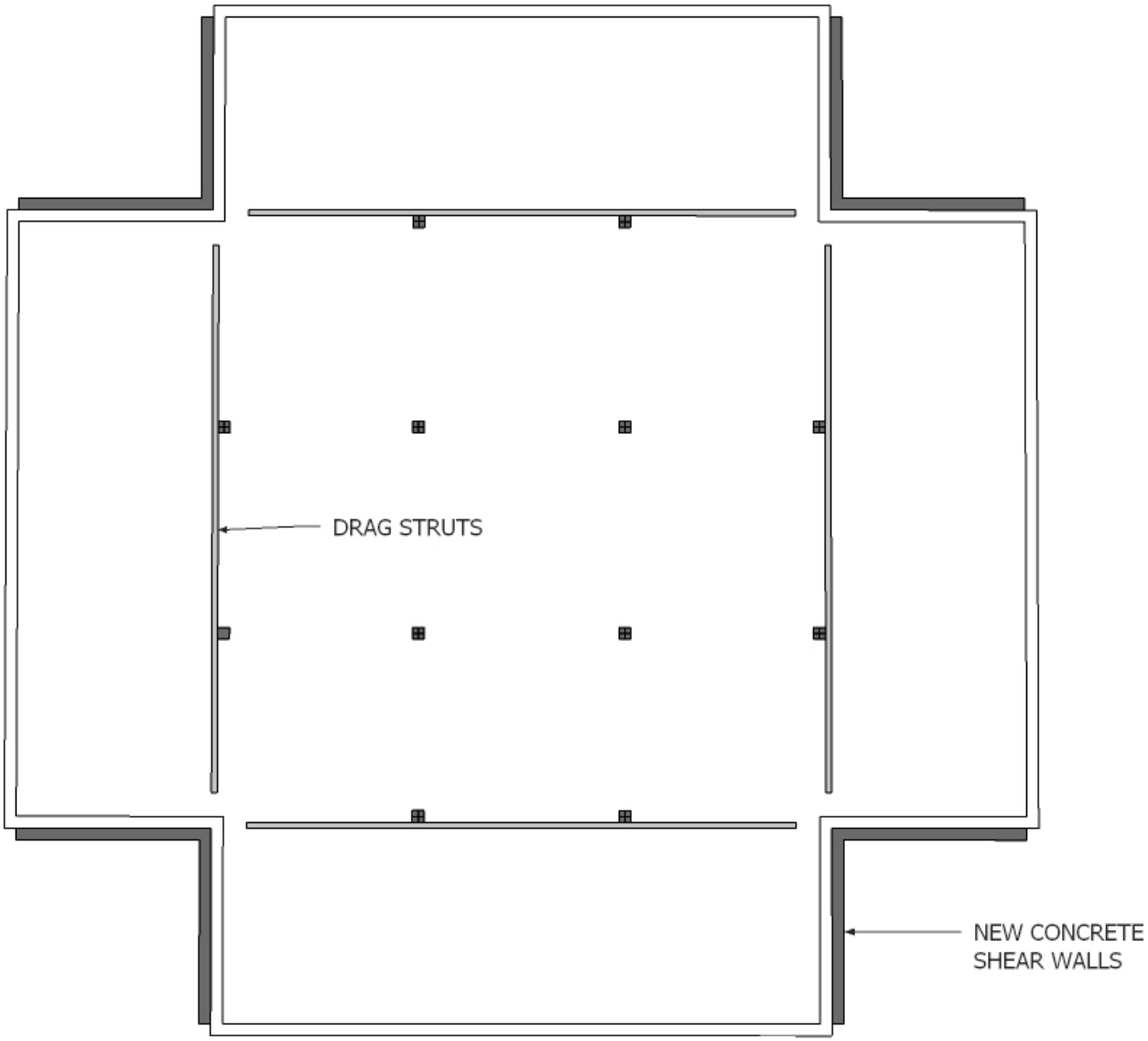
DAYTON BUILDING SEISMIC RETROFIT

OPTION 2



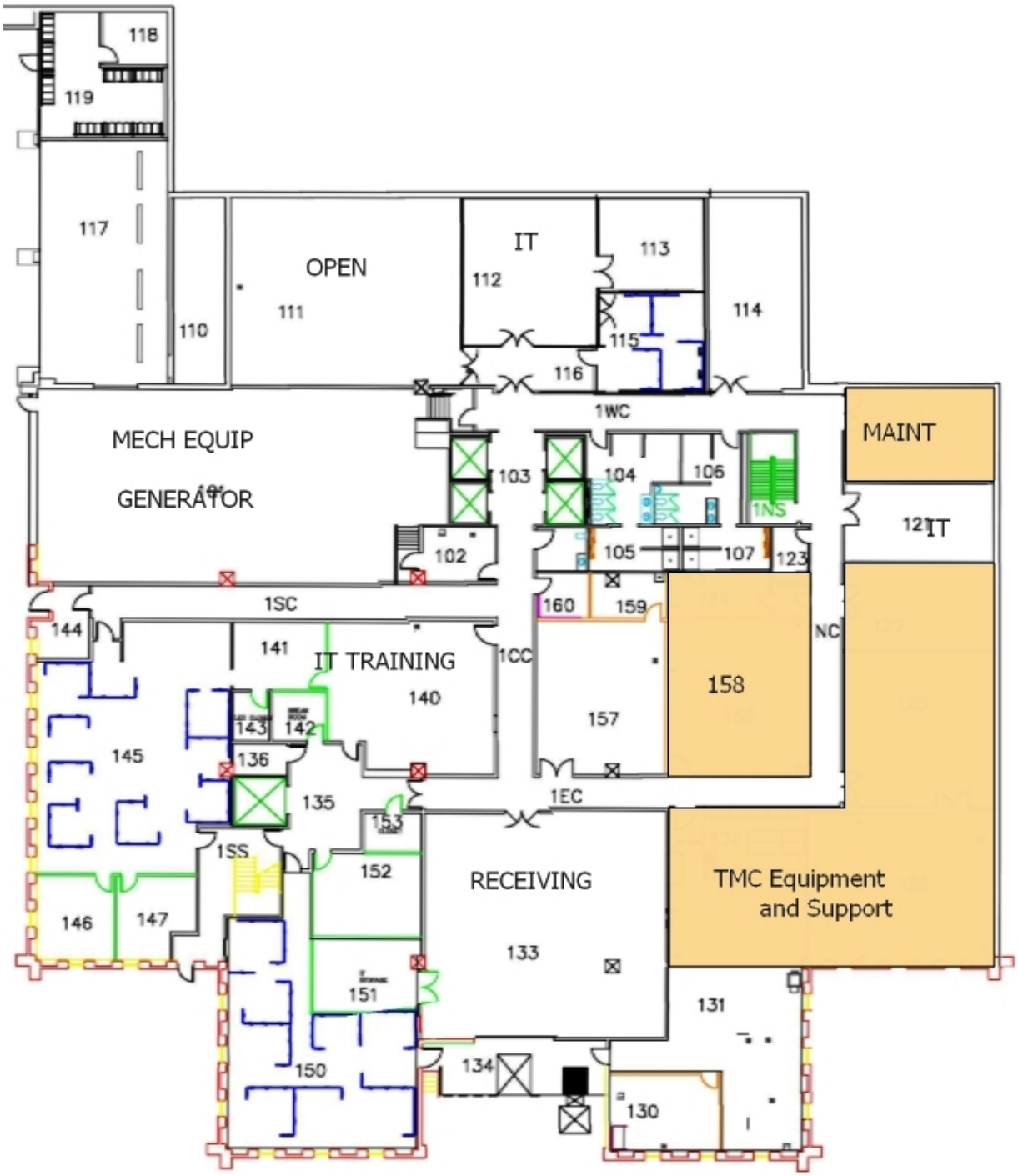
DAYTON BUILDING SEISMIC RETROFIT

OPTION 2



PROPOSED FIRST FLOOR

OPTION 2



PROPOSED SECOND FLOOR

OPTION 2

PROPOSED SECOND FLOOR

(New Control Room for Renovated Dayton Building Space)

OPTION 2

	PROPOSAL	3A
COMPONENT: Wheeler Building – renovated. No new fiber cable infrastructure.	**AUTHOR**	BEST

CURRENT CONCEPT: The current concept was recommended in the Predesign Study from February 2012. A new 22,000 S.F. building would be constructed next to the existing Dayton Building.

BEST CONCEPT: This approach relocates the TMC to the Wheeler Building Data Center in Olympia. Most TMC functions would be accommodated in a single Data Hall area. Office space in other parts of the Center would also be necessary.

FUNCTIONS		
Improve TMC	Increase TMC	House TMC support functions

ADVANTAGES:

- Uses vacant space which the State has some commitment to use.
- Meets all "essential" facility standards
- Uses no expensive already fully built out data room space

DISADVANTAGES:

- Separates NW Region operations
- No operational advantages
- Data halls restrict Control Room design
- Communication connections expensive
- Separates offices and other TMC

DISCUSSION: This approach accommodates all TMC functions within existing space at the State's new Wheeler Building Data Center. Only the "unbuilt" data hall and adjacent finished space along the access corridor would be used within the secure data center. General office space would also be leased in other, non-secure portions of the building. It would take approximately 5 minutes to walk between the two areas, without accounting for security stops.

This approach would utilize all of an "un-built" hall and some of the adjacent finished support spaces. It does not use any of the currently finished "data rack" space in the adjacent bay due to the high build out cost and the high lease cost. The finished data hall has a raised computer floor which is about 4 feet above the concrete slab to allow data connections and air flow, and the ceiling above is at only around 9 ft. The TMC Control Room requires a higher floor to ceiling for a monitor wall. The unbuilt hall would allow a

	PROPOSAL	3A
COMPONENT: Wheeler Building – renovated. No new fiber cable infrastructure.	**AUTHOR**	BEST

ceiling height of 14 ft. Due to the cost to retrofit that finished data hall space, this proposal locates all the TMC functions in the currently unfinished bay, and in leased space throughout the data center.

The data halls are accessed from a long wide corridor with toilets, a break room, and some potential office space on the side away from the data halls. This approach would use the office space and share the toilets and break room.

The unbuilt hall would be built out with a raised floor of approximately 1 ft high. Access ramps and stairs would be necessary from the main corridor to drop down to the TMS floor level.

Not all space in the Predesign program can be accommodated in the hallway offices and in the inbuilt data hall. With this approach, the total net space not already accommodated would be located in leased space on the second floor of the adjacent office building.

There are several unanswered questions with this approach.

- Access should be limited to a TMC, but access would normally be controlled by TMC staff. Data Center staff would control access at the Wheeler Building. This may not be a problem.
- WSDOT might be responsible for construction, or the Data Center might provide a finished space.
- The cost of common areas such as hallways, break rooms, and toilet rooms could be a shared cost or included in the base rent.
- The need for independent HVAC and emergency generator equipment should be defined. Existing equipment might have adequate capacity and be purchased.

Staffing

This alternative relocates the essential function staffing—the control room, ITS equipment, necessary engineering support, and associated support staff in a fully renovated portion of the existing Wheeler Building. Some transportation management staff will remain in the existing Dayton Building.

	PROPOSAL	3A
COMPONENT: Wheeler Building – renovated. No new fiber cable infrastructure.	**AUTHOR**	BEST

The staffing for the control room would be the same as the Dayton options. Total long term staff is projected at 72. Other long term staff growth (up to 96 total TMC related) could be located with Shoreline staff due to shared functions.

Separating the operations between Shoreline and Olympia requires four additional staff. This includes management functions that will be divided requiring additional supervision and still providing necessary contact with region leadership.

Mechanical/Electrical/Plumbing (MEP) systems

- Use full buildout of unbuilt space plus already built out office on other floors
- Mechanical systems are complex for IT operations in new space and fairly simple in offices, assumed no existing systems on roof.
- Preaction Fire Protection system in Control and ITS building. Standard fire protection exists in office space but will need to be rerouted.
- Restrooms assumed not currently existing in IT spaces only. Offices use pre-existing restrooms.
- Electrical installation distribution for all spaces. Backup generator for all spaces.

Equipment and Infrastructure

In moving the TMC to Olympia, the key issue to overcome is the lack of fiber optic connectivity from the Pierce County line to the Wheeler building.

Two technology solutions are available. The first maintains the existing SONET architecture of the WSDOT equipment while the other represents an IP based architectural approach. To achieve an IP based architecture there will be network conversion costs. The below table describes the estimated equipment and conversion costs for the two approaches. Fiber optic leasing is used to provide the connectivity to the Wheeler Building from the Northwest region (Pierce County Line). In each case, a redundant path is included in the cost for reliability purposes. The SONET approach requires the lease of more fiber strands (48 pair) than the IP solution (4 pair) resulting in a larger cost over five years. A 5 year lease is assumed, after 5 years the assumption is that the fiber cable will be extended to the Wheeler building by WSDOT Olympic Region as part of their ITS program.

	PROPOSAL	3A
COMPONENT: Wheeler Building – renovated. No new fiber cable infrastructure.	**AUTHOR**	BEST

	SONET	IP
Equipment	$ 3,876,914	$ 2,505,714
Conversion	$ 1,170,000	$ 3,750,000
Fiber lease (5 year) with redundant circuit	$ 1,785,600	$ 74,400
Total Cost	$ 6,832,514	$ 6,330,114
If fiber extended to Wheeler in next five years	$ 5,046,914	$ 6,255,714

Data and Communications Infrastructure

WSDOT Northwest region has fiber optic cabling within the I-5 Right of way from Dayton (current TMC location) up to the King-Pierce County line. The WSDOT Olympic region has fiber optic cabling within the I-5 right of way from King-Pierce County line to Mounts Road Interchange in the Nisqually area. WSDOT Olympic region is currently finishing an extension of the fiber optic backbone from Mounts Road to the Marvin Road interchange, which is at milepost 110. This extension should be completed in 2012.

Therefore a gap exists in the fiber along I-5 from Milepost 110 (Marvin Road) to milepost 101 (Capital Bldg). This is approximately a 10-mile gap to the Wheeler Bldg. near the Capital. This gap will be completed in the future by WSDOT Olympic region but it is not clear when this will happen. The cost to bridge this 10-mile gap is approximately $7 Million

This proposal assumes that the extension to remove the above gap will be completed in the next 5 years.

Communications Systems

To move the dispatch location to the Olympia Wheeler Building along with the TMC, as part of the TMC, would require the relocation of the radio, antenna, and dispatch location

	PROPOSAL	3A
COMPONENT: Wheeler Building – renovated. No new fiber cable infrastructure.	**AUTHOR**	BEST

(estimated at $150,000.00). This cost is a little higher due to the added cost of a remote HAM antenna installation on the roof for the replacement HAM radio and antenna equipment. The current NOAA and HAM radio equipment would remain in service at the Dayton facility

Due to the one hop sub rate connection speed of the existing analog 800MHz Trunking System with the current console equipment being very sensitive to latency issues, which could not be facilitated at the Wheeler building, an IP solution would need to be purchased to replace the older console technology. The console position equipment would be upgraded to an IP based console (estimated cost $250,000.00). For redundancy, one link of MPLS or VLAN connectivity could be used on the leased fiber or state fiber system; however, a separate Ethernet Micro-Wave radio link would need to be installed between

	Option 1 Remodel	***Option 2*** New Building	***Option 3*** Wheeler (Oly)
160' Tower purchase and installation.	$137,208.50	$137,208.50	
Relocation of radio, antenna, and dispatch equipment.	$145,000.00	$145,000.00	$150,000.00
Site Grounding.	$42,000.00	$42,000.00	
Console upgrade.			$250,000.00
Ethernet Micro-Wave radio link.			$150,000.00
Estimated cost per option:	***$324,208.50***	***$324,208.50***	***$550,000.00***

the Wheeler Building and the WSDOT Tumwater Hill radio site facility (Estimated cost $150,000.00). This would provide redundant radio connectivity on dispirit systems.

Maintenance and Operations

This option includes maintenance, operation and lease costs. These costs are broken down as follows:

Maintenance and Security $5.25 per square foot,
Shell Space $18 per square foot,
Shell Maintenance & Operations $6 per square foot,
Shell Utilities $2 per square foot,
Office Space $46 per square foot,
Raised Floor Space $192 per square foot. (This is for using existing “ready” data center)

	PROPOSAL	3A
COMPONENT: Wheeler Building – renovated. No new fiber cable infrastructure.	**AUTHOR**	BEST

Otherwise use shell built out shell costs, assuming WSDOT will operate and maintain their own data equipment

Telephone and IT Services are provided by the customer and were considered equivalent to the existing Dayton Ave. Building. These costs are broken down as follows:
Telephone $0.36 per square foot,
Information Technology $0.16 per square foot.

Maintenance and Security costs are included in the Office Space and Raised Floor Space costs. Shell Space has a $6 per square foot operations cost and a $2 per square foot utility cost. While the control room is built on a raised floor it is assumed these costs would not be the $192 per square foot cost for raised floor space because this space will be built out by this project and the building systems needed to support the control room are considerably less than the equipment room. It is assumed the minimum cost would be Shell Space costs of $18 per square foot.

The Equipment Room will be built on a raised floor and it is priced at $192 per square foot. The Equipment Room contains the servers that run the TMC and staff including operators are continually entering and exiting the Equipment Room. Development, maintenance, and network operations occurs in the Equipment Room. The equipment including servers in this room shall continue to be owned and maintained by WSDOT and no fees or work orders shall be charged or processed for maintenance and access. The Equipment Room will be built and considered as testing space so continual access can be provided to staff. In addition, media and the public have escorted access to the TMC. Photographs including those in the Equipment Room shall be allowed as part of a lease. Typical server space will not be used but systems to support these typical server spaces will be used to support the equipment room.

WSDOT staff will be traveling to the Seattle area and space for parking will be needed. 5 to 10 parking spaces will be needed for WSDOT vehicles. It is assumed parking costs are part of the lease.

Wheeler Building option costs Total $654,000

Wheeler Building – Functional considerations

The TMCs depend on a daily working relationship with the regional traffic engineering,

	PROPOSAL	3A
COMPONENT: Wheeler Building – renovated. No new fiber cable infrastructure.	**AUTHOR**	BEST

operations and maintenance management, emergency decision-making, and public information offices. In addition working relationships that enable each region to be managed efficiently have been developed with the local State Patrol management, county and city transportation managers, local media, and other agencies within the local region. The following tasks and staff are important daily functions that would be difficult to support with the TMC located in Olympia, 70 miles from the NW region:

- Response to events: The TMC operators work closely with the region's management, traffic engineers, and the public information officers to develop strategic responses to new events.

- Development and maintenance of equipment: Electronic, software and signal engineers keep the system going on a daily basis. Often, solving a system problem requires the engineers to have dual roles: they work with the operators and then go out in the field to test equipment to identify problems. Many of the staff who work in the TMC are only there for part of the day. At other times they work on other duties in other parts of the regions. As many as a third of the control room staff share these other duties, and rotate on a regular basis.

- Traffic analysis: Construction engineers use the TMCs to develop, implement, and monitor traffic management plans. Signal engineers use the TMCs to synchronize signals. Traffic engineers use the TMCs for traffic analyses. Construction traffic engineers use the TMCs in coordination with TMC operators, signal engineers, the region's management and public information officers to manage detour traffic during construction.

- Field operation and management of systems: If the communication link is broken, it may be necessary for operators from the centers to go to an equipment hub and/or a specific bridge or tunnel and manage the system or facility from that site. With the location of the TMC in Olympia one additional ITS engineer, two additional signal engineers, and one public information officer would need to be located in Olympia to work in the TMC.

	PROPOSAL	3B
COMPONENT: Wheeler Building – renovated – with new fiber cable infrastructure	**AUTHOR**	BEST
CURRENT CONCEPT: The current concept was recommended in the Predesign Study from February 2012. A new 22,000 S.F. building would be constructed next to the existing Dayton Building.		
BEST CONCEPT: This approach relocates the TMC to the Wheeler Building Data Center in Olympia, similar to concept 3a. Provide 10 miles of fiber cable infrastructure.		

FUNCTIONS		
Improve TMC	Increase TMC	House TMC support functions

ADVANTAGES:	**DISADVANTAGES:**
• Uses vacant space which the State has some commitment to use. • Meets all "essential" facility standards • Uses no expensive already built out data room space	• Separates NW Region operations • No operational advantages • Data halls restrict Control Room design • Communication connections expensive • Separates offices and other TMC

DISCUSSION: This option is the same as option 2a; but it includes 10 miles of fiber cable infrastructure to complete the data / communication link from Seattle to Olympia, in the event it is not yet completed.

Equipment and Infrastructure

In moving the TMC to Olympia, the key issue to overcome is the lack of fiber optic connectivity from the Pierce County line to the Wheeler building.

Two technology solutions are available. The first maintains the existing SONET architecture of the WSDOT equipment while the other represents an IP based architectural approach. To achieve an IP based architecture there will be network conversion costs. The below table describes the estimated equipment and conversion costs for the two approaches. Fiber optic leasing is used to provide the connectivity to the

	PROPOSAL	3B
COMPONENT: Wheeler Building – renovated – with new fiber cable infrastructure	**AUTHOR**	BEST

Wheeler Building from the Northwest region (Pierce County Line). In each case, a redundant path is included in the cost for reliability purposes. The SONET approach requires the lease of more fiber strands (48 pair) than the IP solution (4 pair) resulting in a larger cost over five years. A 5 year lease is assumed, after 5 years the assumption is that the fiber cable will be extended to the Wheeler building by WSDOT Olympic Region as part of their ITS program.

	SONET	IP
Equipment	$ 3,876,914	$ 2,505,714
Conversion	$ 1,170,000	$ 3,750,000
Fiber lease (5 year) with redundant circuit	$ 1,785,600	$ 74,400
Total Cost	$ 6,832,514	$ 6,330,114
If fiber extended to Wheeler in next five years	$ 5,046,914	$ 6,255,714

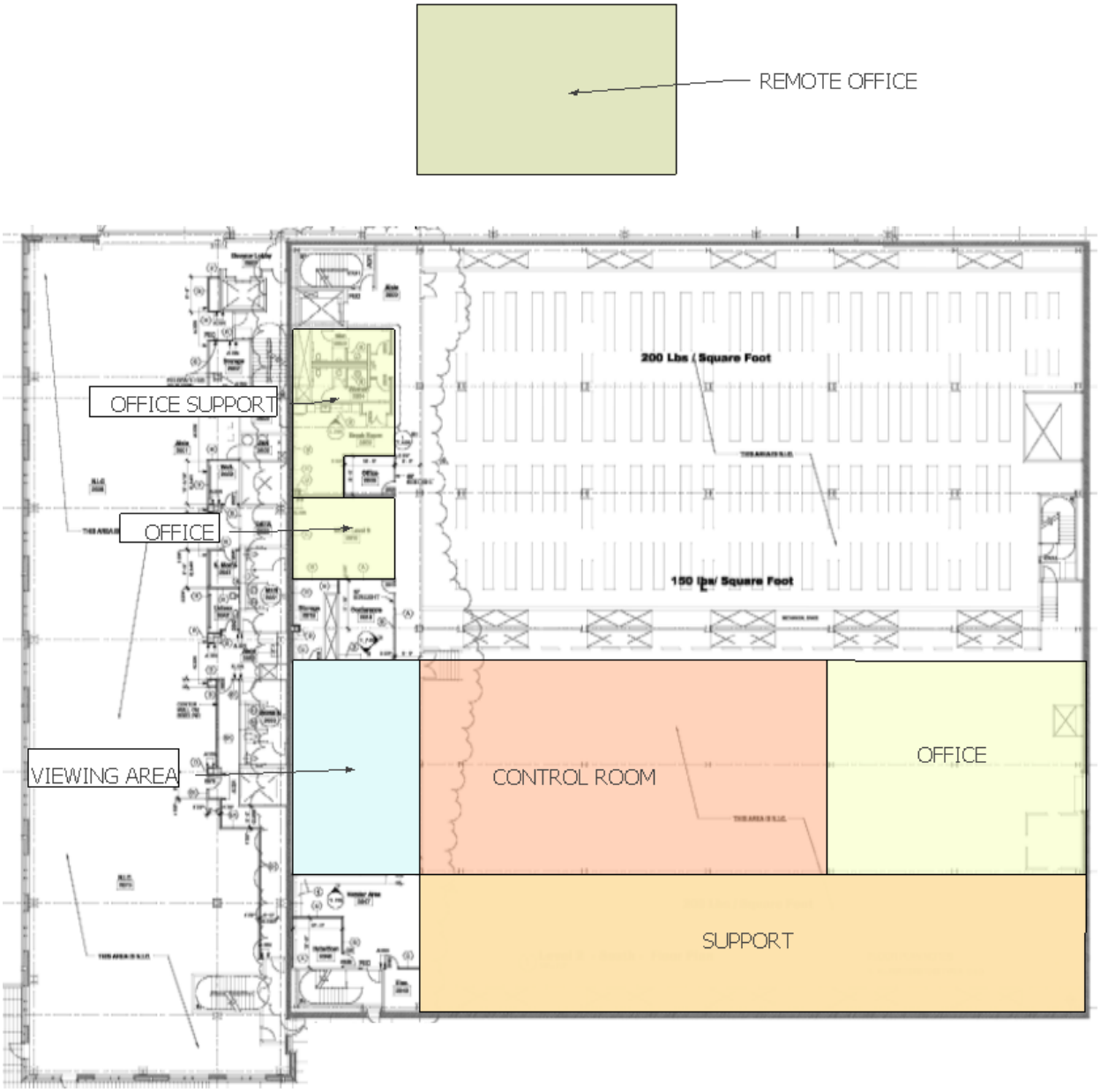
Data and communications infrastructure

WSDOT Northwest region has fiber optic cabling within the I-5 Right of way from Dayton (current TMC location) up to the King-Pierce County line. The WSDOT Olympic region has fiber optic cabling within the I-5 right of way from King-Pierce County line to Mounts Road Interchange in the Nisqually area. WSDOT Olympic region is currently finishing an extension of the fiber optic backbone from Mounts Road to the Marvin Road interchange, which is at milepost 110. This extension should be completed in 2012.

Therefore a gap exists in the fiber along I-5 from Milepost 110 (Marvin Road) to milepost 101 (Capital Bldg). This is approximately a 10-mile gap to the Wheeler Bldg. near the Capital. This gap will be completed in the future by WSDOT Olympic region but it is not clear when this will happen. The cost to bridge this 10-mile gap is approximately $7 Million.

PROPOSED WHEELER BUILDING

OPTION 3



PROGRAM SPACE CALCULATION					SQUARE FOOTAGE					
					Dayton - New		Dayton - Renovation		Wheeler	
PROGRAM SPACES	FTEs	GA SF	Existing	Pre-Design - all new	1a - all new	1b-(New in red)	2a	2b	3a	3b
TMC SPACES *				**13,852**	**11,952**	**11,521**	**11,489**	**11,489**	**11,837**	**11,837**
Control Room [Including WSDOT Broadcasting Area]			1,571	5,584	5,584	5,584	5,584	5,584	5,584	5,584
Emergency Operations Center (EOC) **			933	1,512	900	900	900	900	900	900
Conference Room				520	820	820	520	520	520	520
ITS/IT Equipment Room			1,400	1,920	1,920	1,920	1,920	1,920	1,920	1,920
ITS Storage			140	308	308	308	308	308	308	308
Mechanical Rooms				500	500	500	500	500	500	500
Electrical Room				440	440	440	440	440	440	440
Electrical (Emergency) Room				110	110	110	110	110	110	110
Radio Equipment Room			188	432	432	432	432	432	432	432
Public Viewing & Media Setup Area			324	1,670	500	500	500	500	500	500
Public Restrooms (2-Unisex Restrooms)				233	233	0	0	0	0	0
Staff Corridor				348	348	150	0	0	348	348
Utility Closet (Public Restroom)				55	55	55	55	55	55	55
Communications Closet				220	220	220	220	220	220	220
OFFICE ,Support, and Circulation Space	**59**	**11,792**		**7,554**	**7,554**	**7,554**	**7,103**	**7,103**	**8,614**	**8,614**
Enclosed Offices[1]	**3**	**504**		**504**	**504**	**504**	**504**	**504**	**504**	**504**
Traffic Engineer Regional Ops Office	1		140	168	168	168	168	168	168	168
Freeway Operations Engineer Office	1		140	168	168	168	168	168	168	168
ITS Engineer Office	1		140	168	168	168	168	168	168	168
Open Office Space[2]	**32**	**2,880**		**2,898**	**2,898**	**2,898**	**2,898**	**2,898**	**2,898**	**2,898**
Support Staff Work Space	1									
ITS Engineer Work Space	8									
Freeway Engineering	14									
Software Work Space	6									
PIO - Traffic Work Space	3									
Other Staff	**24**			**168**	**168**	**168**	**0**	**0**	**168**	**168**
Staff with only lockers provided (Locker SF)	23			168	168	168			168	168
Radio Operator Supervisor (Control Room Work Station)	1									
Support Spaces[3]	**59**	**3,245**		**844**	**844**	**844**	**567**	**567**	**844**	**844**
Staff Restrooms				477	477	477	200	200	477	477
Copy Room				112	112	112	112	112	112	112
Break Room				200	200	200	200	200	200	200
Utility Closet				55	55	55	55	55	55	55
Common Areas & Circulation[4]	**59**	**5,163**		**3,140**	**3,140**	**3,140**	**3,134**	**3,134**	**4,200**	**4,200**
Common Areas & Internal Circulation				3,140	3,140	3,140	3,140	3,140	4,200	4,200
AUXILIARY SPACES				**492**	**492**	**250**	**0**	**0**	**0**	**0**
Dayton Building Access Corridor				492	492	250				
BUILDING TOTAL SF				**21,898**	**19,998**	**19,325**	**18,592**	**18,592**	**20,451**	**20,451**

NOTES:

1. GA Guidelines (168 SF/Employee)
2. GA Guidelines (64 SF Cubicle + 26 SF Circulation = 90 SF/Employee)
3. GA Guidelines (55 SF/Employee)
4. GA Guidelines (70 SF/Employee + 25% Special Spaces)

*Per OFM, Emergency operations to be for traffic only - combine with conference area permamently set up for emergency communications.

III. COST/BUDGET ANALYSIS

COST/BUDGET ANALYSIS

For this study, the unit costs developed for the predesign study were reviewed and found to be reasonable for a concept level analysis, the only exception being estimated costs for technical equipment. Accordingly these costs (with adjusted equipment costs) were used for base case scenario. Costs for the Dayton renovation and the Wheeler building options were developed separately by the BEST study team, using similar levels of quality and finish as the base case.

The project markups and contingencies used in the predesign study however were conservative (high) by as much as 10%. Given the conceptual and uncertain level of the project options; the BEST team decided to retain these conservative allowances for all of the options presented herein.

Methodology

Costs for the Dayton renovation and Wheeler options were developed in UNIFORMAT, category 4 level of detail, and then summarized under the following categories appropriate for this facility type:

- Site Development
- Structural
- Architectural
- Mechanical
- Electrical
- Radio communications
- Life Safety
- Infrastructure
- Furniture
- ITS Cabling
- Equipment

All options were summarized per the above with a separate calculation for project costs (design, design and construction management, administrative, permits, etc)

Notes: Base is summation of WSDOT NW Region TMC Pre-design Study March 2012 Appendix D cost estimate.
Base corrected includes adjustments to Radio Tower costs and also adjustments in Quanity of ITS Cabling and equipment resulting in increased cost.

	Pre-design Base				Base - Corrected			
	New Building at Dayton				Dayton - Adjustments to Equipment and ITS cabling			
Cost Category	Current Estimate	Current SF	Current Cost per SF	notes	Proposed Cost	Proposed SF	Proposed Cost per SF	notes
Site Development	$ 1,082,649.30	21898	$ 49.44		$ 1,082,649.30	21898	$ 49.44	
Structural	$ 1,548,502.88	21898	$ 70.71		$ 1,548,502.88	21898	$ 70.71	
Architectural	$ 2,844,239.08	21898	$ 129.89		$ 2,844,239.08	21898	$ 129.89	
Mechanical	$ 1,728,783.73	21898	$ 78.95		$ 1,728,783.73	21898	$ 78.95	
Electrical	$ 1,865,857.65	21898	$ 85.21		$ 1,865,857.65	21898	$ 85.21	
Radio Tower/communications	$ 130,223.00	21898	$ 5.95		$ 282,000.00	21898	$ 12.88	
Life Safety	$ 240,367.04	21898	$ 10.98		$ 240,367.04	21898	$ 10.98	
Infrastructure		21898	$ -			21898	$ -	
Furniture	$ 691,730.00	21898	$ 31.59		$ 691,730.00	21898	$ 31.59	
ITS Cabling (equipment)	$ 1,713,014.00	21898	$ 78.23		$ 2,133,800.00	21898	$ 97.44	
Equipment	$ 561,029.00	21898	$ 25.62		$ 1,065,100.00	21898	$ 48.64	
Project (Design/Management)	$ 5,975,808.63	21898	$ 272.89		$ 6,455,341.42	21898	$ 294.79	
Total	$ 18,382,204.31	21898	$ 839.45		$ 19,938,371.09	21898	$ 910.51	
Rounded Total					$ 20,000,000.00	21898	$ 913.33	

note: Base estimate underestimated the equipment quanities/cost

Notes: Site Development - Only costs included in Site Development is the demolition of interior spaces needed for interior renovation. No other site work is included. No parking lot work.
Structural costs included concrete shear walls - For Maximum shear walls extend to the third floor ceiling and the third floor ceiling is reinforced. For Minimum the concrete shear walls extend to the top of second floor ceiling with the second floor ceiling reinforced.
Architectural costs - Maximum includes renovation of spaces to the same level of finishes as the Base new building with IT equipment located on the first floor with holes drilled into the ceiling to access the TMS equipment located on the second floor. Office space is located on the second and third floor (partial renovation on second and third floor areas). Minimum includes the same accept does not renovate office space on the third floor - only new paint and flooring. It is anticipated that office space would be utilized in other parts of the building but those areas remain as is and are not renovated
Mechanical and Electrical are improved to the third floor in the Maximum and to the second floor only in the minimum renovated areas only. Fire Sprinkler and fire alarm are improved throughout the entire first and second floor in the minimum and 1st through 3rd floors in the maximum.
A radio tower is included in the renovation options.

					1a				1b			
	Pre-design Base				Dayton New - revised base Maximum				Dayton New - revised base Min			
	New Building at Dayton				New Building w/size reduction/simpler desgn				New Building w/only TMC/electronic equip room)			
Cost Category	Current Estimate	Current SF	Current Cost per SF	notes	Proposed Cost	Proposed SF	Proposed Cost per SF	notes	Proposed Cost	Proposed SF	Proposed Cost per SF	notes
Site Development	$ 1,082,649.30	21898	$ 49.44		$ 1,000,000.00	20000	$ 50.00		$ 600,000.00	11500	$ 52.17	
Structural	$ 1,548,502.88	21898	$ 70.71		$ 1,400,000.00	20000	$ 70.00		$ 955,000.00	11500	$ 83.04	
Architectural	$ 2,844,239.08	21898	$ 129.89		$ 2,400,000.00	20000	$ 120.00		$ 2,280,000.00	19000	$ 120.00	
Mechanical	$ 1,728,783.73	21898	$ 78.95		$ 1,578,000.00	20000	$ 78.90		$ 908,500.00	11500	$ 79.00	
Electrical	$ 1,865,857.65	21898	$ 85.21		$ 1,700,000.00	20000	$ 85.00		$ 977,500.00	11500	$ 85.00	
Radio Tower/communications	$ 282,000.00	21898	$ 12.88		$ 282,000.00	20000	$ 14.10		$ 282,000.00	11500	$ 24.52	
Life Safety	$ 240,367.04	21898	$ 10.98		$ 210,000.00	20000	$ 10.50		$ 120,750.00	11500	$ 10.50	
Infrastructure		21898	$ -			20000	$ -			11500	$ -	
Furniture	$ 691,730.00	21898	$ 31.59		$ 630,000.00	20000	$ 31.50		$ 362,250.00	11500	$ 31.50	
ITS Cabling (equipment)	$ 2,133,800.00	21898	$ 97.44		$ 2,133,800.00	20000	$ 106.69		$ 2,133,800.00	11500	$ 185.55	
Equipment	$ 1,065,100.00	21898	$ 48.64		$ 1,065,100.00	20000	$ 53.26		$ 815,100.00	11500	$ 70.88	
Project (Design/Management)	$ 6,455,341.42	21898	$ 294.79		$ -	20000	$ -		$ -	11500	$ -	
Total	$ 19,938,371.09	21898	$ 910.51		$ 12,398,900.00	20000	$ 619.95		$ 9,434,900.00	19000	$ 496.57	
Rounded	$ 20,000,000.00	21898	$ 913.33		$ 18,300,000.00	20000	$ 915.00		$ 14,100,000.00	19000	$ 742.11	

		Pre-design Base			2b Maximum				2a Minimum			
	New Building at Dayton				Dayton - renovation of 1st, 2nd and 3rd floor				Dayton - renovation of 1st and 2nd			
Cost Category	Current Estimate	Current SF	Current Cost per SF	notes	Proposed Cost	Proposed SF	Proposed Cost per SF	notes	Proposed Cost	Proposed SF	Proposed Cost per SF	notes
Site Development	$ 1,082,649.30	21898	$ 49.44		$ 216,800.00	18600	$ 11.66		$ 187,000.00	15091	$ 12.39	
Structural	$ 1,548,502.88	21898	$ 70.71		$ 1,757,140.00	18600	$ 94.47		$ 1,322,700.00	15091	$ 87.65	
Architectural	$ 2,844,239.08	21898	$ 129.89		$ 1,684,200.00	18600	$ 90.55		$ 1,530,700.00	18600	$ 82.30	
Mechanical	$ 1,728,783.73	21898	$ 78.95		$ 711,200.00	18600	$ 38.24		$ 711,200.00	15091	$ 47.13	
Electrical	$ 1,865,857.65	21898	$ 85.21		$ 718,600.00	18600	$ 38.63		$ 711,000.00	15091	$ 47.11	
Radio Tower/communications	$ 282,000.00	21898	$ 12.88		$ 282,000.00	18600	$ 15.16		$ 282,000.00	15091	$ 18.69	
Life Safety	$ 240,367.04	21898	$ 10.98		$ 553,900.00	18600	$ 29.78		$ 397,300.00	15091	$ 26.33	
Infrastructure		21898	$ -			18600	$ -			15091	$ -	
Furniture	$ 691,730.00	21898	$ 31.59		$ 585,900.00	18600	$ 31.50		$ 475,650.00	15091	$ 31.52	
ITS Cabling (equipment)	$ 2,133,800.00	21898	$ 97.44		$ 2,133,800.00	18600	$ 114.72		$ 2,133,800.00	15091	$ 141.40	
Equipment	$ 1,065,100.00	21898	$ 48.64		$ 1,065,100.00	18600	$ 57.26		$ 1,065,100.00	15091	$ 70.58	
Project (Design/Management)	$ 6,455,341.42	21898	$ 294.79		$ -	18600	$ -		$ -	15091	$ -	
Total	$ 19,938,371.09	21898	$ 910.51		$ 9,708,640.00	18600	$ 521.97		$ 8,816,450.00	15091	$ 584.22	
					$ 14,500,000.00	18600	$ 779.57		$ 13,200,000.00	18600	$ 474.00	

Wheeler notes: Structural, Architectural, Mechanical and Electrical improvements include the buildout of the Shell Bay. Improvements are the same for both Minimum and maximum options.
Differences occur in Infrastructure and equipment. Narrative of wheeler building equipment options is included in equipment narrative section of the final report.

		Pre-design Base			3b Wheeler Fit Out - Maximum				3a Wheeler Fit Out - Minimum			
	New Building at Dayton				Wheeler - all of open site - same technology - trenching fiber cable to				Wheeler - all of open site - new technology - leased fiber - leased office			
Cost Category	Current Estimate	Current SF	Current Cost per SF	notes	Proposed Cost	Proposed SF	Proposed Cost per SF	notes	Proposed Cost	Proposed SF	Proposed Cost per SF	notes
Site Development	$ 1,082,649.30	21898	$ 49.44		$ -	20421	$ -		$ -	20421	$ -	
Structural	$ 1,548,502.88	21898	$ 70.71		$ 649,500.00	14670	$ 44.27		$ 649,500.00	14670	$ 44.27	
Architectural	$ 2,844,239.08	21898	$ 129.89		$ 1,398,500.00	14670	$ 95.33		$ 1,398,500.00	14670	$ 95.33	
Mechanical	$ 1,728,783.73	21898	$ 78.95		$ 1,070,600.00	14670	$ 72.98		$ 1,070,600.00	14670	$ 72.98	
Electrical	$ 1,865,857.65	21898	$ 85.21		$ 728,700.00	14670	$ 49.67		$ 728,700.00	14670	$ 49.67	
Radio Tower/communications	$ 282,000.00	21898	$ 12.88		$ 594,000.00	20421	$ 29.09		$ 594,000.00	20421	$ 29.09	
Life Safety	$ 240,367.04	21898	$ 10.98		$ 167,000.00	14670	$ 11.38		$ 167,000.00	14670	$ 11.38	
Infrastructure		21898	$ -		$ 6,400,000.00	20421	$ 313.40		$ 401,800.00	20421	$ 19.68	
Furniture	$ 691,730.00	21898	$ 31.59		$ 598,500.00	20421	$ 29.31		$ 598,500.00	20421	$ 29.31	
ITS Cabling (equipment)	$ 2,133,800.00	21898	$ 97.44		$ 3,356,300.00	20421	$ 164.36		$ 1,034,115.00	20421	$ 50.64	
Equipment	$ 1,065,100.00	21898	$ 48.64		$ 1,060,800.00	20421	$ 51.95		$ 5,112,000.00	20421	$ 250.33	
Project (Design/Management)	$ 6,455,341.42	21898	$ 294.79		$ -	20421	$ -		$ -	20421	$ -	
Total	$ 19,938,371.09	21898	$ 910.51		$ 16,023,900.00	20421	$ 784.68		$ 11,754,715.00	20421	$ 575.62	
					$ 23,600,000.00	20421	$ 1,155.67		$ 17,400,000.00	20421	$ 852.06	

Cyclical Cost Comparative Summary

O&M Costs New Building Dayton							
O&M Item	Cost per Square Foot	**Pre-Design** New Building Dayton Square Foot	O&M Cost	**1a** New Building Dayton Square Foot	O&M Cost	**1b** New and renovate Building Dayton Square Foot	O&M Cost
Utilities	$ 1.89	22,000	$ 41,580	20,000	$ 37,800	19,000	$ 35,910
Custodial	$ 1.00	22,000	$ 22,000	20,000	$ 20,000	19,000	$ 19,000
Maintenance	$ 2.50	22,000	$ 55,000	20,000	$ 50,000	19,000	$ 47,500
Security	$ 0.25	22,000	$ 5,500	20,000	$ 5,000	19,000	$ 4,750
Landscaping and Ground Maintenance	$ 0.50	22,000	$ 11,000	20,000	$ 10,000	19,000	$ 9,500
Management Fees	$ 0.75	22,000	$ 16,500	20,000	$ 15,000	19,000	$ 14,250
Telephone	$ 0.36	22,000	$ 7,920	20,000	$ 7,200	19,000	$ 6,840
Data Processing	$ 0.16	22,000	$ 3,520	20,000	$ 3,200	19,000	$ 3,040
	$ 7.41		$ 163,020		$ 148,200		$ 140,790

O&M Costs Retrofitted Existing Building					
	Cost per Square Foot	**2a** Renovate existing Dayton building (Include full TMC area, renovated or not)	O&M Cost	**2b** Renovate existing Dayton building (Include full TMC area, renovated or not)	O&M Cost
Utilities	$ 1.89	18,600	$ 35,154	18,600	$ 35,154
Custodial	$ 1.00	18,600	$ 18,600	18,600	$ 18,600
Maintenance	$ 2.50	18,600	$ 46,500	18,600	$ 46,500
Security	$ 0.25	18,600	$ 4,650	18,600	$ 4,650
Landscaping and Ground Maintenance	$ 0.50	18,600	$ 9,300	18,600	$ 9,300
Management Fees	$ 0.75	18,600	$ 13,950	18,600	$ 13,950
Telephone (based on Dayton Costs)	$ 0.36	18,600	$ 6,696	18,600	$ 6,696
Data Processing(Based on Dayton Costs)	$ 0.16	18,600	$ 2,976	18,600	$ 2,976
			$ 137,826		$ 137,826

O&M Costs Wheeler Building including the lease costs **			20,421
Lease Costs	Cost per Square Foot	**Wheeler Building** Square Foot	O&M Cost Total
Shell Space - incl raised floor equipment space	$ 18.00	14,670	$ 264,060
Shell Operations Costs	$ 6.00	14,670	$ 88,020
Shell Utilities	$ 2.00	14,670	$ 29,340
Office Space -including net shared space	$ 46.00	5,751	$ 264,546
Telephone	$ 0.36	14,670	$ 5,281
Data Processing	$ 0.16	14,670	$ 2,347
			$ 653,594

* Facilities Costs based on NW region HQ O&M Costs. Used for both new and renovated spaces - per predesign

** O&M and Lease Costs for Wheeler are provided by Consolidated Technology Services (CTS)

WSDOT TMC Communication and Equipment Cost Estimate

Equipment	Existing		Pre-design/ Redesign		Wheeler Bldg		Alternative solution - IP Based network: Gigabit IP within Existing SONET		All New 10 Gigabit IP	
	QTY	Per Unit	QTY	Cost	QTY	Cost	QTY	Cost	QTY	Cost
CONTROL ROOM										
Video Wall Monitors	42	2200	82	180400	82	180400	82	180400	82	180400
CONSOLES	13	15000	21	318,990	21	315000	21	315000	21	315000
ITS Equipment room			60		60	0		0		0
IT Equipment room			16		16	0		0		0
Radio room			6		6	0		0		0
Electronics						0		0		0
GIGABIT ETHERNET SWITCHES - CONTROL ROOM	9	2200	9	19800	9	19800	9	19800	9	19800
WORKSTATIONS	35	2200	80	176000	80	176000	80	176000	80	176000
DESK TOP MONITORS	40	500	90	45000	90	45000	90	45000	90	45000
ITS EQUIPMENT ROOM HARDWARE										
RACKS	30	2400	82	196800	82	196800	76	182400	76	182400
CISCO 3550 ROUTER	2	14500	2	29000	2	29000	2	29000	2	29000
SONET TERMINAL	2	80000	2	160000	2	160000	2	160000	0	0
VIDEO RECEIVERS & TRANS	66	4300	66	283800	66	283800	0	0	0	0
AMERICAN DYN VIDEO INPUT AND OUTPUT MATRIX SWITCH (704x112 Matrix)	1	251000	1	251000	1	251000	0	0	0	0
SERIAL DISTRIBUTION UNIT	1	1000	1	1000	1	1000	1	1000	1	1000
RACK MOUNTED SERVERS	20	5800	20	116000	20	116000	20	116000	20	116000
DIGITAL VIDEO RECORDER	3	9000	3	27000	3	27000		0		0
Axis Encoding chasis	8	24000	8	192000	8	192000	0	0	0	0
Cisco 6513 Switch/Router		250,000	0	250,000	0	0	0	0	0	0
REPEATERS		5000			150	750000				
REGENERATION OF SITES		130000			2	260000				
PHONES				422,000		422,000		422,000		422,000
RADIO TOWER	0	324208	1	324208	1	550000		550000		550000
CABLE,MOUNTS,FIBER, ETC	3 X 96	0	3 X 96	469114		469114		469114		469114
Leased Fiber (4 strands) capitalized over 20 years	2					372,000		372,000		372,000
FIELD CAMERAS	470		1500		1500			1500		1500
CONVERT CAMERA	470	3000					470	1410000	470	1410000
Recable Camera for IP	470	1000					470	470000	470	470000
Resplice Camera for IP	50	1000					50	50000	50	50000
10Gig Ring within SONET	15	50000					15	750000	0	0
SHELTER for GB IP	1	350000					0	350000	0	350000
L2 GB Switch	235	2000					235	470000	235	470000
ITS Software Upgrade	1	250000					1	250000	1	250000
REPLACE SONET WITH LAYER 3 SWITCH with FIBER SFP ACCESS Cat 6904-40G-T	2	69,000							2	138000
REPLACE SONET HUB WITH LAYER 3 SWITCH with FIBER SFP ACCESS Cat3750E		5000							14	70000
Total Cost				**$3,462,112**		**$4,815,914**		**$6,789,214**		**$6,087,214**
Trenching and Conduit to extend to Olympia WSDOT						**$ 6,486,920**				

MENG Analysis

Equipment Comparative Summary

Communications Radio Cost Summary

	Option 1	*Option 2*	*Option 3*
	Remodel	New Building	Wheeler (Oly)
160' Tower purchase and installation.	$137,208.50	$137,208.50	
Relocation of radio, antenna, and dispatch equipment.	$145,000.00	$145,000.00	$150,000.00
Site Grounding.	$42,000.00	$42,000.00	
Console upgrade.			$250,000.00
Ethernet Micro-Wave radio link.			$150,000.00
Estimated cost per option:	***$324,208.50***	***$324,208.50***	***$550,000.00***

IV. BEST METHODOLOGY

BEST METHODOLOGY

Purpose

The BEST process provides an independent, impartial review by a team assembled specifically for this study. The purpose for the BEST study process is to review a project at the pre-design budgeting level with a focus on the balance between the basic program and the project budget. The multi-discipline team includes specialists for each of the major program components of the project in order to review these elements from an operational programmatic standpoint and compare them to similar projects throughout the country. Through a structured system of investigation, idea generation, and analysis the team is able to consider and identify key areas in the program and space allotments that may warrant adjustment based on practices and/or alternative design solutions

By so modeling the project, the use of alternatives should give the State a better feeling for where the final project budget should be set in order to meet the required program. For this study three specific alternatives were requested of the study team; and the team offered a few variations upon those.

Process

The BEST study is conducted in a workshop format which begins with a presentation by the design team and the owner to present key programming, design, and budget issues. The BEST team worked in interdisciplinary group sessions, alternating with small group and individual study sessions to create a comparative framework for the project and analyze the three study alternatives.
This analysis and recommendations were presented at the conclusion of the study in this written report and a summary oral presentation to the WSDOT design team and OFM representatives.

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V. APPENDIX

Appendix

PROGRAMMING ANALYSIS

Staffing

Determination of Staffing Multiplier for Control Room Staff
Table 3.1 includes positions related to freeway operations, tunnel control, active traffic management, and support functions including supervision and public information. It does not include traffic signal system operators. Traffic signal operators therefore need to be added to the totals shown.
In reviewing Table 2.1, we divided staff into those whose primary workspace is the control room, versus those whose primary workspace is in the back office. Control room staff the following categories:

- Half of Freeway Engineering
- Interns
- Radio Operator Supervisor
- Radio Operators
- Public Information-Traffic

In the existing case, these add up to 20 FTEs. Adding five signal system operator positions brings the existing total to 25. No projections were made for traffic signal operators in the future, but we estimate those needs as 10.
A new security function will be added in the future.
The following workload increases will take place in the future case, based in part on the Predesign report and in part on consultation with WSDOT staff:

	Current	Future
Freeway Centerline Miles	240	480
Traffic Signals	252	450
Tunnel systems	3	6
ATM Direction-miles	41	200

Table 1. Increase in Systems Under Control

Based on the industry study described elsewhere and on the existing workload (with which it is consistent), we suggest the following metrics as reasonable to predict staffing needs for control-room operators.

	Metrics		Existing	
	Workstation Metric	FTE Metric	Workstations	FTE
Freeway Centerline Miles/Staff Member	25	15	9.6	16
Traffic Signals/Staff Member	150	150	1.7	1.7
Tunnel systems/Staff Member	1.5	0.6	2	5
ATM Direction-miles/Staff Member	20	15	2.1	2.7
Total Predicted			15.4	25.4
Actual			11	25

Table 2. Metrics Derived from Industry Study and Existing Workloads

Applying these workload metrics to future growth in the workload as shown in Table 1, the following prediction can be made of workspace and staffing needs.

	Workload (from Table 1)		Built-Out System (Predesign)	
	Current	"Future"	Workstations	FTE
Freeway Operations	240	480	19.2	32
Traffic Signals	252	450	3	3
Tunnel systems	3	6	4	10
ATM	41	200	10	13.3
New Functions (Security)	-	-	0*	5
Predicted			36.2	63.3
Predesign Projection			21	44 (34, plus 10 traffic signal operators)

* Security is embedded into other workstation functions Predesign projections.
Table 3, Predicted and Projected Control-Center Workstation and Staffing Needs

Dividing the future numbers by the existing number yields a multiplier of approximately 2.3 for staffing and 2.4 for workstations for the built-out system. These multipliers represent a high value—the amount required to maintain current services levels in all functions with no compromise, assuming the system is fully built out as expected.

NON-CONTROL ROOM STAFF

Position	Existing	Pre-Design	Forecast Build-out	Dayton New Min	Dayton New Max	Dayton - Remodel Min	Dayton - Remodel Max	Wheeler Min	Wheeler Max
Management (Office)	1	3	3	3	3	1	3	3	3
Support Staff (Cube)	1	3	7	3	7	1	7	3	7
Operations (Cube)	7	16	26	16	26	7	26	16	26
Engineering (Cube)	7	18	26	18	26	7	26	18	26
Software (Cube)	5	6	10	6	10	5	10	6	10
Technician (Cube)	3	10	14	10	14	3	14	10	14
Public Inf. Officer (Cube)	1	3	5	3	5	1	5	3	5
TOTAL	**25**	**59**	**91**	**59**	**91**	**25**	**91**	**59**	**91**
TOTAL	**25**	**59**	**91**	**59**	**91**	**25**	**91**	**59**	**91**

Definitions:
"Full Build" is a twenty year projection
Dayton New Minimum is the Pre-design
Dayton New Maximum is the forecast 2035
Dayton Remodel Minimum is the Existing
Dayton Remodel Maximum is the Forecast
Wheeler Minimum is the Pre-Design
Wheeler Maximum is the Forecast

CONTROL ROOM STAFFING (PEAK HOUR)

Control Room Function	Existing	Pre-Design	Forecast Build-out	Dayton New Min	Dayton New Max	Dayton - Remodel Min	Dayton - Remodel Max	Wheeler Min	Wheeler Max
Supervisor (Workstation & Cube)	1	2	2	2	2	1	2	2	2
Flow (8 hour) Workstation & Locker	2	3	5	3	5	2	5	3	5
Flow (Workstation & Cubicle)	2	3	5	3	5	2	5	3	5
Radio (Workstation & Locker)	2	3	4	3	4	2	4	3	4
Tunnel (Workstation & Locker)	1	2	4	2	4	1	4	2	4
Security (Workstation & Locker)	0	1	4	1	4	0	4	1	4
Guest (Workstation Only)	1	1	2	1	2	1	2	1	2
Signal (Workstation & Cube)	1	3	5	3	5	1	5	3	5
PIO (Workstation & Cube)	1	3	5	3	5	1	5	3	5
TOTAL	**11**	**21**	**36**	**21**	**36**	**11**	**36**	**21**	**36**

Definitions:
Dayton New Minimum is the Pre-design
Dayton New Maximum is the forecast 2035
Dayton Remodel Minimum is the Existing
Dayton Remodel Maximum is Full Build
Wheeler Minimum is Pre-design
Wheeler Maximum is Forecast

Accomodations	Existing	Pre-Design	Forecast Build-out	Dayton New Min	Dayton New Max	Dayton - Remodel Min	Dayton - Remodel Max	Wheeler Min	Wheeler Max
Offices	1	3	3	3	3	1	3	3	3
Cubes	5	11	17	11	17	5	17	11	17
Workstations	11	21	36	21	36	11	36	21	36
Lockers	5	14	17	9	17	5	17	9	17

Wheeler Building Staffing

	Forecasts		Build-Out Projection				Predesign Projection			
Position	Predesign	Build-Out	Dayton	Wheeler	Total	Increase	Dayton	Wheeler	Total	Increase
Management (Office)	3	3	1	3	4	1	1	3	4	1
Support Staff (Cube)	3	7	4	4	8	1	2	2	4	1
Operations (Cube)	16	26	0	26	26	0	0	16	16	0
Engineering (Cube)	18	26	16	12	28	2	10	8	18	0
Software (Cube)	6	10	0	10	10	0	0	6	6	0
Technician (Cube)	10	14	0	14	14	0	0	10	10	0
Public Inf. Officer (Cube)	3	5	2	3	5	0	2	2	4	1
TOTAL	59	91	23	72	95	4	15	47	62	3

Incident Type	2011 Actions by event type	Minutes per action	FTE
Administrative	961	30	0.24
Alarm	178	15	0.02
AMBER Alert	4	240	0.01
Bridge	767	60	0.38
Cable Barrier	18	180	0.03
*Collision	17,044	30	4.26
Construction	24,125	5	1.01
Dead Animal	473	5	0.02
*Debris	3,920	5	0.16
*Disabled vehicle	11,984	15	1.50
Emergency closure	43	120	0.04
Ferry	38	30	0.01
*Fire	188	45	0.07
Flammable Restriction	11	480	0.04
Hazmat	4	200	0.01
In Service	10,512	10	0.88
Incident	744	30	0.19
Maintenance	3,705	60	1.85
Out of Service	6,715	15	0.84
Pass Report	531	60	0.27
Rock Slide	45	960	0.36
Sand / Plowing / Deicing	325	120	0.33
Shift Change	2,148	30	0.54
Signals	2,967	60	1.48
Signs	262	180	0.39
Special Event	29	180	0.04
Trees	62	5	0.00
Vehicle fire	146	120	0.15
Water over Roadway	152	30	0.04
**Ramp Meter Activations (on and off)	127,000	5	5.29
Congestion messages	3,600	10	0.30
Planned roadway events	60	280	0.14
Total Actions (2011)	**218,761**		21
Average actions per day	**599**		
Average Actions per hour	**25**		

TCS Functions								
Note: Reference Predesign Report and Operation Duty Matrix in Masterplan Appendix for list of functions. Also previous VE study has list of general functions								
Current Agency Function	**L (Life Safety) R (Regulatory) A (Advisory)**	**Events**	**Metric**	**Operator time/event (minutes)**	**Mileage/ subsystem**	**Units**	**Annual Load (Hrs)**	**FTE**
Peak freeway operations	R/A	3.21	Per peak period	20	240	Miles	2226	1.11
Incident Management	A	2	Per peak period	15	180	Miles	1040	0.52
Web Page Update (ATIS)	A	2	Per peak period	10	1	Sites	693	0.35
DMS Messaging	A	0.5	Per peak period	1	380	Signs	6587	3.29
Traffic Busters (Video & Data Sharing)	R/A	1	Per peak period	30	10	Partners	300	0.15
Interagency Coordination	A	1	Per shift	30	10	Partners	300	0.15
Reversible Roadway Operations	R	2	Per shift	30	20	Miles	1200	0.60
Active Traffic Management	R	1	Per Shift	30	35	Miles	1050	0.53
Hard Shoulder Running	R	1	Per shift	30	50	MIles	1500	0.75
Ramp Metering	R	233	Per shift	2	233	Sites	1942	0.97
HOT Lanes/Tolling/Dynamic Pricing	R	1	Per Shift	30	65	Miles	125	0.06
IRT (Inc. Resp. Team)-FSP	A	80000	Per Year	8	240	Events	10667	5.33
Logging	A	220000	Per Year	4	240	Actions	14667	7.33
Maintenance Dispatching	A	4,446	Per Year	30	160	Trucks	2223	1.11
City Coordination Alaska Viaduct Recon.	A	720	Per Year	90	15	Future	1080	0.54
Alarm Monitoring (inc floating Bridge)	L	365	Per Year	120	4	Sites	2920	1.46
Emergency Contact (WSDOT & Interagency)	A	104	Per Year	30	10	Partners	520	0.26
Traffic Signal Control	R	1	Per shift	30	252	Intersections	7560	3.78
Traffic Busters (Video & Data Sharing)	R	5	Per Week	90	10	Partners	3900	1.95
Tunnel Management	L	2	Per Week	90	3	Sites	468	0.23
Media/Social Media	A	720	Per Year	30	1	Sites	360	0.18
Web Page Update (ATIS)	A	1	Per Year	90	1	Sites	3120	0.50
Media Press Meeting	A	10	Per Year	90	1	Meetings	31200	1.50
Major events not requiring EOC activation	A	6	Per Year	240	1	Activate	49920	2.50
								36

Wheeler Min		Construction Documents					4/20/2012
0	**Site SF**						
22,000	**Existing Building SF**						
	Area New Construction						
22,000	**Proposed Building SF**						
UNI NUM.	BUILDING COMPONENT	QTY	UNITS	UNIT COST	TOTAL COST	DIVISION COST/SF	DIVISION SUBTOTAL
A	SUBSTRUCTURE					**$0.00**	**$0**
10	FOUNDATIONS						
A1010	Foundation						
	Footing for Shear Walls		cy	550.00	0		
A1030	SLAB ON GRADE					$0.00	$0
	Slab on grade and base fill in		SF	15.00	0		
	Outside Slab for Chiller		SF	20.00	0		
	Sealer to slab on grade		SF	2.00	0		
	Exterior slab on grade - 4"		sf	12.00	0		
	Concrete Curb - reinforced (4"x6")		lf	23.00	0		
B	SHELL					**$27.34**	**$601,430**
10	SUPERSTRUCTURE						
B1010	FLOOR CONSTRUCTION					$27.34	$601,430
	Floor Framing	14670	SF	39.60	580,932		
	underlayment	9070	SF	2.26	20,498		
	1 1/2" Gyp crete topping		SF	2.80	0		
B1020	ROOF CONSTRUCTION					$0.00	$0
B2010	EXTERIOR WALLS					$0.00	$0
	Shear Walls						
	EXTERIOR GLAZING						
	Aluminum exterior windows		SF	50.00	0		
	EXTERIOR DOORS						
	Overhead coiling door, 3'-6" x 6'-0"		EA	1800.00	0		
30	ROOFING						
B3010	ROOF COVERING					$0.00	$0
C	INTERIORS					**$0.00**	
10	INTERIOR CONSTRUCTION						
C1010	INTERIOR PARTITIONS						
	Interior Partition framing @ IT Support		SF	3.20	0		
	Furring interior of exterior walls	8400	SF	5.75	48,300		
	Misc insulation (sound and thermal)	8400	SF	0.95	7,980		
	Gypsum board	8400	SF	2.25	18,900		
	TMC Control Booth -	5600	SF	35.00	196,000		
	Support and office (in min becomes IT)	9070	SF	30.00	272,100		
	IT and IT Support		SF	31.00	0		
	Finished area	3770	SF	0.00	0		
C1010	INTERIOR GLAZING						
	Interior glazing - TMC Control Booth	900	SF	50.00	45,000		
	Other Misc Glazing - office	14670	SF	4.27	62,600		
					0		
	Interior Doors	14670	SF	1.50	22,000		
					0		
	Casework	14670	SF	2.40	35,208		
	Control Rm Consoles - Brackets OFCI	1	ls	$2,500.00	2,500		
	Plywood Backboard @ Radio Equip	1,530	lf	$2.50	3,825		
	Finish Carpentry Allowance	14,670	gsf	$3.00	44,010		
	Toilet Accessories		bath	$2,000.00	0		
	Toilet Partitions		ea	$1,500.00	0		
	Interior Signage	32	ea	$75.00	2,400		
	Other Interior Signage - Restricted Access, etc	5	ea	$75.00	375		
	Wall & Corner Guards - Allowance	1	allow	$7,000.00	7,000		
	Ramps	2	ea	$10,000.00	20,000		
	Subtotal Interior Construction						
	Interior Finishes						

	Access Floor System	0	sf	$12.00	0		
	Polished Concrete		sf	$2.50	0		
	Sealed Concrete		sf	$1.00	0		
	Painted Partitions	14,670	sf	$1.20	17,604		
	Paint Doors & Frames	20	ea	$100.00	2,000		
	Perf Metal Acoustic Panels - Video Wall Allow 60% of Wall Area	1,132	sf	$35.00	39,627		
	Ceramic Tile Walls - Wet Walls FH		sf	$9.50	0		
					0		
	Misc Finishes	14,670	sf allow	$5.00	73,350		
	Subtotal Interior Finishes						
20	STAIRWAYS / ELEVATORS						
C2010	STAIR CONSTRUCTION					$0.00	$0
	Metal stairs		RSR	210.00	0		
	Landing, top metal stairs		SF	45.00	0		
	Railings		LF	122.00	0		
C2020	STAIR FINISHES						
	Painting at stair and rails		LF	10.00	0		
30	INTERIOR FINISHES						
C3010	INTERIOR WALL FINISHES					$0.67	$14,670
	Paint - interior	14670	SF	1.00	14,670		
	Ceramic Tile inc. @ ADA shower		SF	11.00	0		
	Miscellaneous wall finishes, allow		LS	2200.00	0		
C3020	INTERIOR FLOOR FINISHES					$4.33	$95,355
	Flooring - 1st Floor	14670	SF	6.50	95,355		
	Flooring - 2nd Floor		SF	6.50	0		
	Flooring - 3rd Floor		SF	6.50	0		
C3030	INTERIOR CEILING FINISHES					$12.00	$264,060
	Gypsum board ceilings, painted		SF	11.00	0		
	Suspended Ceiling - 1st Floor	14670	SF	18.00	264,060		
	Suspended Ceiling - 2nd Floor		SF	18.00	0		
	Suspended Ceiling - 3rd floor		SF	18.00	0		
D	SERVICES					**$0.00**	**$0**
10	**CONVEYING SYSTEMS**						
D1010	Elevator		ST		0	$0.00	$0
D	SERVICES - MECHANICAL					**$45.06**	**$991,293**
20	PLUMBING SYSTEMS						
D2010	PLUMBING					$7.34	$161,370
	Plumbing Connection	14670	SF	11.00	161,370		
	Plumbing Fixtures		EA	350.00	0		
	Distribution piping (not included above)						
	Domestic water piping; allow		LF	35.00	0		
	Waste and vent piping						
	Natural gas piping						
	NG Piping: 1" - 1.5"		LF	45.00	0		
	Equipment connections		EA	450.00	0		
	Test and flush		LS	1250.00	0		
30	HVAC SYSTEMS						
D3010	AIR SYSTEMS					$37.72	$829,923
	HVAC Equipment New	14,670	bldsf	$31.00	454,770		
	HVAC Piping New	14,670	bldsf	$2.30	33,741		
	HVAC Ductwork New	14,670	bldsf	$10.00	146,700		
	HVAC Equipment Reuse/Refurb	6,800	bldsf	$8.00	54,400		
	HVAC Piping Reuse/Refurb	6,800	bldsf	$0.82	5,576		
	HVAC Ductwork Reuse/Refurb	6,800	bldsf	$3.15	21,420		
	Controls	14,670	bldsf	$6.77	99,316		
	4,500 GAL Fuel Oil Tank - Incl Freight & Accessories		gal	$4.50	0		
	Fuel Oil Piping to Building - Material Cost		ls	$19,200	0		
	Labor to Set Tank, Install Piping, Trenching		ls	$14,784	0		
	Crane Time - Incl Travel, Set-up, Return		hrs	$2,500	0		
	City of Olympia Certification & Permit	1	allow	$11,500	11,500		
			SF	3.60	0		
	Test & Balance	1	LS	2500.00	2,500		
					0		
	Insulation; new & repair		LS	4000.00	0		
D4030	Fire Protection / Suppression		LS		0		
	Pre-Action System @ ITS Equip, Radio Rm., Control Rm & EOC	9,224	sf	$5.35	49,348		
	Wet System - Remainder of Building	5,446	sf	$4.50	24,507		
	Fire Pump	1	ls	$20,700.00	20,700		
	Fire extingisher and cabinet	12	ea	650.00	7,800		
D	SERVICES - ELECTRICAL					**$33.04**	**$726,955**

50	ELECTRICAL SYSTEMS						
D5010	ELECTRICAL SERVICE & DISTRIBUTION					$30.67	$674,705
	Fire Alarm Allowance	15,000	bldsf	$3.48	52,250		
x	Security Conduit	15,000	bldsf	$1.27	19,050		
x	Lighting incl. Control & Panel (reuse much of existing)	15,000	bldsf	$1.83	27,450		
x	Switchgear - Distribution (existing)		bldsf	$0.00	0		
x	Generator 900KW, Installed	900	KW	$275.00	247,500		
x	240 KVA UPS, Installed	240	KVA	$500.00	120,000		
x	TI Spaces - Lighting, Branch, Power, IT and TMC only	8,690	sf	$24.50	212,905		
	Radio System Internal Grounding	1	ls	$47,800.00	47,800		
x			EA	3200.00	0		
	Misc.						
	DEMO: Remove & Safe off elec. For partition demo.		SF	0.55	0		
			LS	650.00	0		
			LF	8.00	0		
			LF	8.00	0		
E	EQUIPMENT & FURNISHINGS					**$0.00**	**$0**
E10	EQUIPMENT						
E1020	INSTITUTIONAL EQUIPMENT					$0.00	$0
	Traffic Equipment		EA	410.00	0		
	Monitors/screens		EA	1350.00	0		
	004 Stainless Steel Drainboard		EA	4300.00	0		
	005 Handheld Sprayer		EA	350.00	0		
	006 Eyewash Station (in plumbing)		EA	3100.00	0		
	007 Metal Grating		SF	27.00	0		
	010 Extractor		EA	10295.00	0		
	013 4'x6' Dry Erase Board		EA	410.00	0		
	018 Compressed Air Drops		EA	600.00	0		
	019 Shop Sink (Mfg - not custom)		EA	1000.00	0		
	020 Shop Compressor		EA	1200.00	0		
	024 Mop Sink		EA	1500.00	0		
x	025 Mop Hanger		EA	175.00	0		
	026 Hanger Rod		LF	45.00	0		
	027 In Counter Lavatory		EA	1800.00	0		
	028 Wall Mounted Lavatory		EA	2500.00	0		
	029 Floor Mounted Toilet		EA	2000.00	0		
	030 Wall Mounted Toilet		EA	2000.00	0		
E20	FURNISHINGS						
E2010	FIXED FURNISHINGS					$0.00	$0
x			EA	240.00	0		
			EA	540.00	0		
			EA	150.00	0		
			LF	65.00	0		
	Reinstall						
x	Whiteboards / tack boards / chalkboards		EA	40.00	0		
x	Fire extinguishers		EA	20.00	0		
x	Salvage items		LF	55.00	0		
x			LF	50.00	0		
x			ea	300.00	0		
x			EA	40.00	0		
F	OTHER BUILDING CONSTRUCTION					**$0.00**	**$0**
F20	SELECTIVE DEMOLITION						
						$0.00	$0
	Site Demolition						
	Remove and salvage for re-use						
	Wheel stops		EA	22.00	0		
	Bollards		EA	55.00	0		
	Demolish and remove						
	AC paving for new sewer line		SF	4.00	0		
x	Concrete pad / sidewalks		SF	4.50	0		
x	Concrete drive apron		SF	4.50	0		
	Building Demolition						
	Remove and salvage for re-use						
x	Whiteboards / tack boards / chalkboards		EA	20.00	0		
x	Electronics - Computer and display		EA	100.00	0		
x	HVAC - Liebert		ea	500.00	0		
x			LF	26.00	0		
x			ea	250.00	0		
x			ea	150.00	0		
x			EA	15.00	0		
	Demolish and remove						
x	Window Demolition at Shear Wall Location		SF	5.00	0		
x							
x	HVAC		SF	3.75	0		
x	Interior Part. Walls - 1st floor		SF	0.65	0		
x	Interior Part. Walls - 2nd floor		SF	0.65	0		
x	Interior Part. Walls - 3rd floor		SF	0.65	0		

x	Interior Walls - 1st floor		SF	8.00	0		
x	Suspended Ceiling - 1st floor		SF	2.00	0		
x	Suspended Ceiling - 2nd floor		SF	2.00	0		
x	Suspended Ceiling - 3rd floor		SF	2.00	0		
x	Remove Flooring - 1st Floor		SF	0.95	0		
x	Remove Flooring - 2nd Floor		SF	0.95	0		
x	Remove Flooring - 3rd Floor		SF	0.95	0		
x	Single door and frame		EA	50.00	0		
x	Portion of partition		LS	100.00	0		
x	Casework		LF	3.42	0		
x	Interior window and frame		SF	7.00	0		
x	Structural slab - Drill hole		EA	110.00	0		
x							
x							
x							
x	Remove ceilings		SF	0.80	0		
x	Remove and reconfigure ceiling support structure to accommodate new partitions		LS	350.00	0		
x	Antenna stand (relocate)		EA	110.00	0		
	SUBTOTAL				**3,716,898**		
G	SITEWORK					**$0.00**	**$0**
G10	SITE PREPARATION						
G1020	SITE PREP					$0.00	$0
G1020	Site clearing		AC	5000.00	0		
G20	LANDSCAPING					$0.00	$0
			SF	0.00	0		
G30	SITE UTILITIES						
G3010	WATER SUPPLY & DISTRIBUTION				0	$0.00	$0
D4030	Domestic water service 4"		LF	25.00	0		
	Domestic water meter		LS	4000.00	0		
	SITEWORK					$0.00	$0
	Reinstall wheelstops		EA	22.00	0		
	Reinstall bollards		EA	210.00	0		
	AC paving at sewer line replacement		SF	5.00	0		
	Concrete mechanical pad		SF	15.00	0		
	Structural concrete slab @ North & South apron		SF	12.50	0		
G30	SITE CIVIL / MECHANICAL UTILITIES						
G3020	SANITARY SEWER					$0.00	$0
x	4" waste inc. street connection		LF	110.00	0		
G40	SITE ELECTRICAL UTILITIES						
G4010	SITE ELECTRICAL					$0.00	$0
x	New 600 Amp Main overhead feed		LF	75.00	0		
	CATV entrance		LF	5.00	0		
	Utility fee		LS	15000.00	0		
	Site Lighting		LS	16000.00	0		
	Site Lighting - bollards at Genset		EA	900.00	0		
	SUBTOTAL SITEWORK				**0**		
	SUBTOTAL BUILDING & SITEWORK				**3,716,898**		

Dayton Building renovate	Construction Documents					4/20/2012
0	**Site SF**					
18,591	**Existing Building SF**					
	Area New Construction					
18,591	**Proposed Building SF**					
UNI NUM.	BUILDING COMPONENT	QTY	UNITS	UNIT COST	TOTAL COST	DIVISION COST/SF	DIVISION SUBTOTAL
A	SUBSTRUCTURE					**$8.50**	**$158,000**
10	FOUNDATIONS						
A1010	Foundation						
	Footing for Shear Walls	280	cy	550.00	154,000		
A1030	SLAB ON GRADE					$0.22	$4,000
	Slab on grade and base fill in		SF	15.00	0		
	Outside Slab for Chiller	200	SF	20.00	4,000		
	Sealer to slab on grade		SF	2.00	0		
	Exterior slab on grade - 4"		sf	12.00	0		
	Concrete Curb - reinforced (4"x6")		lf	23.00	0		
B	SHELL					**$79.02**	**$1,468,980**
10	SUPERSTRUCTURE						
B1010	FLOOR CONSTRUCTION					$17.67	$328,500
	Floor reinforcement (Collectors)	1260	LF	225.00	283,500		
	5/8" underlayment		SF	2.26	0		
	1 1/2" Gyp crete topping		SF	2.80	0		
	Reinforce existing columns (Fiber wrap)	36	columns	1250.00	45,000		
B1020	ROOF CONSTRUCTION					$12.91	$240,000
	Roof structural improvements						
	Fill in roof framing						
					0		
					0		
	Connect existing Exterior Wall to new Shear Wall						
	Braces/Shoring	40	EA	150.00	6,000		
	Steel connectors	10000	LB	4.50	45,000		
	Labor	12600	sf	15.00	189,000		
			EA		0		
			LS		0		
	Roof Addition						
x	Roof structure at addition		SF	18.00	0		
	Batt insulation		SF	2.00	0		
B2010	EXTERIOR WALLS					$48.44	$900,480
	Shear Walls	12600					
	Concrete Shear Walls (reinforced) - 18"	12600	SF	44.00	554,400		
	Finish on Concrete Shear Wall	12600	SF	5.50	69,300		
	Interior Finish (@ removed windows) of shear Wall	4158	SF	10.00	41,580		
			EA	55.00	0		
	Allowance for architectural features at exterior at Shear Walls	11760	SF	20.00	235,200		
	Cladding at addition						
	Stud framing		SF	8.00	0		
x	Batt insulation		SF	1.50	0		
	Plywood sheathing		SF	5.20	0		
	Allowance for cladding		SF	20.00	0		
	EXTERIOR GLAZING						
	Aluminum exterior windows		SF	50.00	0		
	EXTERIOR DOORS						
	Overhead coiling door, 3'-6" x 6'-0"		EA	1800.00	0		
30	ROOFING						
B3010	ROOF COVERING					$0.00	$0
	Roofing at addition		SF	13.20	0		
	Three ply SBS roofing system, including insulation		SF	13.20	0		
	Sheet metal capping		LF	6.50	0		
	Galvanized flashings		LS	6200.00	0		
	Re-flash and set drains, Allowance		EA	225.00	0		
	Gutters		LF	23.50	0		
	Downspouts		EA	210.00	0		

C	INTERIORS					**$85.13**	**$1,582,581**
10	INTERIOR CONSTRUCTION						
C1010	INTERIOR PARTITIONS					$58.35	$1,084,853
	Interior Partition framing		SF	3.20	0		
	Furring interior of exterior walls (@ shear Wall)	10080	SF	5.75	57,960		
	Misc insulation (sound and thermal)	10080	SF	0.95	9,576		
	Gypsum board	10080	SF	2.25	22,680		
	TMC Control Booth -	5600	SF	38.00	212,800		
	Public	1670	SF	30.00	50,100		
	Office	3818	SF	31.00	118,358		
	Cooridor	650	SF	0.00	0		
C1010	INTERIOR GLAZING						
	Interior glazing - TMC Control Booth	900	SF	50.00	45,000		
	Other Misc Glazing - office	18575	SF	4.55	84,572		
					0		
	Interior Doors	18575	SF	1.78	33,000		
					0		
	Casework	14875	SF	2.47	36,720		
					0		
	Vanities	30	lf	$100.00	3,000		
	Control Rm Consoles - Brackets OFCI	1	ls	$2,500.00	2,500		
	Plywood Backboard @ Radio Equip	1,530	lf	$2.50	3,825		
	Wood Base	270	lf	$10.00	2,700		
	Finish Carpentry Allowance	18,600	gsf	$2.00	37,200		
	Toilet Accessories	2	bath	$2,000.00	4,000		
	Toilet Partitions	6	ea	$1,500.00	9,000		
	Interior Signage	32	rooms	$75.00	2,400		
	Other Interior Signage - Restricted Access, etc	5	ea	$75.00	375		
	Wall & Corner Guards - Allowance	1	allow	$7,000.00	7,000		
	Create Hallways within Dayton Building 229, 230	2	ea	$10,000.00	20,000		
	Subtotal Interior Construction						
	Interior Finishes						
	Access Floor System	0	sf	$12.00	0		
	Tile Flooring - Restrooms	668	sf	$11.00	7,348		
	Ceramic Tile Base	211	lf	$13.00	2,743		
	Polished Concrete		sf	$2.50	0		
	Sealed Concrete	5,600	sf	$1.00	5,600		
	Painted Partitions	34,645	sf	$0.80	27,716		
	Paint Doors & Frames	30	ea	$100.00	3,000		
	Perf Metal Acoustic Panels - Video Wall Allow 60% of Wall Area	1,132	sf	$35.00	39,627		
	Ceramic Tile Walls - Wet Walls FH	650	sf	$9.50	6,175		
	Suspended Acoustical Ceiling	9,522	sf	$4.00	38,088		
	"Open to Structure" - Painted	3,860	sf	$1.50	5,790		
	Restore Finishes to match existing Dayton Building	18,600	sf allow	$10.00	186,000		
	Subtotal Interior Finishes						
20	STAIRWAYS / ELEVATORS						
C2010	STAIR CONSTRUCTION					$0.00	$0
	Metal stairs		RSR	210.00	0		
	Landing, top metal stairs		SF	45.00	0		
	Railings		LF	122.00	0		
C2020	STAIR FINISHES						
	Painting at stair and rails		LF	10.00	0		
30	INTERIOR FINISHES						
C3010	INTERIOR WALL FINISHES					$0.90	$16,740
	Paint - interior	18600	SF	0.90	16,740		
	Ceramic Tile inc. @ ADA shower		SF	11.00	0		
	Miscellaneous wall finishes, allow		LS	2200.00	0		
C3020	INTERIOR FLOOR FINISHES					$6.49	$120,738
	Flooring - 1st Floor	3700	SF	6.50	24,050		
	Flooring - 2nd Floor	11375	SF	6.50	73,938		
	Flooring - 3rd Floor	3500	SF	6.50	22,750		
C3030	INTERIOR CEILING FINISHES					$19.38	$360,250
	Gypsum board ceilings, painted		SF	11.00	0		
	Suspended Ceiling - 1st Floor	1500	SF	22.00	33,000		
	Suspended Ceiling - 2nd Floor	11375	SF	22.00	250,250		
	Suspended Ceiling - 3rd floor	3500	SF	22.00	77,000		
D	SERVICES					**$0.00**	**$0**
10	**CONVEYING SYSTEMS**						
D1010	Elevator		ST		0	$0.00	$0

D	SERVICES - MECHANICAL					**$35.42**	**$658,501**
20	PLUMBING SYSTEMS						
D2010	PLUMBING					$0.00	$0
	Plumbing Connection		EA	920.00	0		
	Plumbing Fixtures		EA	350.00	0		
	Distribution piping (not included above)						
	Domestic water piping; allow		LF	35.00	0		
	Waste and vent piping						
	Natural gas piping						
	NG Piping: 1" - 1.5"		LF	45.00	0		
	Equipment connections		EA	450.00	0		
	Test and flush		LS	1250.00	0		
30	HVAC SYSTEMS						
D3010	AIR SYSTEMS					$35.42	$658,501
	HVAC Equipment New	11,392	bldsf	$30.00	341,760		
	HVAC Piping New	11,392	bldsf	$2.20	25,062		
	HVAC Ductwork New	11,392	bldsf	$9.99	113,826		
	HVAC Equipment Reuse/Refurb	8,690	bldsf	$8.00	69,520		
	HVAC Piping Reuse/Refurb	8,690	bldsf	$0.82	7,126		
	HVAC Ductwork Reuse/Refurb	8,690	bldsf	$3.15	27,374		
	Controls	0	bldsf	$6.77	0		
	4,500 GAL Fuel Oil Tank - Incl Freight & Accessories	4,500	gal	$4.50	20,250		
	Fuel Oil Piping to Building - Material Cost	1	ls	$19,200	19,200		
	Labor to Set Tank, Install Piping, Trenching	1	ls	$14,784	14,784		
	Crane Time - Incl Travel, Set-up, Return	7	hrs	$800	5,600		
	City of Shoreline Certification & Permit	1	allow	$11,500	11,500		
			SF	3.60	0		
	Test & Balance	1	LS	2500.00	2,500		
					0		
	Insulation; new & repair		LS	4000.00	0		
D4030	Fire Protection / Suppression		LS		0		
	Pre-Action System @ ITS Equip, Radio Rm., Control Rm & EOC	9,224	sf	$5.35	49,348		
	Wet System - Remainder of Building	60,000	sf	$4.50	270,000		
	Fire Pump	1	ls	$20,700.00	20,700		
	Fire extingisher and cabinet	12	ea	650.00	7,800		
D	SERVICES - ELECTRICAL					**$44.67**	**$830,405**
50	ELECTRICAL SYSTEMS						
D5010	ELECTRICAL SERVICE & DISTRIBUTION					$35.79	$665,405
	Fire Alarm Allowance	60,000	bldsf	$2.75	165,000		$51,150
x	Security Conduit	0	bldsf	$1.00	0		$91,540
x	Lighting incl. Control & Panel (reuse much of existing)	18,600	bldsf	$1.45	26,970		
x	Switchgear - Distribution (existing)	0	bldsf	$0.00	0		
x	Generator 900KW, Installed	900	KW	$275.00	247,500		
x	240 KVA UPS, Installed	240	KVA	$500.00	120,000		
x	TI Spaces - Lighting, Branch, Power, IT and TMC only	8,690	sf	$24.50	212,905		
	Radio System Internal Grounding	1	ls	$47,800.00	47,800		
x			EA	3200.00	0		
	Misc.						
	DEMO: Remove & Safe off elec. For partition demo.	18600	SF	0.55	10,230		
			LS	650.00	0		
			LF	8.00	0		
			LF	8.00	0		
E	EQUIPMENT & FURNISHINGS					**$0.00**	**$0**
E10	EQUIPMENT						
E1020	INSTITUTIONAL EQUIPMENT					$0.00	$0
	Traffic Equipment		EA	410.00	0		
	Monitors/screens		EA	1350.00	0		
	004 Stainless Steel Drainboard		EA	4300.00	0		
	005 Handheld Sprayer		EA	350.00	0		
	006 Eyewash Station (in plumbing)		EA	3100.00	0		
	007 Metal Grating		SF	27.00	0		
	010 Extractor		EA	10295.00	0		
	013 4'x6' Dry Erase Board		EA	410.00	0		
	018 Compressed Air Drops		EA	600.00	0		
	019 Shop Sink (Mfg - not custom)		EA	1000.00	0		
	020 Shop Compressor		EA	1200.00	0		
	024 Mop Sink		EA	1500.00	0		
x	025 Mop Hanger		EA	175.00	0		
	026 Hanger Rod		LF	45.00	0		
	027 In Counter Lavatory		EA	1800.00	0		
	028 Wall Mounted Lavatory		EA	2500.00	0		
	029 Floor Mounted Toilet		EA	2000.00	0		
	030 Wall Mounted Toilet		EA	2000.00	0		
E20	FURNISHINGS						
E2010	FIXED FURNISHINGS					$0.00	$0
x			EA	240.00	0		

			EA	540.00	0		
			EA	150.00	0		
			LF	65.00	0		
	Reinstall						
x	Whiteboards / tack boards / chalkboards		EA	40.00	0		
x	Fire extinguishers		EA	20.00	0		
x	Salvage items		LF	55.00	0		
x			LF	50.00	0		
x			ea	300.00	0		
x			EA	40.00	0		
F	OTHER BUILDING CONSTRUCTION					**$10.80**	**$200,700**
F20	SELECTIVE DEMOLITION						
						$10.80	$200,700
	Site Demolition						
	Remove and salvage for re-use						
	Wheel stops		EA	22.00	0		
	Bollards		EA	55.00	0		
	Demolish and remove						
	AC paving for new sewer line		SF	4.00	0		
x	Concrete pad / sidewalks		SF	4.50	0		
x	Concrete drive apron		SF	4.50	0		
	Building Demolition						
	Remove and salvage for re-use						
x	Whiteboards / tack boards / chalkboards		EA	20.00	0		
x	Electronics - Computer and display	20	EA	100.00	2,000		
x	HVAC - Liebert	1	ea	500.00	500		
x			LF	26.00	0		
x			ea	250.00	0		
x			ea	150.00	0		
x			EA	15.00	0		
	Demolish and remove						
x	Window Demolition at Shear Wall Location	4158	SF	5.00	20,790		
x							
x	HVAC	19000	SF	3.75	71,250		
x	Interior Part. Walls - 1st floor	0	SF	0.65	0		
x	Interior Part. Walls - 2nd floor	11375	SF	0.65	7,394		
x	Interior Part. Walls - 3rd floor	3500	SF	0.65	2,275		
x	Interior Walls - 1st floor	3800	SF	8.00	30,400		
x	Suspended Ceiling - 1st floor	3800	SF	2.00	7,600		
x	Suspended Ceiling - 2nd floor	11375	SF	2.00	22,750		
x	Suspended Ceiling - 3rd floor	3500	SF	2.00	7,000		
x	Remove Flooring - 1st Floor	3800	SF	0.95	3,610		
x	Remove Flooring - 2nd Floor	11375	SF	0.95	10,806		
x	Remove Flooring - 3rd Floor	3500	SF	0.95	3,325		
x	Single door and frame		EA	50.00	0		
x	Portion of partition		LS	100.00	0		
x	Casework		LF	3.42	0		
x	Interior window and frame		SF	7.00	0		
x	Structural slab - Drill hole	100	EA	110.00	11,000		
x							
x							
x							
x	Remove ceilings		SF	0.80	0		
x	Remove and reconfigure ceiling support structure to accommodate new partitions		LS	350.00	0		
x	Antenna stand (relocate)		EA	110.00	0		
	SUBTOTAL				**5,247,015**		
G	SITEWORK					**$0.00**	**$0**
G10	SITE PREPARATION						
G1020	SITE PREP					$0.00	$0
G1020	Site clearing		AC	5000.00	0		
G20	LANDSCAPING					$0.00	$0
			SF	0.00	0		
G30	SITE UTILITIES						
G3010	WATER SUPPLY & DISTRIBUTION				0	$0.00	$0
D4030	Domestic water service 4"		LF	25.00	0		
	Domestic water meter		LS	4000.00	0		
	SITEWORK					$0.00	$0
	Reinstall wheelstops		EA	22.00	0		
	Reinstall bollards		EA	210.00	0		
	AC paving at sewer line replacement		SF	5.00	0		
	Concrete mechanical pad		SF	15.00	0		
	Structural concrete slab @ North & South apron		SF	12.50	0		
G30	SITE CIVIL / MECHANICAL UTILITIES						
G3020	SANITARY SEWER					$0.00	$0
x	4" waste inc. street connection		LF	110.00	0		
G40	SITE ELECTRICAL UTILITIES						
G4010	SITE ELECTRICAL					$0.00	$0

x	New 600 Amp Main overhead feed		LF	75.00	0		
	CATV entrance		LF	5.00	0		
	Utility fee		LS	15000.00	0		
	Site Lighting		LS	16000.00	0		
	Site Lighting - bollards at Genset		EA	900.00	0		
	SUBTOTAL SITEWORK				**0**		
	SUBTOTAL BUILDING & SITEWORK				**5,247,015**		

Dayton Building renovate Min. 1st and 2nd floor	Construction Documents					4/20/2012
0	**Site SF**					
15,091	**Existing Building SF**					
0	**Area New Construction**					
15,091	**Proposed Building SF**					
UNI NUM.	BUILDING COMPONENT	QTY	UNITS	UNIT COST	TOTAL COST	DIVISION COST/SF	DIVISION SUBTOTAL
A	SUBSTRUCTURE					**$10.47**	**$158,000**
10	FOUNDATIONS						
A1010	Foundation						
	Footing for Shear Walls	280	cy	550.00	154,000		
A1030	SLAB ON GRADE					$0.27	$4,000
	Slab on grade and base fill in		SF	15.00	0		
	Outside Slab for Chiller	200	SF	20.00	4,000		
	Sealer to slab on grade		SF	2.00	0		
	Exterior slab on grade - 4"		sf	12.00	0		
	Concrete Curb - reinforced (4"x6")		lf	23.00	0		
B	SHELL					**$70.68**	**$1,066,679**
10	SUPERSTRUCTURE						
B1010	FLOOR CONSTRUCTION					$20.77	$313,500
	Floor reinforcement (Collectors)	1260	LF	225.00	283,500		
	5/8" underlayment		SF	2.26	0		
	1 1/2" Gyp crete topping		SF	2.80	0		
	Reinforce existing columns (Fiber wrap)	24	columns	1250.00	30,000		
B1020	ROOF CONSTRUCTION					$9.15	$138,075
	Roof structural improvements						
	Fill in roof framing						
					0		
					0		
	Connect existing Exterior Wall to new Shear Wall						
	Braces/Shoring	30	EA	150.00	4,500		
	Steel connectors	750	LB	4.50	3,375		
	Labor	8680	sf	15.00	130,200		
			EA		0		
			LS		0		
	Roof Addition						
x	Roof structure at addition		SF	18.00	0		
	Batt insulation		SF	2.00	0		
B2010	EXTERIOR WALLS					$40.76	$615,104
	Shear Walls	8680					
	Concrete Shear Walls (reinforced) - 18"	8680	SF	44.00	381,920		
	Finish on Concrete Shear Wall	8680	SF	5.50	47,740		
	Interior Finish (@ removed windows) of shear Wall	2864.4	SF	10.00	28,644		
			EA	55.00	0		
	Allowance for architectural features at exterior at Shear Walls	7840	SF	20.00	156,800		
	Cladding at addition						
	Stud framing		SF	8.00	0		
x	Batt insulation		SF	1.50	0		
	Plywood sheathing		SF	5.20	0		
	Allowance for cladding		SF	20.00	0		
	EXTERIOR GLAZING						
	Aluminum exterior windows		SF	50.00	0		
	EXTERIOR DOORS						
	Overhead coiling door, 3'-6" x 6'-0"		EA	1800.00	0		
30	ROOFING						
B3010	ROOF COVERING					$0.00	$0
	Roofing at addition		SF	13.20	0		
	Three ply SBS roofing system, including insulation		SF	13.20	0		
	Sheet metal capping		LF	6.50	0		
	Galvanized flashings		LS	6200.00	0		
	Re-flash and set drains, Allowance		EA	225.00	0		
	Gutters		LF	23.50	0		
	Downspouts		EA	210.00	0		

C	INTERIORS					**$93.92**	**$1,417,319**
10	INTERIOR CONSTRUCTION						
C1010	INTERIOR PARTITIONS					$61.04	$921,079
	Interior Partition framing		SF	3.20	0		
	Furring interior of exterior walls (@ shear Wall)	6720	SF	5.75	38,640		
	Misc insulation (sound and thermal)	6720	SF	0.95	6,384		
	Gypsum board	6720	SF	2.25	15,120		
	TMC Control Booth -	5600	SF	38.00	212,800		
	Public	1670	SF	30.00	50,100		
	Office	3818	SF	31.00	118,358		
	Cooridor	650	SF	0.00	0		
C1010	INTERIOR GLAZING						
	Interior glazing - TMC Control Booth	900	SF	50.00	45,000		
	Other Misc Glazing - office	11375	SF	1.83	20,869		
					0		
	Interior Doors	11375	SF	1.93	22,000		
					0		
	Casework	11375	SF	2.89	32,900		
					0		
	Interior Construction						
	Vanities		lf	$100.00	0		
	Control Rm Consoles - Brackets OFCI	1	ls	$2,500.00	2,500		
	Plywood Backboard @ Radio Equip	1,530	lf	$2.50	3,825		
	Wood Base	270	lf	$10.00	2,700		
	Finish Carpentry Allowance	19,776	gsf	$2.00	39,552		
	Toilet Accessories		bath	$2,000.00	0		
	Toilet Partitions		ea	$1,500.00	0		
	Interior Signage	32	rooms	$75.00	2,400		
	Other Interior Signage - Restricted Access, etc	5	ea	$75.00	375		
	Wall & Corner Guards - Allowance	1	allow	$7,000.00	7,000		
	Create Hallways within Dayton Building 229, 230	2	ea	$10,000.00	20,000		
	Subtotal Interior Construction						
	Interior Finishes						
	Access Floor System	0	sf	$12.00	0		
	Tile Flooring - Restrooms		sf	$11.00	0		
	Ceramic Tile Base		lf	$13.00	0		
	Polished Concrete		sf	$2.50	0		
	Sealed Concrete	5,600	sf	$1.00	5,600		
	Painted Partitions	34,645	sf	$0.80	27,716		
	Paint Doors & Frames	20	ea	$100.00	2,000		
	Perf Metal Acoustic Panels - Video Wall Allow 60% of Wall Area	1,132	sf	$35.00	39,627		
	Ceramic Tile Walls - Wet Walls FH	650	sf	$9.50	6,175		
	Suspended Acoustical Ceiling	9,522	sf	$4.00	38,088		
	"Open to Structure" - Painted	3,860	sf	$1.50	5,790		
	Restore Finishes to match existing Dayton Building	15,556	sf allow	$10.00	155,560		
	Subtotal Interior Finishes						
20	STAIRWAYS / ELEVATORS						
C2010	STAIR CONSTRUCTION					$0.00	$0
	Metal stairs		RSR	210.00	0		
	Landing, top metal stairs		SF	45.00	0		
	Railings		LF	122.00	0		
C2020	STAIR FINISHES						
	Painting at stair and rails		LF	10.00	0		
30	INTERIOR FINISHES						
C3010	INTERIOR WALL FINISHES					$1.11	$16,740
	Paint - interior	18600	SF	0.90	16,740		
	Ceramic Tile inc. @ ADA shower		SF	11.00	0		
	Miscellaneous wall finishes, allow		LS	2200.00	0		
C3020	INTERIOR FLOOR FINISHES					$8.01	$120,900
	Flooring - 1st Floor	3800	SF	6.50	24,700		
	Flooring - 2nd Floor	7400	SF	6.50	48,100		
	Flooring - 3rd Floor	7400	SF	6.50	48,100		
C3030	INTERIOR CEILING FINISHES					$23.76	$358,600
	Gypsum board ceilings, painted		SF	11.00	0		
	Suspended Ceiling - 1st Floor	1500	SF	22.00	33,000		
	Suspended Ceiling - 2nd Floor	7400	SF	22.00	162,800		
	Suspended Ceiling - 3rd floor	7400	SF	22.00	162,800		
D	SERVICES					**$0.00**	**$0**
10	**CONVEYING SYSTEMS**						

D1010	Elevator		ST		0	$0.00	$0
D	SERVICES - MECHANICAL					**$43.64**	**$658,501**
20	PLUMBING SYSTEMS						
D2010	PLUMBING					$0.00	$0
	Plumbing Connection		EA	920.00	0		
	Plumbing Fixtures		EA	350.00	0		
	Distribution piping (not included above)						
	Domestic water piping; allow		LF	35.00	0		
	Waste and vent piping						
	Natural gas piping						
	NG Piping: 1" - 1.5"		LF	45.00	0		
	Equipment connections		EA	450.00	0		
	Test and flush		LS	1250.00	0		
30	HVAC SYSTEMS						
D3010	AIR SYSTEMS					$43.64	$658,501
	HVAC Equipment New	11,392	bldsf	$30.00	341,760		
	HVAC Piping New	11,392	bldsf	$2.20	25,062		
	HVAC Ductwork New	11,392	bldsf	$9.99	113,826		
	HVAC Equipment Reuse/Refurb	8,690	bldsf	$8.00	69,520		
	HVAC Piping Reuse/Refurb	8,690	bldsf	$0.82	7,126		
	HVAC Ductwork Reuse/Refurb	8,690	bldsf	$3.15	27,374		
	Controls	0	bldsf	$6.77	0		
	4,500 GAL Fuel Oil Tank - Incl Freight & Accessories	4,500	gal	$4.50	20,250		
	Fuel Oil Piping to Building - Material Cost	1	ls	$19,200	19,200		
	Labor to Set Tank, Install Piping, Trenching	1	ls	$14,784	14,784		
	Crane Time - Incl Travel, Set-up, Return	7	hrs	$800	5,600		
	City of Shoreline Certification & Permit	1	allow	$11,500	11,500		
			SF	3.60	0		
	Test & Balance	1	LS	2500.00	2,500		
					0		
	Insulation; new & repair		LS	4000.00	0		
D4030	Fire Protection / Suppression		LS		0		
	Pre-Action System @ ITS Equip, Radio Rm., Control Rm & EOC	9,224	sf	$5.35	49,348		
	Wet System - Remainder of Building	40,000	sf	$4.50	180,000		
	Fire Pump	1	ls	$20,700.00	20,700		
	Fire extingisher and cabinet	12	ea	650.00	7,800		
D	SERVICES - ELECTRICAL					**$50.92**	**$768,405**
50	ELECTRICAL SYSTEMS						
D5010	ELECTRICAL SERVICE & DISTRIBUTION					$43.63	$658,405
	Fire Alarm Allowance	40,000	bldsf	$2.75	110,000		
x	Security Conduit	0	bldsf	$1.00	0		
x	Lighting incl. Control & Panel (reuse much of existing)	15,100	bldsf	$1.45	21,895		
x	Switchgear - Distribution (existing)	0	bldsf	$0.00	0		
x	Generator 900KW, Installed	900	KW	$275.00	247,500		
x	240 KVA UPS, Installed	240	KVA	$500.00	120,000		
x	TI Spaces - Lighting, Branch, Power, IT and TMC only	8,690	sf	$24.50	212,905		
	Radio System Internal Grounding	1	ls	$47,800.00	47,800		
x			EA	3200.00	0		
	Misc.						
	DEMO: Remove & Safe off elec. For partition demo.	15100	SF	0.55	8,305		
			LS	650.00	0		
			LF	8.00	0		
			LF	8.00	0		
E	EQUIPMENT & FURNISHINGS					**$0.00**	**$0**
E10	EQUIPMENT						
E1020	INSTITUTIONAL EQUIPMENT					$0.00	$0
	Traffic Equipment		EA	410.00	0		
	Monitors/screens		EA	1350.00	0		
	004 Stainless Steel Drainboard		EA	4300.00	0		
	005 Handheld Sprayer		EA	350.00	0		
	006 Eyewash Station (in plumbing)		EA	3100.00	0		
	007 Metal Grating		SF	27.00	0		
	010 Extractor		EA	10295.00	0		
	013 4'x6' Dry Erase Board		EA	410.00	0		
	018 Compressed Air Drops		EA	600.00	0		
	019 Shop Sink (Mfg - not custom)		EA	1000.00	0		
	020 Shop Compressor		EA	1200.00	0		
	024 Mop Sink		EA	1500.00	0		
x	025 Mop Hanger		EA	175.00	0		
	026 Hanger Rod		LF	45.00	0		
	027 In Counter Lavatory		EA	1800.00	0		
	028 Wall Mounted Lavatory		EA	2500.00	0		
	029 Floor Mounted Toilet		EA	2000.00	0		
	030 Wall Mounted Toilet		EA	2000.00	0		

E20	FURNISHINGS						
E2010	FIXED FURNISHINGS					$0.00	$0
x			EA	240.00	0		
			EA	540.00	0		
			EA	150.00	0		
			LF	65.00	0		
	Reinstall						
x	Whiteboards / tack boards / chalkboards		EA	40.00	0		
x	Fire extinguishers		EA	20.00	0		
x	Salvage items		LF	55.00	0		
x			LF	50.00	0		
x			ea	300.00	0		
x			EA	40.00	0		
F	OTHER BUILDING CONSTRUCTION					**$11.47**	**$173,100**
F20	SELECTIVE DEMOLITION						
						$11.47	$173,100
	Site Demolition						
	Remove and salvage for re-use						
	Wheel stops		EA	22.00	0		
	Bollards		EA	55.00	0		
	Demolish and remove						
	AC paving for new sewer line		SF	4.00	0		
x	Concrete pad / sidewalks		SF	4.50	0		
x	Concrete drive apron		SF	4.50	0		
	Building Demolition						
	Remove and salvage for re-use						
x	Whiteboards / tack boards / chalkboards		EA	20.00	0		
x	Electronics - Computer and display	20	EA	100.00	2,000		
x	HVAC - Liebert	1	ea	500.00	500		
x			LF	26.00	0		
x			ea	250.00	0		
x			ea	150.00	0		
x			EA	15.00	0		
	Demolish and remove						
x	Window Demolition at Shear Wall Location	4158	SF	5.00	20,790		
x							
x	HVAC	15000	SF	3.75	56,250		
x	Interior Part. Walls - 1st floor	0	SF	0.65	0		
x	Interior Part. Walls - 2nd floor	11375	SF	0.65	7,394		
x	Interior Part. Walls - 3rd floor		SF	0.65	0		
x	Interior Walls - 1st floor	3800	SF	8.00	30,400		
x	Suspended Ceiling - 1st floor	3800	SF	2.00	7,600		
x	Suspended Ceiling - 2nd floor	11375	SF	2.00	22,750		
x	Suspended Ceiling - 3rd floor		SF	2.00	0		
x	Remove Flooring - 1st Floor	3800	SF	0.95	3,610		
x	Remove Flooring - 2nd Floor	11375	SF	0.95	10,806		
x	Remove Flooring - 3rd Floor		SF	0.95	0		
x	Single door and frame		EA	50.00	0		
x	Portion of partition		LS	100.00	0		
x	Casework		LF	3.42	0		
x	Interior window and frame		SF	7.00	0		
x	Structural slab - Drill hole	100	EA	110.00	11,000		
x							
x							
x							
x	Remove ceilings		SF	0.80	0		
x	Remove and reconfigure ceiling support structure to accommodate new partitions		LS	350.00	0		
x	Antenna stand (relocate)		EA	110.00	0		
	SUBTOTAL				**4,499,853**		
G	SITEWORK					**$0.00**	**$0**
G10	SITE PREPARATION						
G1020	SITE PREP					$0.00	$0
G1020	Site clearing		AC	5000.00	0		
G20	LANDSCAPING					$0.00	$0
			SF	0.00	0		
G30	SITE UTILITIES						
G3010	WATER SUPPLY & DISTRIBUTION				0	$0.00	$0
D4030	Domestic water service 4"		LF	25.00	0		
	Domestic water meter		LS	4000.00	0		
	SITEWORK					$0.00	$0
	Reinstall wheelstops		EA	22.00	0		
	Reinstall bollards		EA	210.00	0		
	AC paving at sewer line replacement		SF	5.00	0		
	Concrete mechanical pad		SF	15.00	0		
	Structural concrete slab @ North & South apron		SF	12.50	0		
G30	SITE CIVIL / MECHANICAL UTILITIES						
G3020	SANITARY SEWER					$0.00	$0

x	4" waste inc. street connection		LF	110.00	0		
G40	SITE ELECTRICAL UTILITIES						
G4010	SITE ELECTRICAL					$0.00	$0
x	New 600 Amp Main overhead feed		LF	75.00	0		
	CATV entrance		LF	5.00	0		
	Utility fee		LS	15000.00	0		
	Site Lighting		LS	16000.00	0		
	Site Lighting - bollards at Genset		EA	900.00	0		
	SUBTOTAL SITEWORK				**0**		
	SUBTOTAL BUILDING & SITEWORK				**4,499,853**		

SIGN-UP SHEET

DATE: 4-17-2012

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MENG ANALYSIS

SIGN-UP SHEET

DATE: 4-17-2012

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SIGN-UP SHEET

DATE: 4-17-2012

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Workshop Notes

Dayton New:

Increase control room size

Only include control room, EOC, and ITS in new building
- Standalone
- Addition w/helmet

Decrease observation room – 400sf
Simplify shape
More passive- less generator
Less expensive envelope
Collocate conf and EOC
EOC in Dayton
No public restroom
Rectangular control room

Control Traffic

Separate tunnel controls (not in control room)
Separate signal control (eg consolidate w/ Seattle, King County, Bellevue)
Increase signal monitor/operations
Outsource entire TMC
- Privatize
- City/county

Increase automation
Integrate existing systems around common database (can consolidate equipment and staff)
Mobile workstations, especially EOC applications
Outsource ATIS
Media access outside TMC
Split some geography (Bellingham, Tacoma-Olympic)
Add geography (Bellingham)

Dayton Remodel

Keep radio in Dayton
Cut part of upper floors to increase height for viewing
Only remodel essential space (IT, control)
Reduce viewing area

Wheeler

Lease fiber
Lease temp. Add fiber as freeways develop over time
Full fiber
Revise security envelope for better access
Locate only ITS in Wheeler. Control stays in Shoreline
Develop Wheeler as backup- IP datacenter approach

COMPONENT LIFE CYCLE COST ANALYSIS (LCCA)

Project: predesign
Client:
Date:
By: egm
COMPONENT predesign
COMPONENT # predesign
Escalation rate 0.03
Discount rate 0.05
Study Period 20 Yrs.

Instructions: Enter escalation, discount, and study period above.
Enter annual costs, replacement costs (and appropriate replacement year), and salvage value.
Enter these costs in the shaded cells using today's (current) dollars. For annual costs, escalation rates will be automatically entered, but can be individually overwritten below for differential escalation.
All costs will automatically be escalated and discounted.

ALT A :	Predesign			ALTERNATIVE B:				DIFFERENCE
INITIAL COSTS			INITIAL COST $ 20,000,000				INITIAL COST	DIFFERENCE $ 20,000,000
O & M ANNUAL COSTS								
Subcomponents	**Cost in current $**	**Esc.**	**Pres. Worth $**	**Subcomponents**	**Cost in current $**	**Esc.**	**Pres. Worth $**	
Utilities	$ 41,580	0.03	$ 683,730			0.030	$ -	**$ 683,730**
Custodial	$ 22,000	0.03	$ 361,762			0.030	$ -	**$ 361,762**
Maintenance	$ 55,000	0.03	$ 904,405			0.030	$ -	**$ 904,405**
Security	$ 5,500	0.03	$ 90,440			0.030	$ -	**$ 90,440**
Landscaping and Ground Maintena	$ 11,000	0.03	$ 180,881			0.030	$ -	**$ 180,881**
Management Fees	$ 16,500	0.03	$ 271,321			0.030	$ -	**$ 271,321**
Telephone	$ 7,920	0.03	$ 130,234			0.030	$ -	**$ 130,234**
Data Processing	$ 3,520	0.03	$ 57,882			0.030	$ -	**$ 57,882**
SUBT. O & M OVER LIFE CYCLE	**$ 163,020**		**$ 2,680,656**		-		**$ -**	**$ 2,680,656**
REPLACEMENT and CYCLICAL COSTS								
Subcomponents	**Cost in current $**	**Yr.**	**Pres. Worth $**	**Subcomponents**	**Cost in current $**	**Yr.**	**Pres. Worth $**	
			$ -				$ -	**$ -**
			$ -				$ -	**$ -**
			$ -				$ -	**$ -**
			$ -				$ -	**$ -**
			$ -				$ -	**$ -**
			$ -				$ -	**$ -**
			$ -				$ -	**$ -**
			$ -				$ -	**$ -**
			$ -				$ -	**$ -**
SUBT. REPLACEMENT			**$ -**				**$ -**	**$ -**
TOT. O & M & REPL. (Pres. Worth)			**$ 2,680,656**				**$ -**	**$ 2,680,656**
TOT. INITIAL, O&M, & REPL. (Pres. Worth)			**$ 22,680,656**				**$ -**	**$ 22,680,656**
	Cost in current $				**Cost in current $**			
SALVAGE VALUE		20	$ -			20	$ -	**$ -**
TOT. INITIAL, O&M, REPL. MINUS SALVAGE			**$ 22,680,656**				**$ -**	**$ 22,680,656**

COMPONENT LIFE CYCLE COST ANALYSIS (LCCA)

Project: **1a and 1b**
Client:
Date:
By: egm
COMPONENT
COMPONENT # 1a and 1b
Escalation rate 0.03
Discount rate 0.05
Study Period 20 Yrs.

Instructions: Enter escalation, discount, and study period above.
Enter annual costs, replacement costs (and appropriate replacement year), and salvage value.
Enter these costs in the shaded cells using today's (current) dollars. For annual costs, escalation rates will be automatically entered, but can be individually overwritten below for differential escalation.
All costs will automatically be escalated and discounted.

ALT A :	1a			ALT B:	1b			DIFFERENCE
INITIAL COSTS			**INITIAL COST $ 18,300,000**				**INITIAL COST**	**DIFFERENCE $ 18,300,000**
O & M ANNUAL COSTS								
Subcomponents	**Cost in current $**	**Esc.**	**Pres. Worth $**	**Subcomponents**	**Cost in current $**	**Esc.**	**Pres. Worth $**	
Utilities	$ 37,800	0.03	$ 621,573		35,910.00	0.030	$ 590,494	**$ 31,079**
Custodial	$ 20,000	0.03	$ 328,875		19,000	0.030	$ 312,431	**$ 16,444**
Maintenance	$ 50,000	0.03	$ 822,186		47,500	0.030	$ 781,077	**$ 41,109**
Security	$ 5,000	0.03	$ 82,219		4,750	0.030	$ 78,108	**$ 4,111**
Landscaping and Ground Maintena	$ 10,000	0.03	$ 164,437		9,500	0.030	$ 156,215	**$ 8,222**
Management Fees	$ 15,000	0.03	$ 246,656		14,250	0.030	$ 234,323	**$ 12,333**
Telephone	$ 7,200	0.03	$ 118,395		6,840	0.030	$ 112,475	**$ 5,920**
Data Processing	$ 3,200	0.03	$ 52,620		3,040	0.030	$ 49,989	**$ 2,631**
SUBT. O & M OVER LIFE CYCLE	**$ 148,200**		**$ 2,436,960**		**140,790**		**$ 2,315,112**	**$ 121,848**
REPLACEMENT and CYCLICAL COSTS								
Subcomponents	**Cost in current $**	**Yr.**	**Pres. Worth $**	**Subcomponents**	**Cost in current $**	**Yr.**	**Pres. Worth $**	
			$ -				$ -	**$ -**
			$ -				$ -	**$ -**
			$ -				$ -	**$ -**
			$ -				$ -	**$ -**
			$ -				$ -	**$ -**
			$ -				$ -	**$ -**
			$ -				$ -	**$ -**
			$ -				$ -	**$ -**
			$ -				$ -	**$ -**
SUBT. REPLACEMENT			**$ -**				**$ -**	**$ -**
TOT. O & M & REPL. (Pres. Worth)			**$ 2,436,960**				**$ 2,315,112**	**$ 121,848**
TOT. INITIAL, O&M, & REPL. (Pres. Worth)			**$ 20,736,960**				**$ 2,315,112**	**$ 18,421,848**
	Cost in current $				**Cost in current $**			
SALVAGE VALUE		20	$ -			20	$ -	**$ -**
TOT. INITIAL, O&M, REPL. MINUS SALVAGE			**$ 20,736,960**				**$ 2,315,112**	**$ 18,421,848**

COMPONENT LIFE CYCLE COST ANALYSIS (LCCA)

Project: **2a and 2b**
Client:
Date:
By: egm
COMPONENT
COMPONENT # 2a and 2b
Escalation rate 0.03
Discount rate 0.05
Study Period 20 Yrs.

Instructions: Enter escalation, discount, and study period above.
Enter annual costs, replacement costs (and appropriate replacement year), and salvage value.
Enter these costs in the shaded cells using today's (current) dollars. For annual costs, escalation rates will be automatically entered, but can be individually overwritten below for differential escalation.
All costs will automatically be escalated and discounted.

ALT A :	2a			ALT B:	2b			DIFFERENCE
INITIAL COSTS			INITIAL COST $ 13,200,000				INITIAL COST $ 14,500,000	DIFFERENCE $ (1,300,000)
O & M ANNUAL COSTS								
Subcomponents	**Cost in current $**	**Esc.**	**Pres. Worth $**	**Subcomponents**	**Cost in current $**	**Esc.**	**Pres. Worth $**	
Utilities	$ 35,154	0.03	$ 578,063		35,154.00	0.030	$ 578,063	$ -
Custodial	$ 18,600	0.03	$ 305,853		18,600	0.030	$ 305,853	$ -
Maintenance	$ 46,500	0.03	$ 764,633		46,500	0.030	$ 764,633	$ -
Security	$ 4,650	0.03	$ 76,463		4,650	0.030	$ 76,463	$ -
Landscaping and Ground Maintena	$ 9,300	0.03	$ 152,927		9,300	0.030	$ 152,927	$ -
Management Fees	$ 13,950	0.03	$ 229,390		13,950	0.030	$ 229,390	$ -
Telephone	$ 6,696	0.03	$ 110,107		6,696	0.030	$ 110,107	$ -
Data Processing	$ 2,976	0.03	$ 48,937		2,976	0.030	$ 48,937	$ -
SUBT. O & M OVER LIFE CYCLE	**$ 137,826**		**$ 2,266,373**		**137,826**		**$ 2,266,373**	**$ -**
REPLACEMENT and CYCLICAL COSTS								
Subcomponents	**Cost in current $**	**Yr.**	**Pres. Worth $**	**Subcomponents**	**Cost in current $**	**Yr.**	**Pres. Worth $**	
			$ -				$ -	$ -
			$ -				$ -	$ -
			$ -				$ -	$ -
			$ -				$ -	$ -
			$ -				$ -	$ -
			$ -				$ -	$ -
			$ -				$ -	$ -
			$ -				$ -	$ -
			$ -				$ -	$ -
SUBT. REPLACEMENT			**$ -**				**$ -**	**$ -**
TOT. O & M & REPL. (Pres. Worth)			**$ 2,266,373**				**$ 2,266,373**	**$ -**
TOT. INITIAL, O&M, & REPL. (Pres. Worth)			**$ 15,466,373**				**$ 16,766,373**	**$ (1,300,000)**
	Cost in current $				**Cost in current $**			
SALVAGE VALUE		20	$ -			20	$ -	$ -
TOT. INITIAL, O&M, REPL. MINUS SALVAGE			**$ 15,466,373**				**$ 16,766,373**	**$ (1,300,000)**

COMPONENT LIFE CYCLE COST ANALYSIS (LCCA)

Project: **3a and 3b**
Client:
Date:
By: egm
COMPONENT
COMPONENT # 3a and 3b
Escalation rate 0.03
Discount rate 0.05
Study Period 20 Yrs.

Instructions: Enter escalation, discount, and study period above.
Enter annual costs, replacement costs (and appropriate replacement year), and salvage value.
Enter these costs in the shaded cells using today's (current) dollars. For annual costs, escalation rates will be automatically entered, but can be individually overwritten below for differential escalation.
All costs will automatically be escalated and discounted.

ALT A :	3a			ALT B:	3b			DIFFERENCE
INITIAL COSTS			INITIAL COST $ 17,500,000				INITIAL COST $ 23,700,000	DIFFERENCE $ (6,200,000)
O & M ANNUAL COSTS								
Subcomponents	**Cost in current $**	**Esc.**	**Pres. Worth $**	**Subcomponents**	**Cost in current $**	**Esc.**	**Pres. Worth $**	
Shell Space - incl raised floor equip	$ 264,060	0.03	$ 4,342,131		264,060.00	0.030	$ 4,342,131	$ -
Shell Operations Costs	$ 88,020	0.03	$ 1,447,377		88,020	0.030	$ 1,447,377	$ -
Shell Utilities	$ 29,340	0.03	$ 482,459		29,340	0.030	$ 482,459	$ -
Office Space -including net shared	$ 264,546	0.03	$ 4,350,122		264,546	0.030	$ 4,350,122	$ -
Telephone	$ 5,281	0.03	$ 86,843		5,281	0.030	$ 86,843	$ -
Data Processing	$ 2,347	0.03	$ 38,597		2,347	0.030	$ 38,597	$ -
		0.03	$ -			0.030	$ -	$ -
		0.03	$ -			0.030	$ -	$ -
SUBT. O & M OVER LIFE CYCLE	**$ 653,594**		**$ 10,747,528**		**653,594**		**$ 10,747,528**	**$ -**
REPLACEMENT and CYCLICAL COSTS								
Subcomponents	**Cost in current $**	**Yr.**	**Pres. Worth $**	**Subcomponents**	**Cost in current $**	**Yr.**	**Pres. Worth $**	
			$ -				$ -	$ -
			$ -				$ -	$ -
			$ -				$ -	$ -
			$ -				$ -	$ -
			$ -				$ -	$ -
			$ -				$ -	$ -
			$ -				$ -	$ -
			$ -				$ -	$ -
			$ -				$ -	$ -
SUBT. REPLACEMENT			**$ -**				**$ -**	**$ -**
TOT. O & M & REPL. (Pres. Worth)			**$ 10,747,528**				**$ 10,747,528**	**$ -**
TOT. INITIAL, O&M, & REPL. (Pres. Worth)			**$ 28,247,528**				**$ 34,447,528**	**$ (6,200,000)**
	Cost in current $				**Cost in current $**			
SALVAGE VALUE		20	$ -			20	$ -	$ -
TOT. INITIAL, O&M, REPL. MINUS SALVAGE			**$ 28,247,528**				**$ 34,447,528**	**$ (6,200,000)**