Roofing Alternatives for the Sportsplex
Bellingham Parks & Recreation Department
Bellingham, Washington

ROOFING ALTERNATIVES
FOR THE
BELLINGHAM SPORTSPLEX

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Roofing Alternatives for the Sportsplex
Bellingham Parks & Recreation Department
Bellingham, Washington

MINAKER ARCHITECTURE, p.s

September 14, 2016

City of Bellingham
Parks & Recreation Department
2221 Pacific Street
Bellingham, WA 98229

Re: #2016-0371 ROOFING ALTERNATIVES FOR THE BELLINGHAM SPORTSPLEX

Dear Gina G Austin,

Minaker Architecture is pleased to submit this final report entitled "Roofing Alternatives for the Bellingham Sportsplex". This report is prepared in accordance with the Minaker Architecture p.s. service agreement #2016-0371. Dated September 14, 2016. This report is for use by the City of Bellingham Parks and Recreation Department.

I would like to thank you for the opportunity we had to work with the City of Bellingham Parks & Recreation Department on this project.

Please feel free to call me anytime.

Sincerely,

Minaker Architecture, p.s.

Gregory Minaker, Architect
President

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Final Sportsplex Roof Report

Findings

Existing Conditions

Recommendations

Alternative Roof System "1"

Alternative Roof System "2"

Alternative Roof System "3"

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Drawings

Existing Roof Plan
Existing Floor Plan
Existing Building Section "1"
Existing Building Section "2"

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Final Sportsplex Roof

Existing Roofing Material: Galvanized metal over bagged insulation Roof Slope 1:12

This report is based on a site visit performed on August 2nd, 2016. Gregory Minaker, Architect, Ken Levesque, Designer at Minaker Architecture and Greg Guillen,SE CG Engineering inspected the roof. The following observations and recommendations are the opinions of Minaker Architecture and do not constitute any requirements for client.

Observations
The Sportsplex is a steel frame building with galvanized metal roofing and metal siding along with a 11 course high CMU wall at the base of the building. The building houses a Hockey Rink on in the south side and two soccer fields in the north side, each built at separate times, approximately three years apart. These two buildings join at the center, the first building built to house the ice rink was the first to be built. North building that houses the soccer fields placed their steel columns approximately three inches from the south building metal skin.

Up on the existing roof it appears to be in fair condition; it consists of galvanized metal roofing, fastened to metal purlins with hex-head gasket sheet metal screws. Insulation is the typical bag-n-sag type, common for use on metal building with this type of construction. Areas of the roof where metal sheets laps are coated with differing types of sealant added after to repair leaks. When the sheets of metal roofing edges are not staggered, moisture can travel horizontally up the slope. Allowing moisture to travel up between the lapped metal sheets, due to moisture tension. If sealant is improperly installed or there is an inadequate lapping of the roofing gives water added places to enter the building.

The roof ridge cap at the west end of the building in bent to the point where there is an opening in the lap, which may allow for moisture intrusion. also at the ridge, the sealant has failed at the gasket; wind driven moisture may enter the roofing system at these locations.

There are some miscellaneous areas to note. At a number of pipe boot locations, the sealant is failing. The standoffs for the metal gutter are fastened and installed upslope of the roofing and provide an upslope lap, where moisture can collect and migrate through the opening provided by the fasteners.

On the North elevation at the east bump out off the main structure, there are down spouts that discharge directly onto a lower roof of the bump out; this provides an opportunity for large amounts of moisture to spill adjacent to the structure. To avoid this condition, down spouts should be installed where the discharge is directed away from the structure.

Down spouts on the north and south elevations are damaged in various ways, places like where they exit the gutter, along the vertical run and at the base where they enter the connection at the ground level.

It is in our opinion that the interior of the north side of the building lacks the proper ventilation, which leads to moisture collection between the insulation and the metal roofing. This does not discount the possible leaks in the roofing from the exterior. The main field of the metal roofing appears to be in good condition. Many fasteners on the roof are rusted, which may be a sign of dissimilar metals between the roofing and the fastener, which can lead to corrosion. There are signs of repair attempts over these fasteners; different types of sealant are installed over a fair number. On the northwest portion of the roof, there are a couple of fasteners that have completely backed out leaving a direct route for water migration into the building.

Within the interior there are many penetrations in the insulation on both north and south sides of the building. On the side of the hockey rink, most of the penetrations are reported to be from pucks hitting the goal and then embedding themselves. There appears to be a few that show signs from failure in the vapor barrier, which may have been from moisture damage. On the side of the soccer fields, there are significant amounts of openings in the vapor barrier and insulation; some where the underside of the metal roofing is exposed. It was reported that a majority of these are from moisture damage this could be from both water intrusion and condensation

Along the center portion at the ridge, the insulation appears to be undamaged. Noting the condition of the insulation at the points where there is minimal occupancy, it is supposed that some if not a majority of the damage to the insulation is from condensation, which is a symptom of a lack of ventilation within an insulated space. The failure and damage to the insulation will lead to difficulties regulating the temperature in the structure.

It is Minaker Architectures option that a new roof membrane is needed, be it replacing existing metal roof with new or another system as recommend further in this report, along with appropriate insulation and additional ventilation to the large interior spaces will prolong the building life and user's safety.

CG ENGINEERING | civil & structural engineering & planning

MEMORANDUM

To: Gregory Minaker,Architect

From: Greg Guillen, PE, SE

Date: August 30, 2016

Re: Bellingham Sportsplex – Roof Assessment

CG Engineering performed a site visit to Bellingham Sportsplex Arena on August 2nd 2016, in order to gather information, take measurements and photos, and observe the existing conditions of the Sportsplex. The owner is investigating options for re-roofing in the near future.

The existing Sportsplex is a metal building structure consisting of metal roofing supported by light-gauge Z-purlins, spanning between steel girder frame members. The girders form the main structural supports for the building, and are supported on foundations at each end. The current roof system consists of an exposed fastener metal roof. The metal roof and screw penetrations appear to have started to rust and leak in places. The owner has proposed 3 schemes for addressing the roof deterioration. The schemes and our comments and recommendations concerning them are outlined below:

Scheme 1 - Consists of a complete roof replacement. All existing insulation and metal decking will be removed and replaced with components of similar size and weight. No further evaluation on the system's structure is necessary so long as the added weight of the new roofing system is within 5% of the existing roofing system weight per IEBC Section 702.2.

Scheme 2 - Consists of covering the existing metal deck roof with a series of insulation layers topped with a new PVC membrane roof. The covering contains multiple layers of rigid insulation laid over the existing metal deck and then covered with a PVC membrane and connected down to the existing metal roof. No further evaluation is required so long as the new covering systems overall weight is less than 3 psf per IEBC Section 707.2.

Scheme 3 - Consists of installing Roof Huggers along the purlin lines and then laying a new metal deck on top of the existing roof system. The system must either have the cavity ventilated to reduce condensation build up or be fully insulated between the new and existing metal decking layers. No further evaluation on the structures capacity is necessary so long as the new system's overall weight is less than 3 psf per IEBC Section 707.2

CG ENGINEERING
250 4th Avenue South, Suite 200
Edmonds, WA 98020
ph. 425.778.8500 | f. 425.778.5536
www.cgengineering.com

CG engineering has reviewed the above schemes and found that each is a viable option to address the roofing problems seen at the above mentioned site. CG engineering was only provided with preliminary schemes. If the above schemes fall outside of the exceptions listed in the IEBC Sections 702 and 707 then further evaluation concerning the buildings main structural support system may be needed.

08/30/2016

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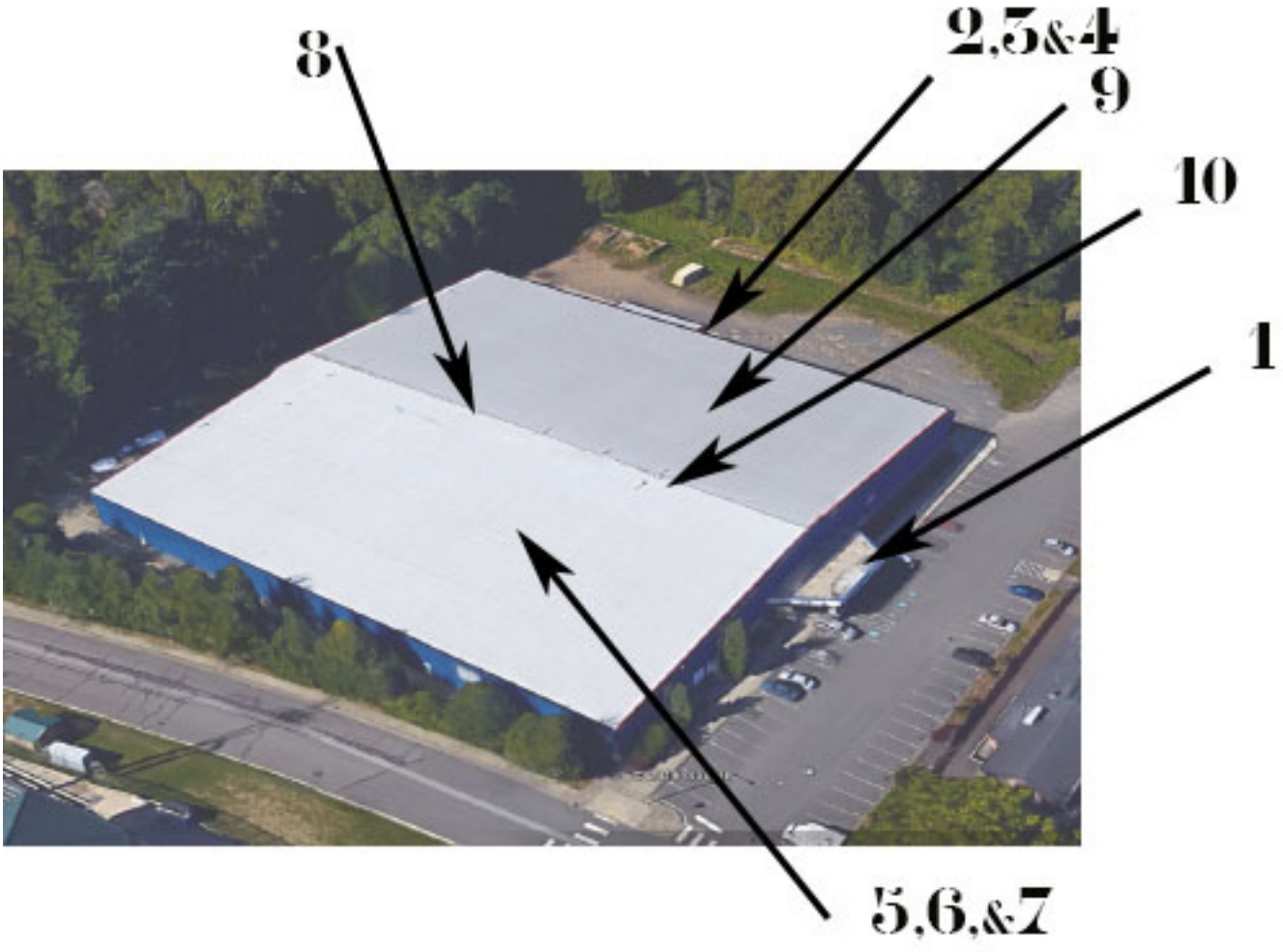
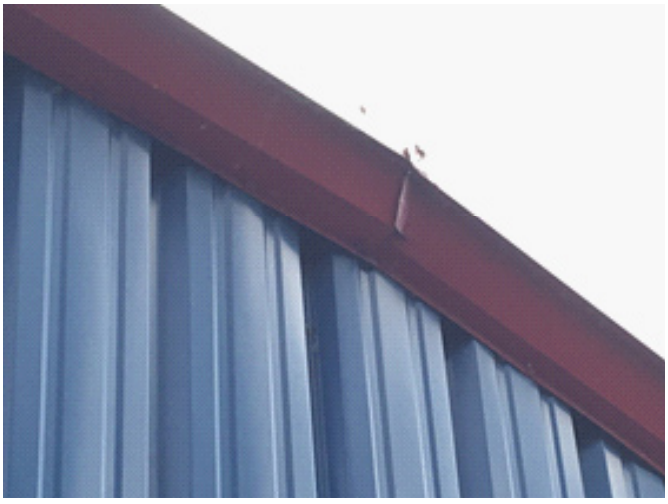


Front elevation of structure.
Note water flows over edge into added gutter system.
The canopy roof needs to be reworked and develop a downspout system that will bring water within the boundries of the structure.

1

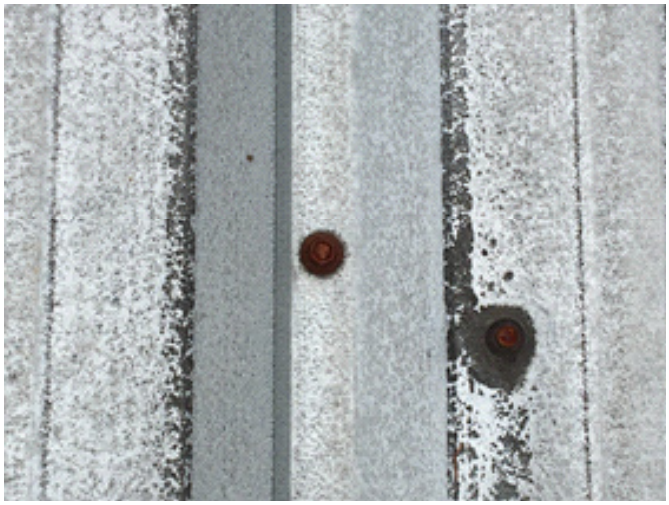
Downspout spills onto another roof.
Recommend moving away from lower roof.

2



There is an opening in the edge metal; this condition can allow moisture into the roof system.
The gutters are incorrectly mounted and need to be lowered approximately 3" for ice and snow to slide off.

3



Many of the fasteners on the roof are rusted and will likely fail soon.

4

Some areas have two fasteners in one location, this can make it difficult to keep weather tight.

5

Many fasteners are coated with sealant.

6

The laps in the roofing are not staggered, this can lead to moisture intrusion.

7

Debris has collected at both sides of the ridge. This condition can lead to moisture intrusion.

8

Sealant has been applied to some of the laps of the roofing

9

A majority of the pipe boots are sagging and collection of moisture, these conditions can lead to failure.

10

Some fasteners are backing out on the Northwest portion of the roof.

11

The standoffs for the gutter are installed over the roofing, creating an upslope lap. Combined with the hole from the fasteners, moisture will likely enter.

12

Sealant at pipe boots have failed, providing an inlet for mositure

13

The insulation at the ridge on the West side of the building appears to be intact.

14

There is damage to insulation above some of the louvers.

15

On the soccer side of the building, there are numerous locations where the insulation has failed.

16

There does not appear to be insulation at the roll-up door locations.

17

There are multiple locations of damage insulation in hockey side of the building.

18

On both sided of the hockey rink, the insulation is damaged, it is from the hockey pucks as reported by staff.

19

Recommendations;

The following solutions are ordered in degree of magnitude. Each type should be installed per manufacturer and code requirements. It is also imperative to determine the necessary ventilation requirements to avoid additional condensate issues. Also, it would be prudent to protect the exposed insulation from any further damage by the patron's actions.

Alternative Roof System "1"

Remove existing metal roofing along with insulation and replace with new standing seam and hidden fasteners.

Alternative Roof System "2"

Single ply membrane on top of two new layers of high density rigid insulation sitting on top of the existing Metal roof deck.

Alternative Roof System "3"

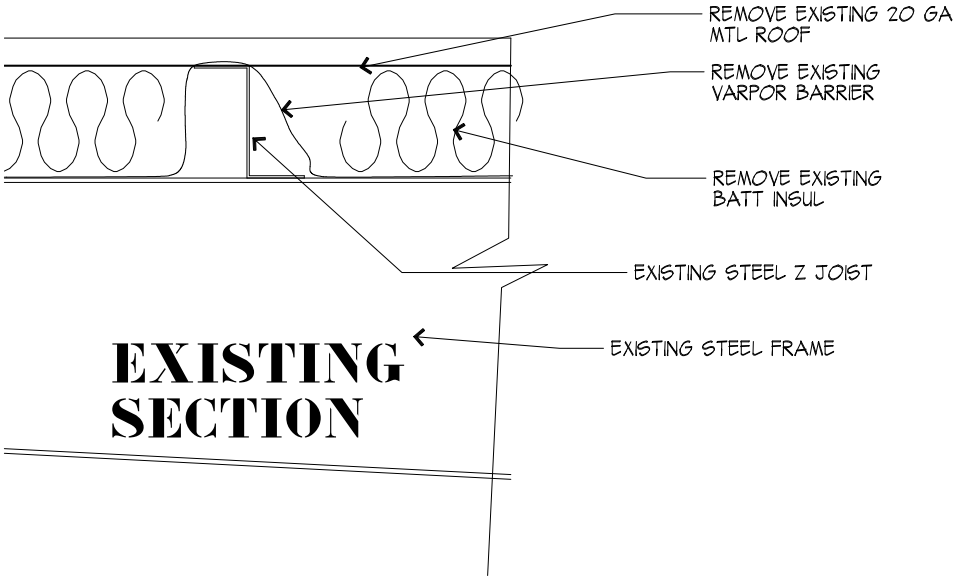
New metal roof sitting on new metal struts approximately 4 1/2" above existing metal roof deck with a 4 1/2" of rigid insulation between.

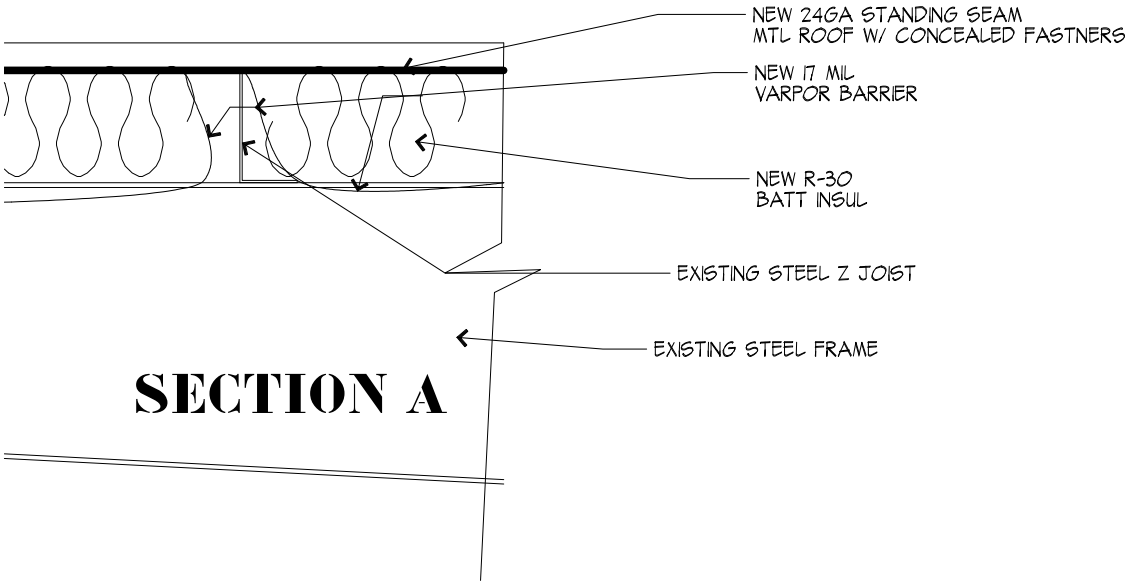
Alternative Roof System "4"

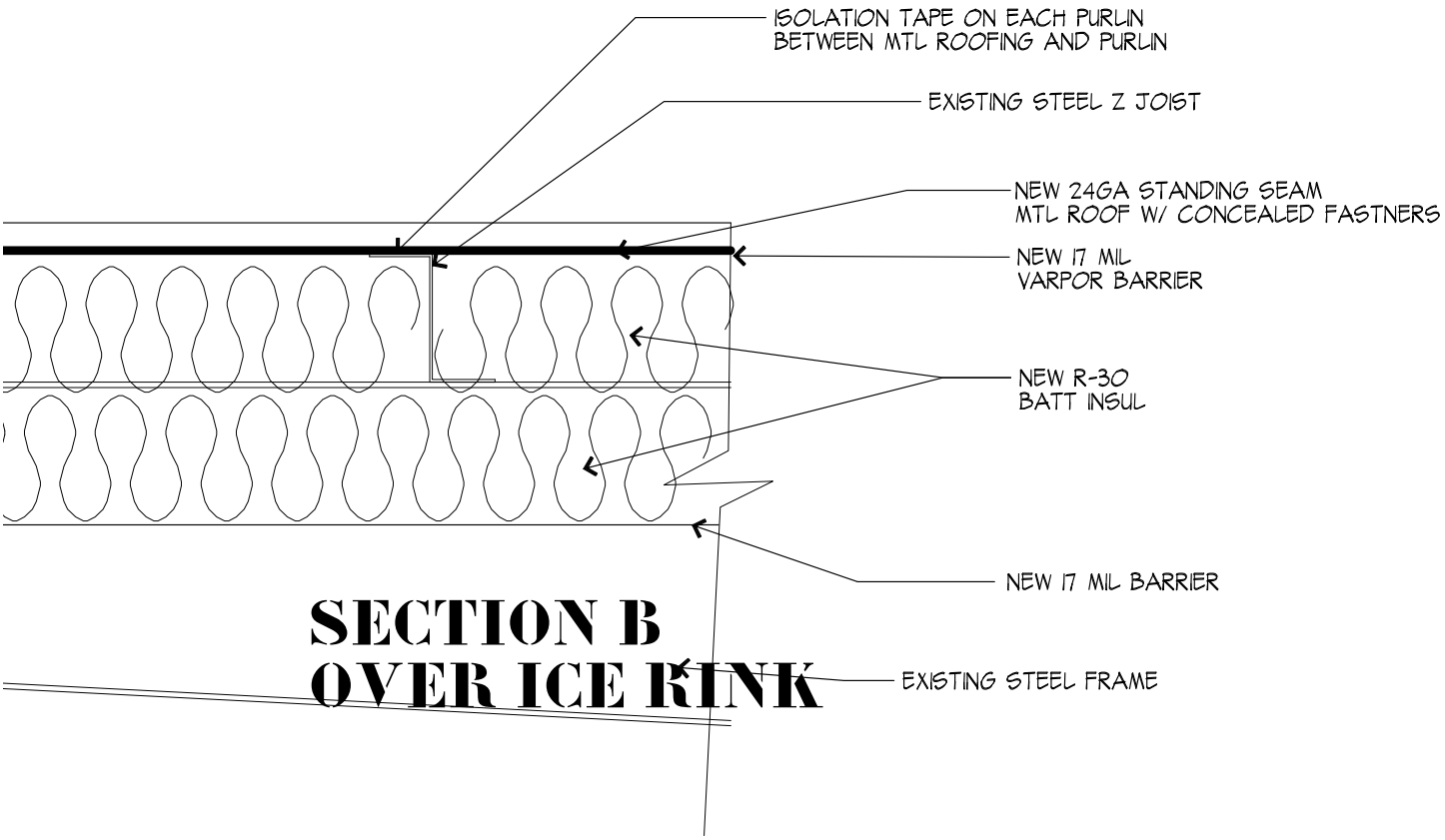
Keep repairing has leaks occur and remount gutters to proper location repair/patch vapor barrier, add additional interior ventilation system

Alternative Roof System "1"

Install a new roofing system. Install a prefinished metal roof with hidden fasteners. The finish provides an extra layer of protection and the hidden fasteners significantly reduce the number of penetrations on the roof; an improperly addressed penetration can be considered a hole in the system. Design and install the roof based on SMACNA recommendations. Install insulation per code requirements, paying direct attention local climate factors.







SECTION B
OVER ICE RINK

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BELLINGHAM SPORTSPLEX, ROOF REPLACEMENT (SCHEME #1)

This is an Opinion of Probable Cost

The Woolsey Company

DATE:	August 29, 2016
A/ E:	**Minaker Architecture, P.S.**
ESTIMATE:	Conceptual Estimate
SPECIFICS:	**Replace Existing Metal Roof at Sportsplex Building**

ITEM #	TITLE		TOTAL
1	DEMOLITION & DISPOSAL		$199,158
2	THERMAL & MOISTURE PROTECTION		$948,266
	PROJECT TOTAL Bare Costs		**$1,147,424**
	Estimate Contingency	13%	$149,165.09
	PROJECT SUBTOTAL		**$1,296,589**
	General Requirements	10%	$129,658.88
	PROJECT SUBTOTAL		**$1,426,248**
	GC Overhead & Profit	10%	$142,624.77
	PROJECT TOTAL		**$1,568,872**

Exclusions and Assumptions:

1 Excludes A/E Fees
2 Excludes State Local Taxes

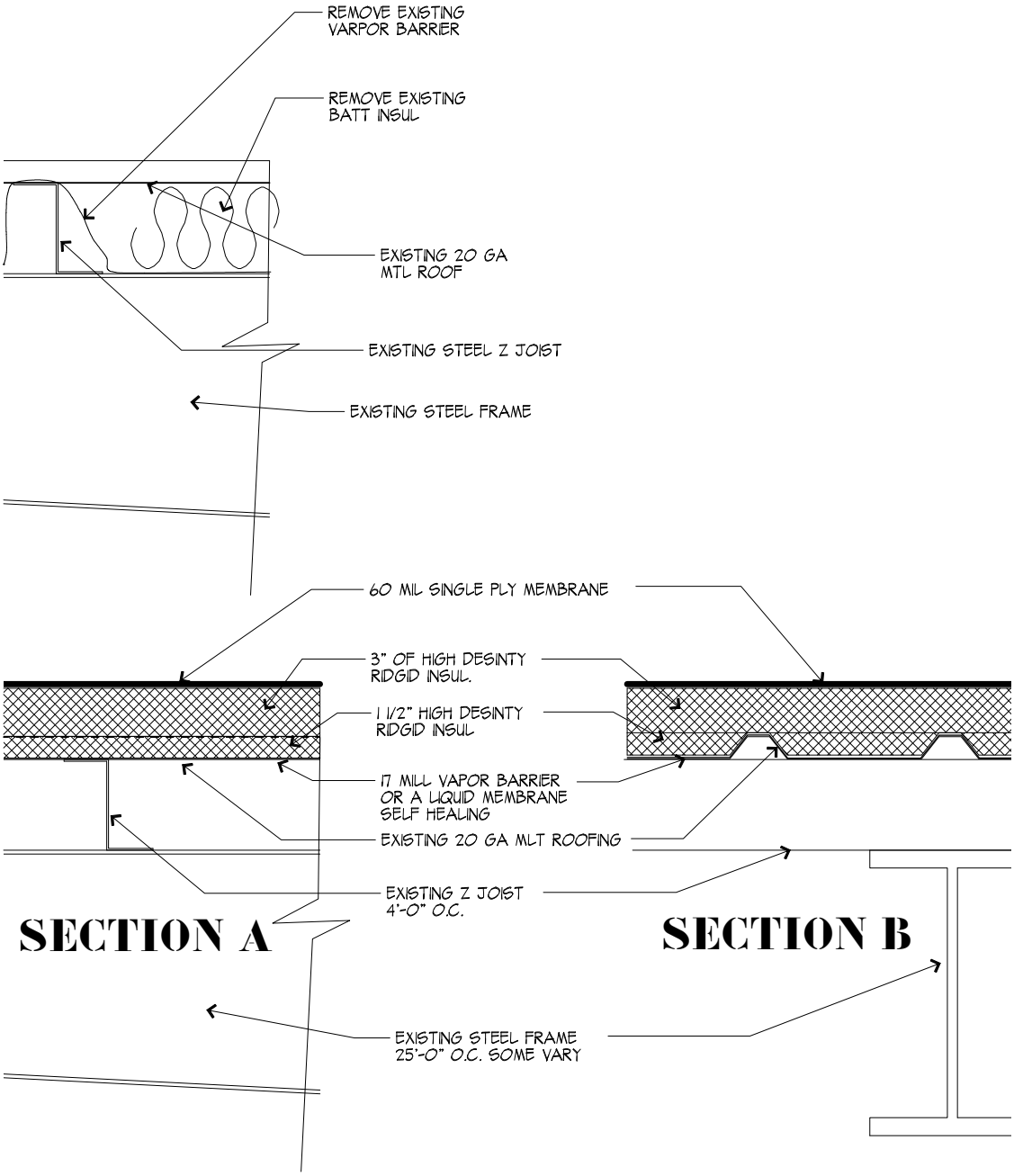
BELLINGHAM SPORTSPLEX, ROOF REPLACEMENT (SCHEME #1)

This is an Opinion of Probable Cost

ITEM #	Description	Quantity	Units	Unit Cost	Totals
DEMOLITION & DISPOSAL					
1	Demo (with care) flashing & sealing at pipes, vents, flues	17	EA	125.00	$2,125
2	Demo all other flashing & sealing	77,500	SF	0.10	$7,750
3	Demo existing gutters	570	LF	3.50	$1,995
4	Demo existing downspouts	400	LF	2.00	$800
5	Demo entire roofing assembly	77,500	SF	1.45	$112,375
6	Demo all roofing insulation	77,500	SF	0.35	$27,125
7	Demo select damaged or unfit metal Purlins (5%)	3,875	SF	0.90	$3,488
8	Load/haul demo'd material	1	LS	16,500.00	$16,500
9	Disposal charges	300	Tons	90.00	$27,000
	DEMOLITION & DISPOSAL				$199,158
THERMAL & MOISTURE PROTECTION					
1	Replace damaged or unfit purlins (5%)	3,875	SF	1.15	$4,456
2	New vapor barrier over existing Purlins	77,500	SF	0.25	$19,375
3	R30 batt insulation, over Vapor Barrier (infill purlins)	77,500	SF	1.15	$89,125
4	New metal roof system, concealed cleat type	77,500	SF	10.25	$794,375
5	New ridge vent	280	LF	8.75	$2,450
6	Flash & seal all pipes, vents, flues, etc	17	EA	225.00	$3,825
7	All other sealing & flashing, throughout	77,500	SF	0.20	$15,500
8	New 8" extruded aluminum gutters, match color	570	LF	23.00	$13,110
9	New aluminum downspouts	400	LF	12.00	$4,800
10	Connections & fittings	1	LS	1,250.00	$1,250
	THERMAL & MOISTURE PROTECTION				$948,266

Alternative Roof System "2"

Remove the existing damaged insulation. Install a vapor barrier on the existing roofing. Then install a rigid insulation with a fully adhered backing board. The insulation may be installed with a profile to fit the existing roofing. The concept is similar to a system over metal decking. Install a single-ply membrane to be fully adhered to the coverboard.



BELLINGHAM SPORTSPLEX, ROOF REPLACEMENT (SCHEME #2)

This is an Opinion of Probable Cost

TWC
The Woolsey Company

DATE:	August 29, 2016
A/ E:	**Minaker Architecture, P.S.**
ESTIMATE:	Conceptual Estimate
SPECIFICS:	**Place Rigid Insulation & TPO Roofing Over Existing**

ITEM #	TITLE		TOTAL
1	DEMOLITION & DISPOSAL		$17,420
2	THERMAL & MOISTURE PROTECTION		$722,935
	PROJECT TOTAL Bare Costs		**$740,355**
	Estimate Contingency	13%	$96,246.15
	PROJECT SUBTOTAL		**$836,601**
	General Requirements	10%	$83,660.12
	PROJECT SUBTOTAL		**$920,261**
	GC Overhead & Profit	10%	$92,026.13
	PROJECT TOTAL		**$1,012,287**

Exclusions and Assumptions:

1 Excludes A/E Fees
2 Excludes State Local Taxes

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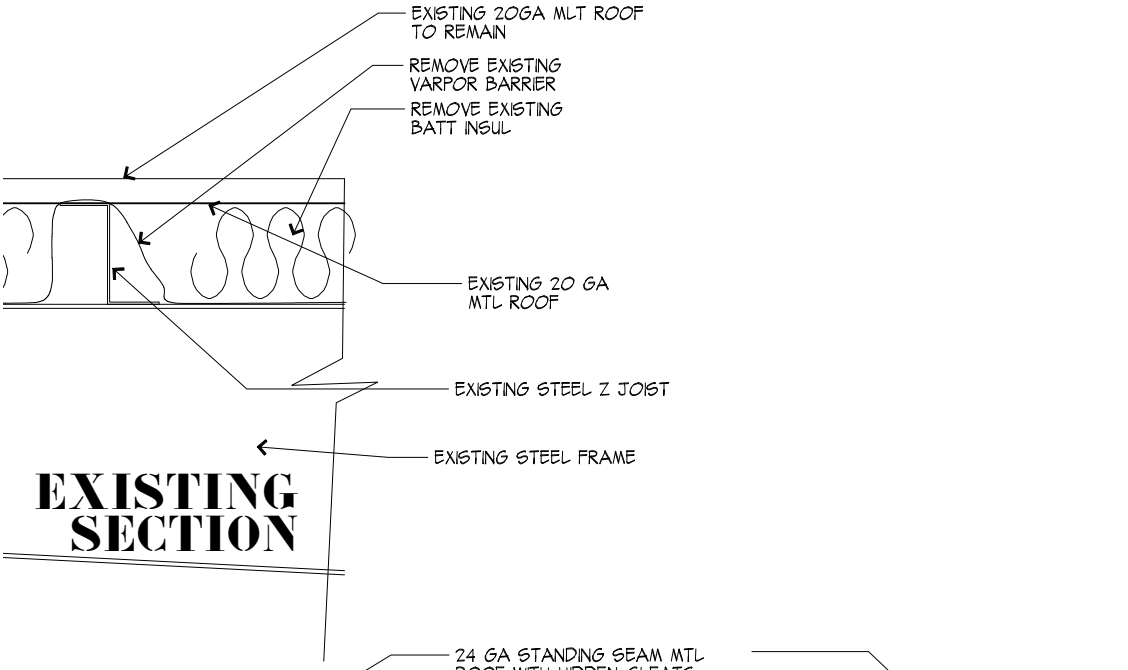
BELLINGHAM SPORTSPLEX, ROOF REPLACEMENT (SCHEME #2)

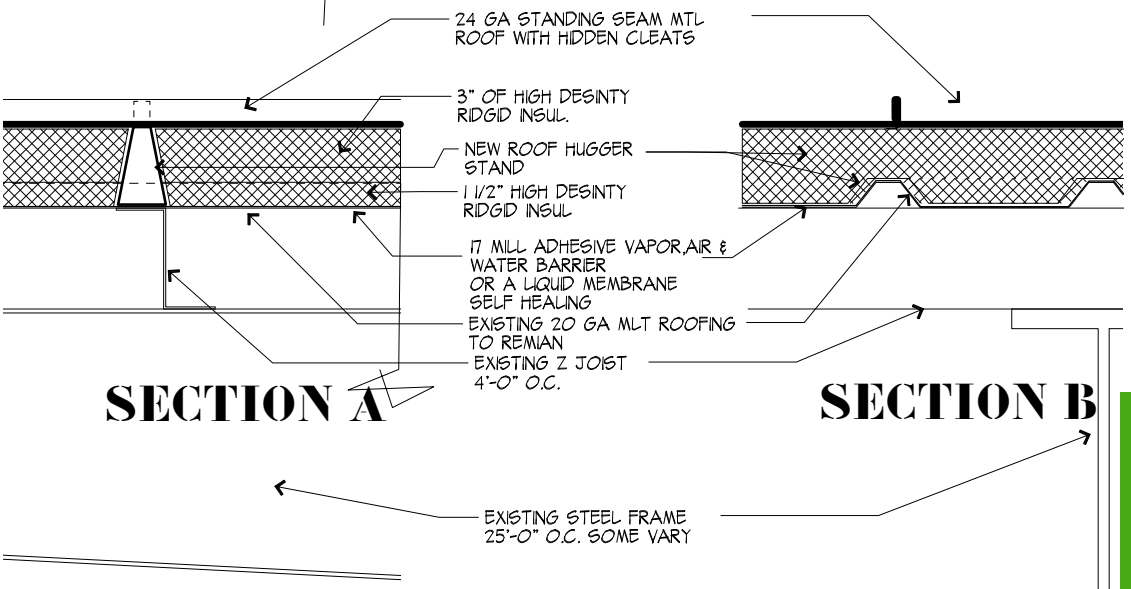
This is an Opinion of Probable Cost

ITEM #	Description	Quantity	Units	Unit Cost	Totals
DEMOLITION & DISPOSAL					
1	Demo (with care) flashing & sealing at pipes, vents, flues	17	EA	125.00	$2,125
2	Demo all other flashing & sealing	77,500	SF	0.10	$7,750
3	Demo existing gutters	570	LF	3.50	$1,995
4	Demo existing downspouts	400	LF	2.00	$800
5	Other minor demolition	1	LS	1,000.00	$1,000
6	Load/haul demo'd material	1	LS	1,500.00	$1,500
7	Disposal charges	25	Tons	90.00	$2,250
	DEMOLITION & DISPOSAL				$17,420
THERMAL & MOISTURE PROTECTION					
1	New vapor barrier over existing roof	77,500	SF	0.25	$19,375
2	Infill existing Standing Seams with 2" rigid insulation	77,500	SF	2.05	$158,875
3	2" rigid insulation over infilled	77,500	SF	2.00	$155,000
4	Backer board over rigid insulation	77,500	SF	1.35	$104,625
5	New PVC roofing system, complete, glue & mech adhere	77,500	SF	3.15	$244,125
6	New ridge vent	280	LF	8.75	$2,450
7	Flash & seal all pipes, vents, flues, etc	17	EA	225.00	$3,825
8	All other sealing & flashing, throughout	77,500	SF	0.20	$15,500
9	New 8" extruded aluminum gutters, match color	570	LF	23.00	$13,110
10	New aluminum downspouts	400	LF	12.00	$4,800
11	Connections & fittings	1	LS	1,250.00	$1,250
	THERMAL & MOISTURE PROTECTION				$722,935

Alternative Roof System "3"

Install lift bars (Huggers) at all purlins on top of existing metal roofing along with 4.5" of high density foam with a new standing seam spanning the new lift bars.





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BELLINGHAM SPORTSPLEX, ROOF REPLACEMENT (SCHEME #3)

This is an Opinion of Probable Cost

The Woolsey Company

DATE:	August 30, 2016
A/ E:	**Minaker Architecture, P.S.**
ESTIMATE:	Conceptual Estimate
SPECIFICS:	**Install RoofHuggers Over Existing, New Roofing & Related**

ITEM #	TITLE		TOTAL
1	DEMOLITION & DISPOSAL		$4,545
2	THERMAL & MOISTURE PROTECTION		$1,199,160
	PROJECT TOTAL Bare Costs		**$1,203,705**
	Estimate Contingency	13%	$156,481.65
	PROJECT SUBTOTAL		**$1,360,187**
	General Requirements	10%	$136,018.67
	PROJECT SUBTOTAL		**$1,496,205**
	GC Overhead & Profit	10%	$149,620.53
	PROJECT TOTAL		**$1,645,826**

Exclusions and Assumptions:

1 Excludes A/E Fees
2 Excludes State Local Taxes

BELLINGHAM SPORTSPLEX, ROOF REPLACEMENT (SCHEME #3)

This is an Opinion of Probable Cost

ITEM #	Description	Quantity	Units	Unit Cost	Totals
DEMOLITION & DISPOSAL					
1	Leave in place flashing/sealing at pipes, vents, ASSUMED	1	EA	0.00	$0
2	Leave in place all other flashing & sealing, ASSUMED	1	SF	0.00	$0
3	Demo existing gutters	570	LF	3.50	$1,995
4	Demo existing downspouts	400	LF	2.00	$800
5	Load/haul demo'd material	1	LS	750.00	$750
6	Disposal charges	1	Tons	1,000.00	$1,000
	DEMOLITION & DISPOSAL				**$4,545**
THERMAL & MOISTURE PROTECTION					
1	New vapor barrier over existing roof	77,500	SF	0.25	$19,375
2	Infill existing Standing Seams with 2" rigid insulation	77,500	SF	2.05	$158,875
3	2" rigid insulation over infilled	77,500	SF	2.00	$155,000
4	RoofHugger system, complete	19,000	LF	3.65	$69,350
5	New metal roof system, concealed cleat type	77,500	SF	9.75	$755,625
6	New ridge vent	280	LF	8.75	$2,450
7	Flash & seal all pipes, vents, flues, etc	17	EA	225.00	$3,825
8	All other sealing & flashing, throughout	77,500	SF	0.20	$15,500
9	New 8" extruded aluminum gutters, match color	570	LF	23.00	$13,110
10	New aluminum downspouts	400	LF	12.00	$4,800
11	Connections & fittings	1	LS	1,250.00	$1,250
	THERMAL & MOISTURE PROTECTION				**$1,199,160**

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Bellingham Parks & Recreation Department
Bellingham, Washington

Alternative Roof System "4"

These are some fixes for the existing system, but are not guaranteed to solve any problems long term.

Continue to apply silicone sealant over failing fasteners.

Replace pipe boots where failing. Raise the existing pipe boots top upward, to avoid a location where moisture may collect, then install a stainless steel collar around near the top of the boot followed with a bead of sealant at the top of the boot.

Replace missing fasteners with new that include a neoprene washer.

Remove the debris from the ridge. Remove and replace failing gaskets' line the perimeter of the gasket with a flexible sealant.

Remove and reset Gutters to be 1/2" lower the roof edge.

Clean gutters frequently.

Patch existing vapor barrier in the ice room and the soccer room.

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