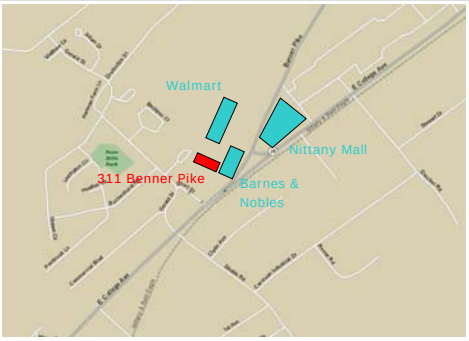
The Benner Pike Shops

Inyoung Hwang
2006 AE Thesis
Construction Management Option

Presentation Overview

- Building background
- Analysis #1 – close out planning and communication
- Analysis #2 – exterior wall tilt-up construction
- Analysis #3 – HVAC units reconfiguration

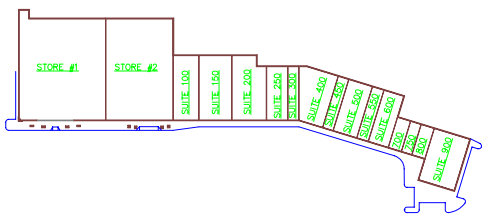
General Information



General Information

- One story (different heights)
- Area : 10,900 ft^2 (structure area)
  22,500 ft^2 (gross area)
- Cost : $15.2 million
- Project length : Jan, 2005 – Dec, 2005

General Information



- Ross Dress For Less, Bed Bath & Beyond, Fashion Bug, etc.

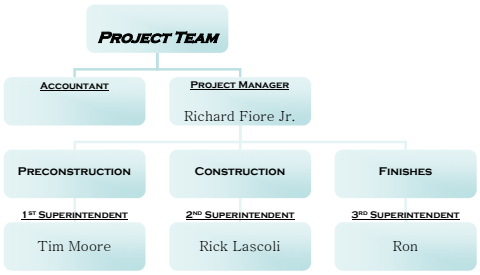
Analysis #1 – Close out Planning and Communication

- Close out is the finish phase of a project.
- Planned during preconstruction.
- Deals with final payment, retainage, clean up, punch list.
- Could be very irritating.
- Making sure that the client is satisfied.

Analysis #1 – Close out Planning and Communication

- The Benner Pike Shops project has different close out planning comparing from other projects.
- It is the method the GC uses for their projects.
- The main issue is in its staffing plan.

Analysis #1 – Close out Planning and Communication



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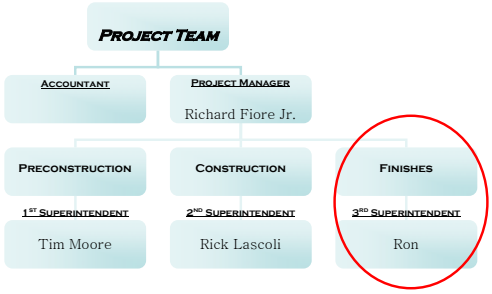

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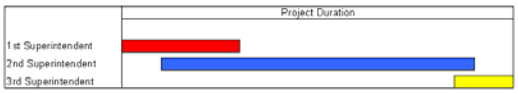


- Shift between 1st and 2nd superintendents worked out well.
- 2nd superintendent in charge of the project for 90%.
- 3rd superintendent to wrap up the project

Analysis #1 – Close out Planning and Communication

- Based on the survey, same supervisor should be present for the close out phase.
- Last impression is sometimes the most important.
- The GC of the project should consider revising their close out planning.

Analysis #2 – Exterior Wall Tilt-up Construction

- Tilt-up vs. CMU walls
- The building is enclosed with 12" CMU's.
- Too much time spent for masonry.
- Tilt-up construction is popular in construction field.

Analysis #2 – Exterior Wall Tilt-up Construction

- Rear side of exterior wall is going to be switched to tilt-up system.
- Exterior closure schedule is modified to make the tilt-up system fit into the plan.

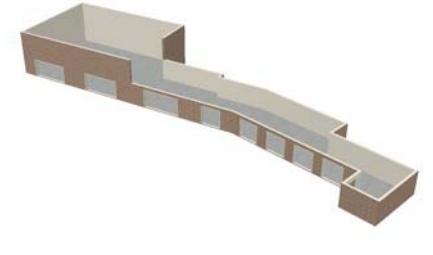
Analysis #2 – Exterior Wall Tilt-up Construction

Phase 1 : Tilt up construction for rear wall

Analysis #2 – Exterior Wall Tilt-up Construction

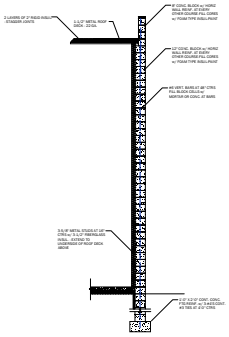
Phase 2 : Masonry for the front wall

Analysis #2 – Exterior Wall Tilt-up Construction



Phase 3 : Concrete pour for the slab

Analysis #2 – Exterior Wall Tilt-up Construction



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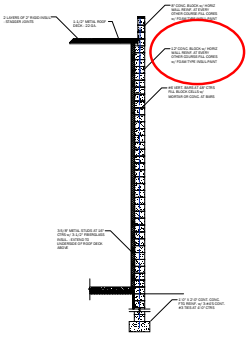

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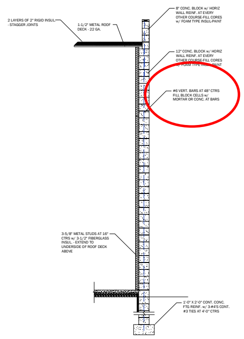

Analysis #2 – Exterior Wall Tilt-up Construction

	Daily Output	Quantity	Total Duration	
Tilt up Construction	1550 S.F. per day	26808 S.F.	15.36	15 days
CMU Construction	250 S.F. per day	23808 S.F.	95.232	96 days

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81 days =
11 weeks

Analysis #2 – Exterior Wall Tilt-up Construction

Description	Size	Quantity	Unit	Unit Cost			Total Cost
				Material	Labor	Equipment	
Existing System							
Concrete Block	8"x16"x12" thick	23808	S.F.	3.59	6.15		$231,890
	reinforced alt. courses						
Vertical	Walls, #3 to #7	4.47	ton	810.00	420.00		$5,498
Reinforcement							
TOTAL							$237,388
Modified System							
Tilt-up	Wall panel construction	23808	S.F.	4.93	4.52		$224,986
	walls only, 8" thick						
Vertical	Slab, #3 to #7	4.47	ton	810.00	550.00		$6,079
Reinforcement							
Horizontal	Slab, #3 to #7	5.96	ton	810.00	550.00		$8,106
Reinforcement							
Crane Rental	120 ton hydraulic	3	week				$22,650
TOTAL							$261,820

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TOTAL					10% ↑		$261,820

Analysis #2 – Exterior Wall Tilt-up Construction

Description	Quantity	Unit	Unit Cost	Total Cost
Project Staff - Previous				
Project manager	40	Week	$1,625	$65,000
Superintendent	40	Week	$1,500	$60,000
Superintendent	24	Week	$1,500	$36,000
Field engineer	48	Week	$995	$47,760
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Total				$304,280
Project Staff - Modified				
Project manager	29	Week	$1,625	$47,125
Superintendent	29	Week	$1,500	$43,500
Superintendent	13	Week	$1,500	$19,500
Field engineer	37	Week	$995	$36,815
Field engineer	37	Week	$995	$36,815
Field engineer	37	Week	$995	$36,815
Total				$220,570

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Total			28% ↓	$220,570

Analysis #2 – Exterior Wall Tilt-up Construction

$83,710 - $24,432

=

$59,278

Analysis #2 – Exterior Wall Tilt-up Construction

CMU Construction	R-Value
Outside Air Film	0.17
12" Concrete Block	1.28
3 1/2" Fiberglass Batt	11
1/2" Gypsum Board	0.45
Inside Air Film	0.68
Total	13.58
Tilt up Construction	
Outside Air Film	0.17
Poured Concrete (8" thick)	0.64
3 1/2" Fiberglass Batt	11
1/2" Gypsum Board	0.45
Inside Air Film	0.68
Total	12.94

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0.64 ↓

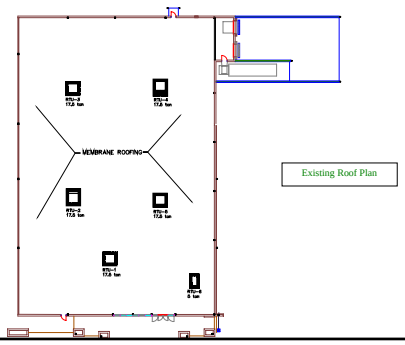
Analysis #3 – HVAC reconfiguration

- This analysis focuses on two large shops in the Benner Pike Shops; Bed Bath & Beyond and Ross Dress For Less.
- Existing Units
  - Bed Bath & Beyond - six HVAC units
  - Ross Dress For Less - seven HVAC units
- Due to heat loss from the front glass façade, separate HVAC units are required for the front portion.

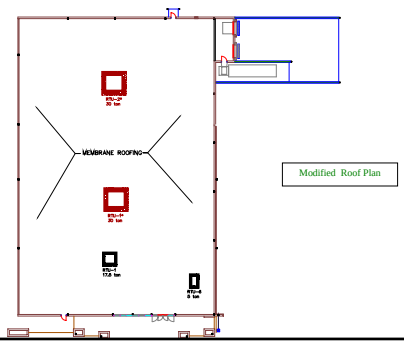
Bed Bath & Beyond

- No change of the HVAC unit for the front and the office area
- Four backside combined into two large units.
- The existing ductwork kept without any major modification.

Bed Bath & Beyond



Bed Bath & Beyond



Bed Bath & Beyond

ID	Manufacturer	Area Served	Cooling Data				Heating Input				Air Flow Range			Physical Data	
			Nominal Ton	Gross Cap	Net Cap (Btuh)	ARI Rated CFM	Low	Standard	Medium	High	CFM Min. Cool	CFM Min. Heat	CFM Max.	Dim. HxWxD (in)	Weight (lbs)
Existing units to be kept															
RTU-1	Lennox	Retail	17.5	218,000	210,000	6,600	169,000	260,000	360,000	480,000	4,900	2,780-5,080	8,400	55x91x133	2,695
RTU-6	Lennox	Office	5	63,000	60,000	2,000	-	76,000	-	125,000	1,400	1,050-1,320	2,400	37x45x96	660
Combination of the existing units															
RTU-2	Lennox	Retail	17.5	218,000	210,000	6,600	169,000	260,000	360,000	480,000	4,900	2,780-5,080	8,400	55x91x133	2,695
RTU-5	Lennox	Retail	17.5	218,000	210,000	6,600	169,000	260,000	360,000	480,000	4,900	2,780-5,080	8,400	55x91x133	2,695
RTU-1*	Lennox	Retail	30	351,000	336,000	10,500	-	260,000	360,000	480,000	8,400	4,815-7,110	14,400	65x81x145	3,340
RTU-3	Lennox	Retail	17.5	218,000	210,000	6,600	169,000	260,000	360,000	480,000	4,900	2,780-5,080	8,400	55x91x133	2,695
RTU-4	Lennox	Retail	17.5	218,000	210,000	6,600	169,000	260,000	360,000	480,000	4,900	2,780-5,080	8,400	55x91x133	2,695
RTU-2*	Lennox	Retail	30	351,000	336,000	10,500	-	260,000	360,000	480,000	8,400	4,815-7,110	14,400	65x81x145	3,340

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Bed Bath & Beyond

- CFM needed in the space
  22,570 ft²(1.3 CFM / ft²) = 29,341 CFM
- Total CFM in Units
  6,600 + 2,000 + 10,500 + 10,500 = 29,600 CFM
- Total CFM in units fall under 5% range of CFM needed in the space.

Bed Bath & Beyond

ID	Dim HxWxD (in)	Dim. in ft	Joist type	Span (ft)	Load Capacity (lb/ft)	Allowable load (lb)	Actual load (lb)
Existing Units							
RTU-1	55x91x133	4.5x7.5x11	20K10	12	550	45,375	2,695
RTU-6	37x45x96	3x3.5x7	20K10	12	550	13,475	660
Modified Units							
RTU-1*	65x81x145	5.5x7.5x12	22K4	12	550	49,500	3,340
RTU-2*	65x81x145	5.5x7.5x12	22K4	12	550	49,500	3,340

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RTU-2*	65x81x145	5.5x7.5x12	22K4	12	550	49,500	3,340

- Based on joist catalog, allowable capacity was calculated.

Bed Bath & Beyond

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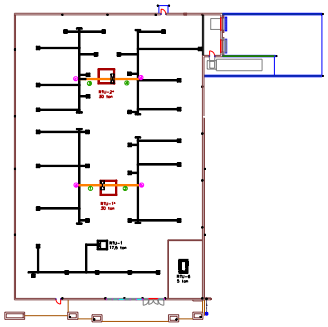
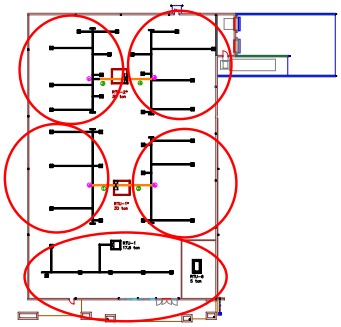
RTU-2*	65x81x145	5.5x7.5x12	22K4	12	550	49,500	3,340

- Minor load increase did not affect load capacity for roof.

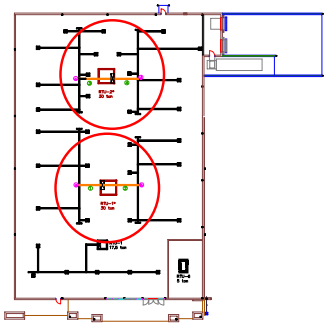
Bed Bath & Beyond



Bed Bath & Beyond



Bed Bath & Beyond



Bed Bath & Beyond

Description	Size	Quantity	Unit	Unit Cost			Total Cost
				Material	Labor	Equipment	
Existing System							
Rooftop HVAC	17.5 ton cooling, 330KBtuh	5	each	13,495.00	1,717.00		$76,060
	5 ton cooling, 112KBtuh	1	each	4,050.00	1,050.00		$5,100
Crane Rental	120 ton hydraulic	1	each				$7,550
TOTAL							$88,710
Modified System							
Rooftop HVAC	30 ton cooling, 540KBtuh	2	each	24,600.00	2,675.00		$54,550
	17.5 ton cooling, 330KBtuh	1	each	13,495.00	1,717.00		$15,212
	5 ton cooling, 112KBtuh	1	each	4,050.00	1,050.00		$5,100
Crane Rental	120 ton hydraulic	1	each				$7,550
Additional Ductwork	Galvanized steel, 1,000 to 2,000lb	1204	lbs	0.38	2.97		$4,033
Turning Vane	Double thick, 14" high set	8	L.F.	6.40	1.76		$65
TOTAL							$86,511

Bed Bath & Beyond

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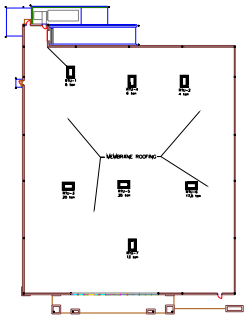
Crane Rental	120 ton hydraulic	1	each				$7,550
Additional Ductwork	Galvanized steel, 1,000 to 2,000lb	1204	lbs	0.38	2.97		$4,033
Turning Vane	Double thick, 14" high set	8	L.F.	6.40	1.76		$65
TOTAL							$86,511

Ross Dress For Less

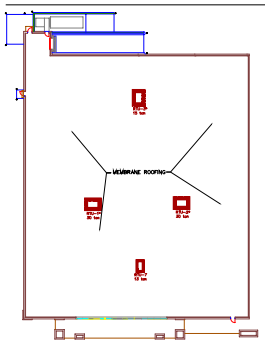
- The shop is divided into three portions: front, middle, rear.
- rear units are replaced with one large unit to cover the stockroom that is located at the side of the rear portion.
- The existing ductwork kept without any major modification.

Ross Dress For Less



Existing Roof Plan

Ross Dress For Less



Modified Roof Plan

Ross Dress For Less

ID	Manufacturer	Area Served	Cooling Data					Heating Input				Air Flow Range			Physical Data	
			Nominal Ton	Gross Cap (Btuh)	Net Cap (Btuh)	ARI Rated CFM	Low	Standard	Medium	High	CFM Min. Cool	CFM Min. Heat	CFM Max.	Dim. HxWxD (in)	Weight (lbs)
Existing units to be kept																
RTU-7	Lennox	Retail	13	160,000	156,000	5,100	169,000	260,000	360,000	-	3,640	2,780-4,445	6,240	55x91x133	2,555
Combination of the existing units																
RTU-5	Lennox	Retail	25	311,000	300,000	9,500	-	260,000	360,000	480,000	7,000	2,780-7,110	12,000	55x91x145	3,340
RTU-3	Lennox	Retail	20	252,000	242,000	7,500	-	260,000	360,000	480,000	5,600	2,780-5,080	9,600	55x91x133	2,735
RTU-6	Lennox	Retail	17.5	218,000	210,000	6,600	169,000	260,000	360,000	480,000	4,900	2,780-5,080	8,400	55x91x133	2,685
RTU-1*	Lennox	Retail	30	351,000	336,000	10,500	-	260,000	360,000	480,000	8,400	4,815-7,110	14,400	65x91x145	3,340
RTU-2*	Lennox	Retail	30	351,000	336,000	10,500	-	260,000	360,000	480,000	8,400	4,815-7,110	14,400	65x91x145	3,340
RTU-1	Lennox	Retail	5	63,000	60,000	2,000	-	78,000	-	125,000	1,400	1,060-1,320	2,400	37x45x86	860
RTU-2	Lennox	Office	4	50,500	48,000	1,450	-	78,000	-	125,000	1,120	1,060-1,320	1,920	37x45x86	850
RTU-4	Lennox	Office	6	74,000	71,000	2,100	-	78,000	-	125,000	1,680	1,060-1,320	2,880	37x45x86	885
RTU-3*	Lennox	Office	15	188,000	182,000	5,700	169,000	260,000	360,000	480,000	4,200	2,780-5,080	7,200	55x91x133	2,685

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Ross Dress For Less

- CFM needed in the space
  24,624 ft²(1.3 CFM / ft²) = 32,011 CFM
- Total CFM in Units
  5,100 + 10,500 + 10,500 + 5,700 = 31,800 CFM
- Total CFM in units fall under 5% range of CFM needed in the space.

Ross Dress For Less

ID	Dim. HxWxD (in)	Dim. in ft	Joist type	Span (ft)	Load Capacity (lb/ft)	Allowable load (lb)	Actual load (lb)
Existing Units							
RTU-7	55x91x133	4.5x7.5x11	26K9	16	550	45,375	2,555
Modified Units							
RTU-1*	65x91x145	5.5x7.5x12	28K10	16	550	49,500	3,340
RTU-2*	65x91x145	5.5x7.5x12	22K7	16	550	49,500	3,340
RTU-3*	55x91x133	4.5x7.5x11	22K7	16	550	45,375	2,685

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- Based on joist catalog, allowable capacity was calculated.

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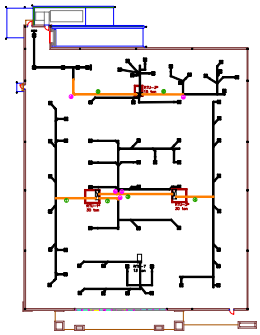
- Minor load increase did not affect load capacity for roof.

Ross Dress For Less



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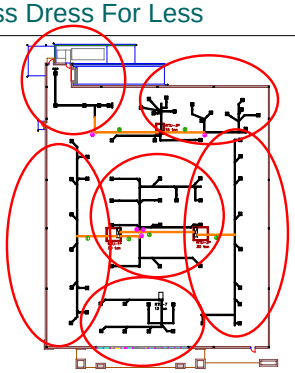

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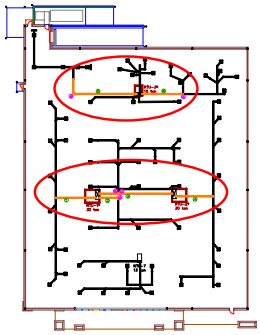

Ross Dress For Less

Description	Size	Quantity	Unit	Unit Cost			Total Cost
				Material	Labor	Equipment	
Existing System							
Rooftop HVAC	25 ton cooling, 450KBtuh	1	each	19,500.00	2,250.00		$21,750
	20 ton cooling, 360KBtuh	1	each	15,800.00	1,875.00		$17,675
	17.5 ton cooling, 330KBtuh	1	each	13,495.00	1,717.00		$15,212
	13 ton cooling, 230KBtuh	1	each	9,255.00	1,483.00		$10,738
	6 ton cooling, 140KBtuh	1	each	4,750.00	1,125.00		$5,875
	5 ton cooling, 112KBtuh	1	each	4,050.00	1,050.00		$5,100
	4 ton cooling, 95KBtuh	1	each	3,700.00	975.00		$4,675
Crane Rental	weekly rental covered in Bed, Bath & Beyond						
TOTAL							$81,025
Modified System							
Rooftop HVAC	25 ton cooling, 450KBtuh	2	each	19,500.00	2,250.00		$43,500
	17.5 ton cooling, 330KBtuh	2	each	13,495.00	1,717.00		$30,424
Crane Rental	weekly rental covered in Bed, Bath & Beyond						
Additional Ductwork	Galvanized steel, 1,000 to 2,000 lb	1716.7	lbs	0.38	2.97		$5,751
Turning Vane	Double thick, 14" high set	13	L.F.	6.40	1.76		$106
TOTAL							$79,781

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Questions...