



Foundry at 41st

Emily Roarty

Advisor: Dr. David Riley

Foundry at 41st

Introduction

- Depth 1: Kitchen Plumbing Manifold
 - Problem and Goals
 - Background Information
 - Execution
 - Recommendations
- Depth 2: Hollow-Core Concrete Plank
 - Problem and Goals
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 - Execution
 - Structural Breadth
 - Recommendations
- Depth 3: LEED Goals and Green Roof
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 - Mechanical Breadth
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- Depth 4: Minimal Living Research
 - Problem and Goals
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 - Recommendations
- Conclusion

Introduction:

- Architecture
- Cost and Schedule
- Logistics

Architecture



Building Facts

Project	The Foundry at 41st
Location	Lawrenceville, PA
Owner	FL Willow Developers
Type of Project	Residential
Gross Square Feet	164,997 square feet
Floor Stories/ Units	6 stories/ 184 units
Project Team	
Owner	FL Willow Developers
Construction Manager	PJ Dick
Architect	Rothschild Dayno
MEP	Allan & Shariff
Structural	Atlantic Engineering Services
Schedule	November 2015-May 2017
Budget	\$35 million
Delivery Method	Design Bid Build

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Introduction:
Architecture
Cost and Schedule
Logistics

Cost

Total Budget	\$35 million
Total Cost	\$25 million
Cost/ Square Feet	\$151.52

Schedule

Total Schedule (years)	2 years
Total Schedule (months)	24 months
Dates	November 2015 to May 2017

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Introduction:
Architecture
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Logistics

Characteristics:
-Tight, Urban Site
-Laydown Area in Courtyard

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Depth 1: Kitchen Plumbing Manifold

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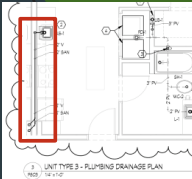
Depth 1: Kitchen Plumbing Manifold



25' 3"

Problem:

- Redundancy in plumbing back to back Kitchen and Bathroom Units



UNIT TYPE 3 - PLUMBING DRAINAGE PLAN
WALL 7' 0" x 10' 0"

Goals:

- Save on waste plumbing
- Save on Schedule
- Reduce Costs

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Depth 4: Minimal Living Research

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Depth 1: Kitchen Plumbing Manifold

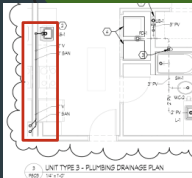
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Depth 1: Background Information

Key	Unit	Count
Kitchen	3 to 3	43
Bath	3 to 3	28
Bath	3 to 1	10
Bath	3 to 2	1
Master	3 to 2	1
Master	3 to 2	1
Master	3 to 2	1
Master	3 to 2	1
Master	3 to 2	1
Master	3 to 2	1

Identified:


- 43 instances of Unit 3 to Unit 3 Kitchens
- 28 instances of Unit 3 to Unit 3 Bathrooms
- 10 instances of Unit 3 to Unit 1 Bathrooms



UNIT TYPE 3 - PLUMBING DRAINAGE PLAN
WALL 7' 0" x 10' 0"

Focused on the 43 shared wall instances of Unit 3 to Unit 3 in Wall Kitchens

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Depth 2: Hollow-Core Concrete Plank

- Problem and Goals
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Depth 2: Hollow-Core Concrete Plank

Problem:

- Schedule Intensive Second Floor Cast in Place Concrete Floor
- Existing System:

LEVEL 2 (SLAB/DECK) SCHEDULE

MARK	TYPE	REINFORCING	TOTAL THICKNESS
10	15" H WY CORRUG. SLAB/DECK 20 GA COMP STEEL DECK	REINFC W 20# W/ 10" ON C	7 1/2"

Goals:

- Reduce the Schedule of Second Floor Construction
- Reduce Labor Costs
- Meet or Exceed Material Property Requirements

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Depth 2: Hollow-Core Concrete Plank

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Depth 2: Background Information

	Hollow-core	Double Tee	Push-Tension Cast
Span to Depth Ratio	Excellent	Good	In place
Construction Speed	Excellent	Excellent	Poor
ASTC Ratings	Excellent	Good	Excellent
Shoring Required	No	No	Yes (Significant)
Immediate Safe Working Platform	Yes	Yes	No
Span Lengths	Up to 30 ft	Up to 60 ft	Up to 90 ft
Typical Use	Problem Slabs Residential Floors Hospitality	Parking Garages Office Buildings Warehouse	Problem Slabs Residential Floors Parking Garages Office Buildings
Fire Rating	2 Hour	2 Hour	2 Hour
Contractor Benefits	Reduced Risk Speed of Construction Design Assistance	Reduced Risk Speed of Construction Design Assistance	Self Performance

Hollow Core Concrete Plank:

- Spans up to 30 ft
- Precast
- 2 Hour Fire Rating

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Depth 2: Hollow-Core Concrete Plank

- ✓ Problem and Goals
- ✓ Background Information
- ✓ Execution
- ✓ Structural Breadth
- Recommendations

Depth 2: Hollow-Core Concrete Plank

Goals:

- ✓ Reduce the Schedule of Second Floor Construction
- X Reduce Labor Costs
- ✓ Meet or Exceed Material Property Requirements

Recommendation:

- Yes, I would recommend on basis of:
- ✓ Reduced Schedule of 22 days
- ✓ Exceeds the material property

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Depth 3: LEED Implementation and Goals

- Problem and Goals
- Background Information
- Execution
- Mechanical Breadth
- Recommendations

Depth 3: LEED Implementation and Goals

Problem:

- Existing building can be LEED certified with Building Size Adjustment
- How can financially justify LEED accreditation



Goals:

- Perform the Size Adjustment
- Financially Justify LEED accreditation
- Objectives to reach Silver or Gold

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Depth 3: LEED Implementation and Goals

- ✓ Problem and Goals
- Background Information
- Execution
- Mechanical Breadth
- Recommendations

Depth 3: Background Information

- With the size adjustment, the Foundry is LEED Certified.
- If the Energy and Atmosphere points were pursued it could reach Silver or Goal Status.


Prerequisite/ Credit	Verification Strategy	Verification Status	Verification Notes	Submittal Date or Self-Reporting
EA - Annual Energy Use	Provide annual energy data and basis for calculating base annual energy use.	Not Pursued	With the size adjustment, the building is not pursuing the EA credit as it is not required for this building.	None
EA - Energy Related Goals	LEED Energy Related Goals	Not Pursued	With the size adjustment, the building is not pursuing the EA credit as it is not required for this building.	None
EA - Energy Related Goals	LEED Energy Related Goals	Not Pursued	With the size adjustment, the building is not pursuing the EA credit as it is not required for this building.	None

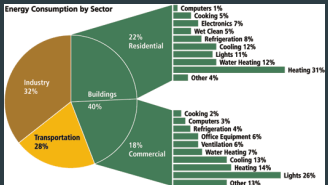


Size Adjustment:
Lowered Standard by 5 pts:

- Certified, 35
- Silver, 45
- Gold, 55
- Platinum 75 points

Maximum Score (pts)	Maximum Score (pts) by number of prerequisites	Adjustment to award threshold
35	35	0
45	45	0
55	55	0
65	65	0
75	75	0
85	85	0
95	95	0
105	105	0
115	115	0
125	125	0
135	135	0
145	145	0
155	155	0
165	165	0
175	175	0
185	185	0
195	195	0
205	205	0
215	215	0
225	225	0
235	235	0
245	245	0
255	255	0
265	265	0
275	275	0
285	285	0
295	295	0
305	305	0
315	315	0
325	325	0
335	335	0
345	345	0
355	355	0
365	365	0
375	375	0
385	385	0
395	395	0
405	405	0
415	415	0
425	425	0
435	435	0
445	445	0
455	455	0
465	465	0
475	475	0
485	485	0
495	495	0
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535	535	0
545	545	0
555	555	0
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575	575	0
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595	595	0
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615	615	0
625	625	0
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655	655	0
665	665	0
675	675	0
685	685	0
695	695	0
705	705	0
715	715	0
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885	885	0
895	895	0
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3455	34	

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<p>Foundry at 41st</p> <p>Introduction</p> <p>Depth 1: Kitchen Plumbing Manifold</p> <p>Problem and Goals</p> <p>Background Information</p> <p>Execution</p> <p>Recommendations</p> <p>Depth 2: Hollow-Core Concrete Plank</p> <p>Problem and Goals</p> <p>Background Information</p> <p>Execution</p> <p>Structural Breadth</p> <p>Recommendations</p> <p>Depth 3: LEED Goals and Green Roof</p> <p>Problem and Goals</p> <p>Background Information</p> <p>Execution</p> <p>Mechanical Breadth</p> <p>Recommendations</p> <p>Depth 4: Minimal Living Research</p> <p>Problem and Goals</p> <p>Background Information</p> <p>Execution</p> <p>Recommendations</p> <p>Conclusion</p>	<p>Depth 4: Minimal Living Research</p> <ul style="list-style-type: none"> ○ Problem and Goals ○ Background Information ○ Execution ○ Recommendations 	<p>Depth 4: Minimal Living Research</p> <p>Problem:</p> <p>Increased Consumption is damaging our environment.</p>  <p>The pie chart shows energy consumption by sector: Industry (32%), Buildings (60%), and Transportation (8%). The bar chart breaks down Buildings into Residential (22%) and Commercial (38%). Residential energy use includes Heating (31%), Water Heating (12%), Cooling (12%), Lights (11%), Refrigeration (8%), Hot Water (5%), Electronics (7%), and Computers (1%). Commercial energy use includes Heating (14%), Cooling (13%), Water Heating (7%), Refrigeration (6%), Office Equipment (6%), Ventilation (6%), Computers (2%), and Cooking (2%).</p>	<p>Goals:</p> <ul style="list-style-type: none"> ○ Sustainable Living ○ Simpler lifestyle ○ Economic justification
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Foundry at 41st

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Depth 4: Minimal Living Research

Currently there is \$2.2 Billion Dollar Storage Industry.

According to the Self Storage Association
 “physically possible that **every American** could stand — all at the same time — under the total canopy of self-storage roofing.”

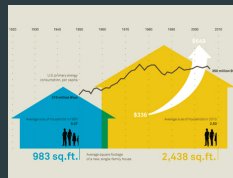


Foundry at 41st

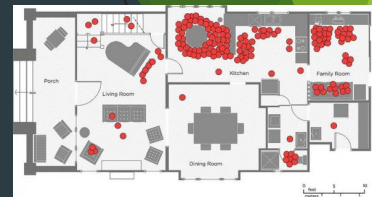
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Depth 4: Background Information



3x as much space per person now than in the 1950's



A Family of 4 Uses **40%** of Space

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 ○ Recommendations

Depth 4: Execution

Redesign of 6th Floor

Average Sq.
 Ft. Reduction
 of 450 sq. ft.
 or 40%

600 1050

Redesign 6th Floor Plan



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 ○ Recommendations

Depth 4: Execution



675 sq ft- 2 bed



530 sq ft- Micro

Unit Type	Quantity	Area per unit	Total Area
2 bed	10	675	6750
Micro	12	532	6384
			13134
Unit Type	Quantity	Cost per unit	Monthly Income
2 bed	10	1900	19000
Micro	12	1000	12000
			31000

Broke even on cost:
 - before 28,000 monthly income.
 Additional 10,000 sq. ft. roof terrace
 -tenants can have green roof and terrace

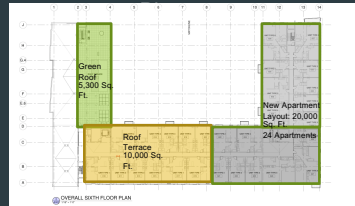
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 ✓ Problem and Goals
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Depth 4: Execution

Breakdown



New Layout
 12, Micros
 10, 2 Beds
 =24 rooms,
 32 people



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 ✓ Problem and Goals
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 ✓ Execution
 ○ Recommendations

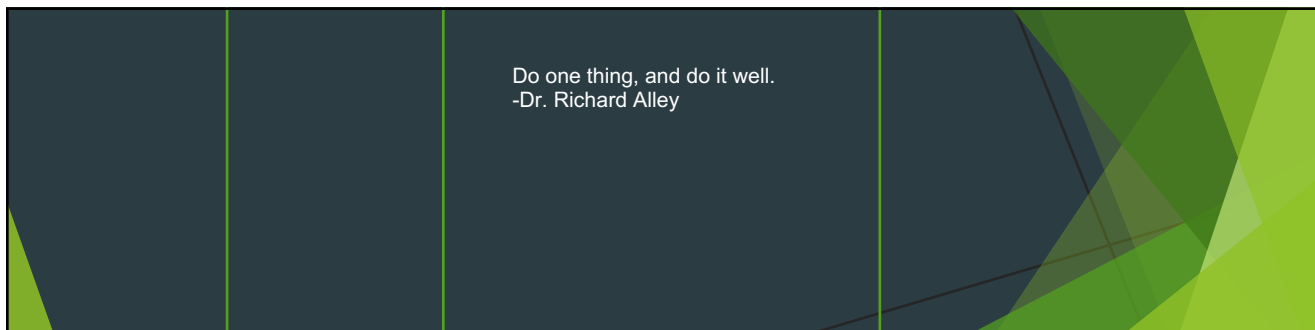
Depth 4: Minimal Living Research

Goals:
 ✓ Ensure that building is using sustainable finishes
 ✓ Create a design for a sustainable living floor

Recommendation:
 Yes, I would recommend.

○ Economically and Environmentally makes sense for the Foundry

<p>Foundry at 41st</p> <p>Introduction</p> <p>Depth 1: Kitchen Plumbing Manifold</p> <p>Problem and Goals</p> <p>Background Information</p> <p>Execution</p> <p>Recommendations</p> <p>Depth 2: Hollow-Core Concrete Plank</p> <p>Problem and Goals</p> <p>Background Information</p> <p>Execution</p> <p>Structural Breadth</p> <p>Recommendations</p> <p>Depth 3: LEED Goals and Green Roof</p> <p>Problem and Goals</p> <p>Background Information</p> <p>Execution</p> <p>Mechanical Breadth</p> <p>Recommendations</p> <p>Depth 4: Minimal Living Research</p> <p>Problem and Goals</p> <p>Background Information</p> <p>Execution</p> <p>Recommendations</p> <p>Conclusion</p>		<p>Conclusion</p> <p>Depth 1: Kitchen Plumbing Manifold</p> <ul style="list-style-type: none"> ✓ Save on waste plumbing ✓ Save 8 days on Schedule X Reduce Costs <p>Depth 3: LEED Goals and Green Roof</p> <p>Breadth 2: Mechanical</p> <ul style="list-style-type: none"> ✓ Perform the Size Adjustment ✓ Financially Justify LEED accreditation ✓ Objectives to reach Silver or Gold 	<p>Depth 2: Hollow-Core Concrete Plank</p> <p>Breadth 1: Structural</p> <ul style="list-style-type: none"> ✓ Reduce the Schedule of Second Floor Construction X Reduce Labor Costs ✓ Meet or Exceed Material Property Requirements <p>Depth 4: Minimal Living Research</p> <ul style="list-style-type: none"> ✓ Reduction of the overall floorplan ✓ Create a design for a sustainable living floor
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Foundry at 41st

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Mechanical Breadth

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Depth 4: Minimal Living Research

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Conclusion

Thank You!

PJ Dick	Project	Supports	Academic
Bryan Passarella	Walnut Capital	Mom and Dad	Dr. David Riley
Jude Champion	Rothschild Deyno	Diana Malcom	Dr. Robert Leicht
Bruce AES		Ronda Stern	Dr. Moses Ling
Eric Pasucci	Allen & Shariff	Matt Grimes	Dr. John Messner

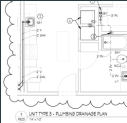
Thanks to all the Partners



Appendix.

1. Plumbing Manifold

Item	Quantity
Plumbing Manifold	1
Single Plumbing Manifold	1
Total Number of Linear Feet for 43 Manifolds	1,598



Dimensions: 18.7 ft approximately 20 ft long
Dimension of Track: 48 ft long
Dimension of Track: 8 ft wide
Approximately 11 trackloads of 4 manifold each to the site
51.7 mile 7.7 mile 2.1 mile 11 mile 529.2 mile
56.7 hour 8 hour day 10: 55360
Total Cost of 11 manifolds: \$56.95

2. Hollow Core Plank

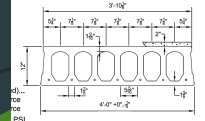
LEVEL 2 (SLAB/DECK) SCHEDULE			
MARK	TYPE	REINFORCING	TOTAL THICKNESS
B2	15'x4'x10' CONCRETE SLAB ON 2"x8" GALV. STEEL DECK REINFORCED WITH 2" TOPPING	7'x10'	7'x10'

	Hollow-core	Double Tee	Post-Tensioned Cast in place
Span to Depth Ratio	Excellent	Good	Excellent
Construction Speed	Excellent	Excellent	Excellent
ATC Ratings	Excellent	Good	Excellent
Shoring Required	No	No	Yes (Shoring)
Immediate Safe	Yes	Yes	No
Span Lengths	Up to 30 ft	Up to 60 ft	Up to 30 ft
Typical Use	Residential Floors	Parking Garages	Residential Floors
Hospitality	Residential Floors	Office Buildings	Parking Garages
Fire Rating	2 Hour	2 Hour	2 Hour
Contractor Benefit	Reduced Risk	Reduced Risk	Good Performance
Speed of Construction	Speed of Construction	Speed of Construction	Speed of Construction

Prestressed Concrete 12"x4'-0" NiCore Plank

2 Hour Fire Resistance Rating With 2" Topping

PHYSICAL PROPERTIES
Composite Section
 $A_c = 361 \text{ in}^2$ Precast $b_w = 14.25 \text{ in}$
 $L = 7840 \text{ in}$ Precast $S_{top} = 1081 \text{ in}^3$
 $V_{cp} = 7.26 \text{ in}$ Topping $S_{top} = 1644 \text{ in}^3$
 $V_{cp} = 4.74 \text{ in}$ Precast $S_{top} = 1653 \text{ in}^3$
 $V_{cp} = 6.74 \text{ in}$ Precast $W_L = 308 \text{ PLF}$
 $V_{cp} = 6.74 \text{ in}$ Precast $W_L = 77.00 \text{ PSF}$



Appendix.

3. LEED Certification

Threshold Adjustment (point range - 0 to +10)				
Maximum home size (SF) by number of bedrooms				
1-2	3	4	5	Adjustment to point threshold
Bedroom	Bedroom	Bedroom	Bedroom	Bedroom
500	600	700	800	0
550	650	750	850	-10
600	700	800	900	-5
650	750	850	950	-5
700	800	900	1000	-5
750	850	950	1050	-5
800	900	1000	1100	-5
850	950	1050	1150	-5
900	1000	1100	1200	-5
950	1050	1150	1250	-5
1000	1100	1200	1300	-5
1050	1150	1250	1350	-5
1100	1200	1300	1400	-5
1150	1250	1350	1450	-5
1200	1300	1400	1500	-5
1250	1350	1450	1550	-5
1300	1400	1500	1600	-5
1350	1450	1550	1650	-5
1400	1500	1600	1700	-5
1450	1550	1650	1750	-5
1500	1600	1700	1800	-5
1550	1650	1750	1850	-5
1600	1700	1800	1900	-5
1650	1750	1850	1950	-5
1700	1800	1900	2000	-5
1750	1850	1950	2050	-5
1800	1900	2000	2100	-5
1850	1950	2050	2150	-5
1900	2000	2100	2200	-5
1950	2050	2150	2250	-5
2000	2100	2200	2300	-5
2050	2150	2250	2350	-5
2100	2200	2300	2400	-5
2150	2250	2350	2450	-5
2200	2300	2400	2500	-5
2250	2350	2450	2550	-5
2300	2400	2500	2600	-5
2350	2450	2550	2650	-5
2400	2500	2600	2700	-5
2450	2550	2650	2750	-5
2500	2600	2700	2800	-5
2550	2650	2750	2850	-5
2600	2700	2800	2900	-5
2650	2750	2850	2950	-5
2700	2800	2900	3000	-5
2750	2850	2950	3050	-5
2800	2900	3000	3100	-5
2850	2950	3050	3150	-5
2900	3000	3100	3200	-5
2950	3050	3150	3250	-5
3000	3100	3200	3300	-5
3050	3150	3250	3350	-5
3100	3200	3300	3400	-5
3150	3250	3350	3450	-5
3200	3300	3400	3500	-5
3250	3350	3450	3550	-5
3300	3400	3500	3600	-5
3350	3450	3550	3650	-5
3400	3500	3600	3700	-5
3450	3550	3650	3750	-5
3500	3600	3700	3800	-5
3550	3650	3750	3850	-5
3600	3700	3800	3900	-5
3650	3750	3850	3950	-5
3700	3800	3900	4000	-5
3750	3850	3950	4050	-5
3800	3900	4000	4100	-5
3850	3950	4050	4150	-5
3900	4000	4100	4200	-5
3950	4050	4150	4250	-5
4000	4100	4200	4300	-5
4050	4150	4250	4350	-5
4100	4200	4300	4400	-5
4150	4250	4350	4450	-5
4200	4300	4400	4500	-5
4250	4350	4450	4550	-5
4300	4400	4500	4600	-5
4350	4450	4550	4650	-5
4400	4500	4600	4700	-5
4450	4550	4650	4750	-5
4500	4600	4700	4800	-5
4550	4650	4750	4850	-5
4600	4700	4800	4900	-5
4650	4750	4850	4950	-5
4700	4800	4900	5000	-5
4750	4850	4950	5050	-5
4800	4900	5000	5100	-5
4850	4950	5050	5150	-5
4900	5000	5100	5200	-5
4950	5050	5150	5250	-5
5000	5100	5200	5300	-5
5050	5150	5250	5350	-5
5100	5200	5300	5400	-5
5150	5250	5350	5450	-5
5200	5300	5400	5500	-5
5250	5350	5450	5550	-5
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5800	5900	6000	6100	-5
5850	5950	6050	6150	-5
5900	6000	6100	6200	-5
5950	6050	6150	6250	-5
6000	6100	6200	6300	-5
6050	6150	6250	6350	-5
6100	6200	6300	6400	-5
6150	6250	6350	6450	-5
6200	6300	6400	6500	-5
6250	6350	6450	6550	-5
6300	6400	6500	6600	-5
6350	6450	6550	6650	-5
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6800	6900	7000	7100	-5
6850	6950	7050	7150	-5
6900	7000	7100	7200	-5
6950	7050	7150	7250	-5
7000	7100	7200	7300	-5
7050	7150	7250	7350	-5
7100	7200	7300	7400	-5
7150	7250	7350	7450	-5
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7900	8000	8100	8200	-5
7950	8050	8150	8250	-5
8000	8100	8200	8300	-5
8050	8150	8250	8350	-5
8100	8200	8300	8400	-5
8150	8250	8350	8450	-5
8200	8300	8400	8500	-5
8250	8350	8450	8550	-5
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9950	10050	10150	10250	-5
10000	10100	10200	10300	-5
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10100	10200	10300	10400	-5
10150	10250	10350	10450	-5
10200	10300	10400	10500	-5
10250	10350	10450	10550	-5
10300	10400	10500	10600	-5
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10400	10500	10600	10700	-5
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11000	11100	11200	11300	-5
11050	11150	11250	11350	-5
11100	11200	11300	11400	-5
11150	11250	11350	11450	-5
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11350	11450	11550	11650	-5
11400	11500	11600	11700	-5
11450	11550	11650	11750	-5
11500	11600	11700	11800	-5
11550	11650	11750	11850	-5
11600	11700	11800	11900	-5
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11800	11900	12000	12100	-5
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11900	12000	12100	12200	-5
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12500	12600	12700	12800	-5
12550	12650	12750	12850	-5
12600	12700	12800	12900	-5
12650	12750	12850	12950	-5
12700	12800	12900	13000	-5
12750	12850	12950	13050	-5
12800	12900	13000	13100	-5
12850	12950	13050	13150	-5
12900	13000	13100	13200	-5
12950	13050	13150	13250	-5
13000	13100	13200	13300	-5
13050	13150	13250	13350	-5
13100	13200	13300	13400	-5
13150	13250	13350	13450	-5
13200	13300	13400	13500	-5
13250	13350	13450	13550	-5
133				