DERRY TRANSFER STATION AND RECYCLING CENTER DESIGN
PHASE 1 – FEASIBILITY STUDY

FOR
TOWN OF DERRY, NEW HAMPSHIRE

DECEMBER 2012

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December 28, 2012

Mr. Michael A. Fowler, P.E., Director
Department of Public Works
14 Manning Street
Derry, NH 03038

RE: Transfer Station and Reycling Facility Design
Phase 1 – Feasibility Study
Kleinfelder Reference No.: 2012184.01-A

Dear Mr. Fowler:

Enclosed is the Feasibility Study Report for the Transfer Station and Recycling Facility Design. The report documents the work completed by Kleinfelder and incorporates comments provided by the Town during the October 4, 2012 progress meeting and subsequent telephone discussions. The report covers the following topics:

- Traffic observations.
- Solid waste and recycling data review and projections.
- Facility Sizing.
- Baler Equipment Evaluation.
- Concepts for Transfer Station and Recycling Facility.

As discussed, three main layout concepts were developed including 1) Retain Existing Facilities, 2) New Facility in the Yard Waste Area, and 3) New Facility in the Soil Stockpile Area. Each layout concept had two options to consider. Based on the October 4, 2012 progress meeting and subsequent discussions, Layout 3B was determined to be the preferred layout as it most closely addresses the operational objectives the Town expressed during the proposal phase. Layout 3B has been refined over time and documented in Layout 3B – Revised and Layout 3C.

This report completes the Phase 1 of the Transfer Station and Recycling Center Design project and provides a firm foundation from which to base a final design phase.

Please contact us to discuss this report or to begin planning of the design and permitting phase.

Respectfully yours,

KLEINFELDER

FOR

Stephen E. Wright, P.E.
Project Manager

Ronald St. Michel, P.E.
Senior Project Engineer

Enclosures

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1. TRAFFIC OBSERVATIONS

1.1 Traffic Observations

On Saturday, August 25, 2012 Kleinfelder provided two people to observe traffic patterns associated with solid waste disposal and recycling activities at the existing transfer station. Kleinfelder noted observations that included:

- Time interval (15 minute periods);
- Number of vehicles in queue;
- Queue duration;
- Off load duration;
- Number of vehicles in queue;
- Nodes visited (i.e. aluminum can roll-off, comingled drop-off area, newspaper container, etc.);
- General observations of people and vehicle movement at the transfer station building area, the metals drop-off area, C&D drop-off area and the truck scale area.

Appendix A contains the traffic observations field data sheets. Table 1.1 - *Raw Data Summary of Vehicles Tracked* provides a summary of the information provided on the data sheets (provided in Appendix B).

Observations were generally made from standing near the off-loading positions in front of the transfer station building. Observations were noted on individual patrons from the time they entered the facility, while in queue, and through off-loading to gain insight as to how the facility is used by various people. While observations were being made on selected vehicles, general observations were also noted regarding the number of vehicles in queue, vehicles parked remotely (not entering the queue), vehicles circling around the facility to avoid the queue line, and activities at other areas.

Table 1.2 – *Data Summary of Vehicles Tracked* provides a summary of how people's time was spent on site.

Table 1.2
Data Summary of Vehicles Tracked[1,2]

Metric	Average	Maximum
Waiting to Off-Load (In the Queue)	0:02:41	0:14:14
Off-Loading	0:02:39	0:07:00
Waiting to Leave	0:00:20	0:04:00
Total Time at the Facility	0:05:29	0:18:00
Number of Nodes Visited	2.47	5
Time per Node Visited	0:01:15	0:05:15
Number of Vehicles at the Facility	15	25

1. Observations performed on August 25, 2012.
2. Average and Maximum values were calculated based on the information shown in Table 1.1 – Raw Data Summary of Vehicles Tracked, see Appendix B.

The most significant information that can be taken from Table 1.2 is that, on average, half of the time spent at the transfer station is spent waiting in queue. Based on the traffic count data for August 25, 2012 (see Table1.3 – *Saturday Traffic Count Data* provided in Appendix B), which was almost half a typical busy Saturday, a larger percentage of time waiting in queue is likely to occur on a typical busy Saturday. Similarly, we would expect increased averages and maximums for each metric in Table 1.2 on a typical busy Saturday.

Other general observations include:

- An initial surge of users enters the site when the facility opens at 7:30 a.m.
- Some users begin off-loading while in queue making fequent walks between their vehicle and the drop-off nodes; while others wait until parked directly in front of the building to begin off-loading.
- Some users, if in the outside lane, would exit the site by circling around the entire transfer station building, if off-loading completed while in queue.
- Some users park in front of or adjacent to the Highway Department building, not entering the queue line, and walk their trash and recyclables to the building.
- Some users, when the queue line is not backed up past the cardboard (OCC) bunker, perform a U-Turn and park in the island just prior to the OCC bunker and face towards the exit and off-load from this location.
- No significant queues were observed at the truck scale.
- No access issues were observed at the metal drop-off area and the C&D drop-off area.
- The vehicle queue line was observed to extend to in front of the office building on this day. Note that queue lines have been observed by Town staff extending to the guard shack at the site entrance on other busier days.

Safety observations include:

- Front-end-loader crossing paths with resident's vehicles on roadway behind transfer station, on roadway to yard waste area, on tipping floor and ramp to tipping floor, crossing main site road when heading toward baler building or the office building.
- Bobcat or loader emptying the OCC bunker and crossing queue line and backing into metals drop-off area.
- One lane moving while other lane is not moving. Residents crossing from standing lane to moving lane are at risk of being struck by moving vehicles.
- Vehicles changing lanes to gain position or to exit more quickly place residents and staff at risk.
- The steep approach to the transfer station building drop-off zone could result in slip, trips and falls during wet or icy conditions or allow vehicles to roll back into another vehicle or resident.

1.2 Traffic Data Summary

The Town provided Kleinfelder with traffic count data from: 1) June 23 through July 3, 2006; 2) June 19 through June 27, 2008; and 3) July 9 through July 20, 2009 that included 24 hour hourly counts of traffic entering the site, which includes the Highway Department facility, transfer station facility and wastewater treatment facility.

Vehicle counts for August 25, 2012 were documented by Kleinfelder in 15 minute increments by watching the Town's video of the site entrance. Table 1.3 – *Saturday Traffic Count Data* provides a summary of the traffic count data by hour and by 15-minute interval when available. From this data the traffic flow in terms of total vehicle count, average hour, peak hour and peak 15 minute interval was calculated. An average of the three busiest Saturdays (June 21, 2008, July 2, 2006 and June 24, 2006) was also calculated and was used in the future projection calculations discussed later in this section. The 2012 and 2009 traffic count data was not used in the Average Busy Saturday calculation because the total vehicle counts were significantly below the other three data sets; therefore, deemed not consistent with a "Busy Saturday" experience. Below is a summary of key traffic data on the average busy Saturday.

Total Vehicles	2,409
Average Hour	301 vehicles
Average 15 Minute	75 vehicles
Peak Hour	337 vehicles
Peak 15 Minute	100 vehicles

A Peaking Factor was calculated by dividing the Peak 15-minute traffic count by the Average 15-minute value (Average Hour Traffic Count divided by four (60 minutes/15 minutes)). The Peaking Factor ranged from 129.60% to 136.61% with an average of 134.09%. The average Peaking Factor is used in the future projection calculations discussed later in this section.

1.3 Traffic Projections

Traffic projections were estimated using a combination of the traffic count data provided by the Town, data recorded by Kleinfelder, and population estimates provided in the Town's Master Plan, dated March 2010. Table 1.4 – *Vehicle Traffic Projections* summarizes these projections and provides a comparison between the preferred concept facility layout and the existing facility layout based on vehicle traffic and available off-loading positions (provided in Appendix B). The traffic data from the August 25, 2012 observation date is provided as a point of reference only. This data was not used to determine traffic projections as it was deemed to be a non-typical Saturday in terms of facility usage. As noted previously, total data for an "Average Busy Saturday" was determined using traffic counts from three busy Saturdays (June 21, 2008, July 2, 2006 and June 24, 2006), see Table 1.3 in Appendix B.

The total projected traffic was calculated using the average busy Saturday traffic flow of 2,409 vehicles and population data for 2008 (34,071), 2012 (37,082) and 2043 (46,292). The traffic flow for years 2012 and 2043 were increased by 213 and 864 vehicles respectively based on the population increase. A 10% participation increase factor was then added to the traffic flow for years 2012 (262 vehicles) and 2043 (327 vehicles). The total projected traffic flow for years 2012 and 2043 is 2,884 and 3,600 vehicles per day (on a busy Saturday).

The projected average hourly traffic flow was then calculated to be 360 and 450 vehicles per hour in 2012 and 2043 respectively. The average 15 minute traffic flow was then calculated by dividing the average hourly traffic flow by four (60 minutes / 15 minutes), resulting in projected average 15 minute traffic flows of 90 and 112 vehicles in 2012 and 2043, respectively. Using the average 15 minute traffic flow and the average Peaking Factor (see above section) the projected 15 minute peak traffic flow was calculated to be 121 and 151 vehicles in 2012 and 2043, respectively.

1.4 Traffic Flow Analysis

The existing traffic flow pattern is a drive-through model using two lanes of traffic (although, as noted earlier, some users park at a distance from the drop-off area and walk their materials to the facility). Based on data recorded on August 25, 2012, the average time spent at the facility was 05:29 (5 minutes 29 seconds) with an average of 02:39 dedicated to off-loading (including walking time).

Alternatively, the proposed traffic flow pattern will be a park-walk model to maximize access to the facility at any one time and improve traffic flow patterns. The preferred concept plan currently provides for 38 parking spaces. Note that the number of parking spaces provided in the final design may change based on site layout constraints. Dividing the average hourly traffic flow by the 38 parking spaces results in 9.49 vehicles per hour per space in 2012. Meaning, that on the average busy Saturday each individual parking space will need to service 9.49 vehicles each hour before queue lines form. Dividing 60 minutes/hour by the 9.49 vehicles/hour/space provides a turn-over rate of 06:20 per vehicle per space. Meaning that a resident will have 06:20 from the time they park to walk their materials (trash and recyclables) to the building, deposit their materials in the appropriate locations, return to their vehicles and exit the parking space. Similarly for 2043, 11.84 vehicles per hour per space usage rate and a turn-over rate of 05:07 are required before queue lines form.

During the peak 15 minute traffic flow period quicker turnover rates are required. The required peak 15 minute usage rate was calculated by dividing the peak 15 minute traffic flow by the 38 parking spaces resulting in 3.18 and 3.97 vehicles per hour per space in 2012 and 2043 respectively. Dividing 15 minutes by the peak 15 minute usage rate results in a turn-over rate of 04:43 in 2012 and 03:47 in 2043.

The time required for the average person to walk from the farthest parking space to the building, walk from one end of the building to the other and back to their vehicle (a total estimated distance of 460 feet), was calculated to be 01:92 based on an average walking speed of 4.0 feet per second. The walking time from a parking space in the middle of the parking lot was calculated to be 01:40 based on a distance of 335 feet.

To determine the total time spent at the proposed facility, time to deposit materials (or off-load) needs to be added to the walking time. As noted in Table 1.2, an average 02:39 was required to deposit five main materials that include trash, OCC, mixed paper, GMP (glass, metal, plastic), and aluminum cans. In the proposed facility the five main materials become eight (trash, OCC, mixed paper, glass, HDPE, PET, steel cans and aluminum cans). This represents a 160% increase in material separation categories (8/5). As a way to account for the additional time associated with increased separation of recyclables, the existing average off-load time of 02:39 was muliplied by the 160% increase and resulted in a projected average off-load time of 04:29 per person.

Therefore, the total on-site time is 05:38 from a middle parking space and 06:10 from the furthest parking space for the average person. A comparison of these values with projected average hour and 15 minute peak turn-over rates indicates that no queue lines would form during the average hour traffic flow on a busy Saturday in 2012. However, the data indicates that queue lines would form during the average hour traffic flow on a busy Saturday in 2043 and during the 15 minute peak traffic flows in 2012 and 2043. Although a calculation of the projected queue line lengths are beyond the scope of the feasibility study, the proposed park-walk model is expected to provide the most efficient operation and flow of traffic.

2. SOLID WASTE & RECYCLING DATA REVIEW & PROJECTIONS

2.1 Review of Existing Data and Calculation of Per Capita Generation Rates

The Town provided Kleinfelder with monthly solid waste (trash) and recycling data brought to the facility between July 2007 and June 2012. The data provided by the Town segregated the material into the following categories:

- Trash;
- Commingled glass, metal and plastic;
- Mixed paper and newspaper;
- Cardboard;
- Light iron; and
- Construction and demolition debris (C&D).

Kleinfelder sorted the data into fiscal years (FY 2008 through FY 2012), focusing specifically on the trash and household recyclables (consisting of commingled glass, metal and plastic; mixed paper and newspaper; and cardboard). The C&D stream was also of interest for the purposes of projecting possible future C&D disposal demands that may be placed on the new facility, but this stream – as well as the light iron stream – is subordinate to the primary focus on estimating trash and household recyclables that will be brought to the facility. The ability to reasonably estimate future quantities of household recyclables has a direct impact on sizing the loose storage requirements for these materials within the proposed building's bunker bays, as well as anticipated bale storage space needs.

Table 2.1 summarizes Kleinfelder's sorting of the Town's past five fiscal years of trash and recycling data brought to the transfer station. Peak disposal months for each material type are highlighted in an gold-colored shade. The table also totals the trash and household recycling quantities and identifies, on a monthly and fiscal year basis, the percentage of trash and household recyclables as a function of the total of these two streams. As shown in the table, the percentage of trash to household recyclables has been fairly steady over the past five years, with trash representing between 75% and 78% of the combined trash and household recyclables tonnage (household recyclables representing between 22% and 25%).

Table 2.1 also provides population data for fiscal years 2008 through 2012. The data is based upon population data provided in the March 2010 Town of Derry Master Plan, prepared by the Southern New Hampshire Planning Commission. The population projection data provided in the Master Plan (Table 2.3 of the Master Plan) includes estimates for 2008, 2010, 2015, 2020, 2025, and 2030. This information was used to estimate population between 2008 and 2012 using straight line projections based off of the Master Plan data. These estimated population figures are shown in the top left of each fiscal year of Table 2.1. Using the population data, per-capita waste generation rates (pounds per person per day) were calculated for each material type for Fiscal Years 2008 through 2012. Total per-capita generation rates for the aggregate of all materials (trash, recyclables, C&D, and light iron) and combined trash and household recyclables were also calculated and are shown in the bottom row of each year of Table 2.1.

Table 2.1
Derry Transfer Station Monthly Tonnage Data for Trash & Recyclables
Fiscal Year 2008 through Fiscal Year 2012

YEAR			Household Recyclables						Trash & Household Recyclables Only		
	Population	34071	(Glass, Metal, Plastic)						TOTAL	Percentages	
	MONTH	TRASH	COMMINGLES	MIXED PAPER & NEWSPAPER	CARDBOARD	LIGHT IRON	C/D	TOTALS		Trash	Household Recylables
FY 2008	Jul-07	760.45	87.27	82.94	37.40	74.43	138.01	1,180.50	968.06	0.79	0.21
	Aug-07	801.34	100.07	111.40	56.79	74.90	130.78	1,275.28	1,069.60	0.75	0.25
	Sep-07	747.90	85.51	95.49	42.37	48.31	113.82	1,133.40	971.27	0.77	0.23
	Oct-07	777.90	85.86	87.18	42.51	76.77	108.67	1,178.89	993.45	0.78	0.22
	Nov-07	830.64	68.56	122.80	50.18	66.75	94.19	1,233.12	1,072.18	0.77	0.23
	Dec-07	700.33	111.74	72.92	44.71	36.73	60.06	1,026.49	929.70	0.75	0.25
	Jan-08	749.45	109.07	91.86	72.99	32.73	50.22	1,106.32	1,023.37	0.73	0.27
	Feb-08	652.83	84.23	77.39	46.05	41.17	56.47	958.14	860.50	0.76	0.24
	Mar-08	667.23	98.21	65.55	0.00	30.30	46.33	907.62	830.99	0.80	0.20
	Apr-08	830.54	73.46	94.42	40.61	84.05	156.84	1,279.92	1,039.03	0.80	0.20
	May-08	786.79	104.85	78.74	35.03	78.50	112.12	1,196.03	1,005.41	0.78	0.22
	Jun-08	773.27	83.32	74.55	70.62	62.24	91.08	1,155.08	1,001.76	0.77	0.23
TOTAL		9,078.67	1,092.15	1,055.24	539.26	706.88	1,158.59	13,630.79	11,765.32	0.77	0.23
% of Total Tonnage		0.67	0.08	0.08	0.04	0.05	0.08	1.00			
Avg Monthly Tonnage		756.56	91.01	87.94	44.94	58.91	96.55	1,135.90			
Peak Month		830.64	111.74	122.80	72.99	84.05	156.84	1,279.92	1,072.18		
		Nov	Dec	Nov	Jan	Apr	Apr	Apr	Nov		
Per Capita (lb/person per day)		1.46	0.18	0.17	0.09	0.11	0.19	2.19	1.89		

YEAR			Household Recyclables						Trash & Household Recyclables Only		
	Population	35316	(Glass, Metal, Plastic)						TOTAL	Percentages	
	MONTH	TRASH	COMMINGLES	MIXED PAPER & NEWSPAPER	CARDBOARD	LIGHT IRON	C/D	TOTALS		Trash	Household Recylables
FY 2009	Jul-08	1,006.33	126.82	100.40	34.26	63.69	143.14	1,474.64	1,267.81	0.79	0.21
	Aug-08	795.57	83.52	67.54	79.45	47.75	123.21	1,197.04	1,026.08	0.78	0.22
	Sep-08	1,014.56	125.28	94.96	126.16	77.65	138.32	1,576.93	1,360.96	0.75	0.25
	Oct-08	769.96	61.23	80.18	149.07	68.28	115.52	1,244.24	1,060.44	0.73	0.27
	Nov-08	741.00	76.13	117.39	36.01	61.15	78.60	1,110.28	970.53	0.76	0.24
	Dec-08	961.64	80.50	103.76	46.73	20.48	69.01	1,282.12	1,192.63	0.81	0.19
	Jan-09	656.47	106.07	48.40	46.58	42.90	44.25	944.67	857.52	0.77	0.23
	Feb-09	612.58	97.59	70.08	92.79	25.08	55.58	953.70	873.04	0.70	0.30
	Mar-09	763.22	144.49	56.36	154.32	46.21	80.95	1,245.55	1,118.39	0.68	0.32
	Apr-09	724.71	83.23	97.59	48.39	67.53	133.34	1,154.79	953.92	0.76	0.24
	May-09	726.42	81.50	49.69	128.96	76.82	122.95	1,186.34	986.57	0.74	0.26
	Jun-09	767.60	112.60	64.74	98.30	68.23	119.14	1,230.61	1,043.24	0.74	0.26
TOTAL		9,540.06	1,178.96	951.09	1,041.02	665.77	1,224.01	14,600.91	12,711.13	0.75	0.25
% of Total Tonnage		0.65	0.08	0.07	0.07	0.05	0.08	1.00			
Avg Monthly Tonnage		795.01	98.25	79.26	86.75	55.48	102.00	1,216.74			
Peak Month		1,014.56	144.49	117.39	154.32	77.65	143.14	1,576.93	1,360.96		
		Sep	Mar	Nov	Mar	Sep	Jul	Sep	Sep		
Per Capita (lb/person per day)		1.48	0.18	0.15	0.16	0.10	0.19	2.27	1.97		

YEAR			Household Recyclables						Trash & Household Recyclables Only		
	Population	36560	(Glass, Metal, Plastic)						TOTAL	Percentages	
	MONTH	TRASH	COMMINGLES	MIXED PAPER & NEWSPAPER	CARDBOARD	LIGHT IRON	C/D	TOTALS		Trash	Household Recylables
FY 2010	Jul-09	899.73	111.02	106.08	89.37	89.12	156.88	1,452.20	1,206.20	0.75	0.25
	Aug-09	705.42	85.69	20.73	89.90	48.62	98.84	1,049.20	901.74	0.78	0.22
	Sep-09	686.74	83.99	57.79	93.01	63.65	84.48	1,069.66	921.53	0.75	0.25
	Oct-09	713.94	112.70	82.00	72.36	60.59	118.01	1,159.60	981.00	0.73	0.27
	Nov-09	684.66	66.09	64.86	54.50	58.75	91.16	1,020.02	870.11	0.79	0.21
	Dec-09	824.69	81.76	92.54	46.97	52.46	72.61	1,171.03	1,045.96	0.79	0.21
	Jan-10	691.80	126.40	71.23	73.85	28.92	42.76	1,034.96	963.28	0.72	0.28
	Feb-10	560.44	87.08	32.30	45.73	21.28	39.95	786.78	725.55	0.77	0.23
	Mar-10	943.94	85.65	101.03	45.43	64.95	108.28	1,349.28	1,176.05	0.80	0.20
	Apr-10	715.89	106.29	57.45	66.28	53.14	134.69	1,133.74	945.91	0.76	0.24
	May-10	762.22	82.23	54.57	0.00	54.85	138.46	1,092.33	899.02	0.85	0.15
	Jun-10	887.65	111.97	74.23	66.20	64.68	148.33	1,353.06	1,140.05	0.78	0.22
TOTAL		9,077.12	1,140.87	814.81	743.60	661.01	1,234.45	13,671.86	11,776.40	0.77	0.23
% of Total Tonnage		0.66	0.08	0.06	0.05	0.05	0.09	1.00			
Avg Monthly Tonnage		756.43	95.07	67.90	61.97	55.08	102.87	1,139.32			
Peak Month		943.94	126.40	106.08	93.01	89.12	156.88	1,452.20	1,206.20		
		Mar	Jan	Jul	Sep	Jul	Jul	Jul	Jul		
Per Capita (lb/person per day)		1.36	0.17	0.12	0.11	0.10	0.19	2.05	1.76		

YEAR			Household Recyclables						Trash & Household Recyclables Only		
	Population	36820	(Glass, Metal, Plastic)						TOTAL	Percentages	
	MONTH	TRASH	COMMINGLES	MIXED PAPER & NEWSPAPER	CARDBOARD	LIGHT IRON	C/D	TOTALS		Trash	Household Recylables
FY 2011	Jul-10	678.89	90.59	36.09	22.86	48.49	98.43	975.35	828.43	0.82	0.18
	Aug-10	670.45	85.32	78.12	41.19	58.97	102.83	1036.88	875.08	0.77	0.23
	Sep-10	856.38	108.52	75.70	45.92	60.04	139.87	1286.43	1086.52	0.79	0.21
	Oct-10	687.85	89.80	64.57	41.27	42.33	91.19	1017.01	883.49	0.78	0.22
	Nov-10	681.58	43.05	81.44	20.39	51.42	107.57	985.45	826.46	0.82	0.18
	Dec-10	869.04	136.51	95.68	80.82	34.16	99.65	1315.86	1182.05	0.74	0.26
	Jan-11	635.53	110.73	46.79	39.00	27.87	46.73	906.65	832.05	0.76	0.24
	Feb-11	582.21	98.87	49.78	58.79	30.72	45.15	865.52	789.65	0.74	0.26
	Mar-11	810.87	117.71	58.61	54.93	46.71	89.86	1178.69	1042.12	0.78	0.22
	Apr-11	712.40	86.89	69.77	20.96	50.02	109.74	1049.78	890.02	0.80	0.20
	May-11	697.60	83.32	62.08	38.22	56.80	103.68	1041.70	881.22	0.79	0.21
	Jun-11	963.33	123.63	55.70	78.42	69.97	152.69	1443.74	1221.08	0.79	0.21
TOTAL		8,846.13	1,174.94	774.33	542.77	577.50	1,187.39	13,103.06	11,338.17	0.78	0.22
% of Total Tonnage		0.68	0.09	0.06	0.04	0.04	0.09	1.00			
Avg Monthly Tonnage		737.18	97.91	64.53	45.23	48.13	98.95	1,091.92			
Peak Month		963.33	136.51	95.68	80.82	69.97	152.69	1,443.74	1,221.08		
		Jun	Jan	Jul	Sep	Jul	Jul	Jun	Jun		
Per Capita (lb/person per day)		1.32	0.17	0.12	0.08	0.09	0.18	1.95	1.69		

YEAR			Household Recyclables						Trash & Household Recyclables Only		
	Population	37082	(Glass, Metal, Plastic)						TOTAL	Percentages	
	MONTH	TRASH	COMMINGLES	MIXED PAPER & NEWSPAPER	CARDBOARD	LIGHT IRON	C/D	TOTALS		Trash	Household Recyclables
FY 2012	Jul-11	657.03	83.82	51.30	45.96	42.27	104.89	985.27	838.11	0.78	0.22
	Aug-11	698.90	122.27	75.90	18.86	47.63	125.80	1089.36	915.93	0.76	0.24
	Sep-11	693.23	68.71	62.30	36.87	52.62	146.71	1060.44	861.11	0.81	0.19
	Oct-11	649.23	139.38	87.53	42.80	38.16	188.90	1146.00	918.94	0.71	0.29
	Nov-11	561.79	73.47	43.69	43.36	38.79	154.14	915.24	722.31	0.78	0.22
	Dec-11	701.23	100.73	84.54	40.14	37.78	137.15	1101.57	926.64	0.76	0.24
	Jan-12	622.22	80.19	51.23	39.63	26.30	187.77	1007.34	793.27	0.78	0.22
	Feb-12	571.45	86.07	49.93	40.66	22.41	77.89	848.41	748.11	0.76	0.24
	Mar-12	804.52	90.96	56.37	35.63	41.33	183.06	1211.87	987.48	0.81	0.19
	Apr-12	628.49	84.68	51.02	34.13	38.18	135.21	971.71	798.32	0.79	0.21
	May-12	658.65	79.54	63.87	33.66	45.51	165.81	1047.04	835.72	0.79	0.21
	Jun-12	885.76	88.48	64.58	47.39	46.89	211.59	1344.69	1086.21	0.82	0.18
TOTAL		8,132.50	1,098.30	742.26	459.09	477.87	1,818.92	12,728.94	10,432.15	0.78	0.22
% of Total Tonnage		0.64	0.09	0.06	0.04	0.04	0.14	1.00			
Avg Monthly Tonnage		677.71	91.53	61.86	38.26	39.82	151.58	1,060.75			
Peak Month		885.76	139.38	87.53	47.39	52.62	211.59	1,344.69	1,086.21		
		Jun	Oct	Oct	Jun	Sep	Jun	Jun	Jun		
Per Capita (lb/person per day)		1.20	0.16	0.11	0.07	0.07	0.27	1.88	1.54		

Note: Maximum monthly tonnages and maximum monthly per capita generation rates are highlighted with gold shading.

Average Trash & Houshold Recyclables Recorded From FY 2008 to FY 2012: 11,604.63

The information presented in Table 2.1, combined with future population projections for the Town of Derry, served as the basis for projecting future trash and recyclable quantities that will be brought to the proposed facility. These projections were then used to estimate trash and recyclable storage requirements appropriate for the facility.

2.2 Solid Waste and Recycling Projections

Solid waste and recycling projections were developed using the peak per capita generation rates associated with each material type recorded during the past five years, as highlighted in Table 2.1. For example, as shown in Table 2.1, the peak per capita generation rate for trash was recorded in FY 2009 (1.48 lbs/person/day), whereas the peak generation rate for mixed paper and newspaper was recorded in FY 2008 (0.17 lbs/person/day). These peak per capita generation rates for each material type were then applied to Derry's current population estimate for 2012 (37,082) to estimate current peak tonnages that the Town may experience at the facility. The same peak generation rates were also applied to the future population projection for Derry in 2043 (46,292).

The solid waste and recycling projections for 2012 and 2043, using the previous five year peak per capita generation rates, are summarized in Table 2.2 (2012) and Table 2.3 (2043) below.

Table 2.2
Current (2012) Peak Solid Waste and Household Recycling Projections

2012 Population: 37,082							
		Household Recyclables			Trash & Household Recyclables Only		
	Trash	Commingles (Glass, Metal, Plastic)	Mixed Paper & Newspaper	Cardboard	TOTALS	Percentages	
						Trash	Household Recyclables
Per Capita Gen Rates (lbs/person/day) →	1.48	0.18	0.17	0.16	1.99	74%	26%
Tons →	10,017	1,237	1,148	1,093	13,496	10,017	3,479

1. Per capita generation rates (highlighted in gold) taken from peak rates recorded for each material type for FY 2008 through FY 2012 (see Table 2.1).
2. Population for 2012 based on population estimates provided in the March 2010 Town of Derry Master Plan, prepared by the Southern New Hampshire Planning Commission. The population projection data provided in the Master Plan for 2010 and 2015 was used to estimate the 2012 population of 37,082 (straight line projection).

Table 2.3
Future (2042) Peak Solid Waste and Household Recycling Projections

2043 Population: 46,292							
		Household Recyclables			Trash & Household Recyclables Only		
	Trash	Commingles (Glass, Metal, Plastic)	Mixed Paper & Newspaper	Cardboard	TOTALS	Percentages	
						Trash	Household Recyclables
Per Capita Gen Rates (lbs/person/day) →	1.48	0.18	0.17	0.16	1.99	74%	26%
Tons →	12,505	1,545	1,433	1,364	16,848	12,505	4,343

1. Per capita generation rates (highlighted in gold) taken from peak rates recorded for each material type for FY 2008 through FY 2012 (see Table 2.1).
2. Population for 2043 based on population estimates provided in the March 2010 Town of Derry Master Plan, prepared by the Southern New Hampshire Planning Commission (SNHPC). The population figure of 46,292 was obtained from Appendix D – *Derry New Hampshire Buildout Report*, prepared by SNHPC in connection with the I93 Community Technical Assistance Program. The population figure of 46,292 represents the Community Scenario, provided on Page D-20 of the Buildout Report (2043 population).

Based on the information provided in Table 2.2, the projected peak tonnage for trash and household recyclables that could be brought to the facility (existing or new) under current conditions is estimated at approximately 13,500 tons per year. The average tonnage for trash and household recyclables brought to the facility during the past five years is approximately 11,600 tons per year (see Table 2.1), meaning the peak demands estimated in Table 2.1 represent approximately a 15 percent increase to the average demands placed on the facility over the past 5 years.

The long-range projections provided in Table 2.3 represent the design basis quantities for the new transfer station and recycling facility. While the future trash and recycling demands will serve as the basis for sizing the facility, the estimated peak tonnages for 2012 will also be carried forward in the facility sizing calculations for the purposes of providing the Town with a comparison of how the size and operation of the facility will vary if it were designed for current tonnages that have been peaked (Table 2.2) versus long-range projected tonnage demands (Table 2.3).

2.3 Estimating Individual Recycling Stream Tonnages

Having generated the trash and household recycling projections, the next step in the waste stream analysis is to estimate the individual material components of the household recycling stream. For example, although Tables 2.2 and 2.3 provide aggregated estimates for commingled glass, metal and plastic, the amount of this total that consists of glass only, versus metal only, versus plastic only must be estimated so that bunker bay storage is provided within the building for the source-separation of each material that the Town will be accepting and baling.

For the purposes of identifying storage volume requirements for source-separated recyclables at the new facility, the household recycling tonnages provided in Tables 2.2 and 2.3 were divided into the following individual streams:

Table 2.4
Components of Household Recycling Stream Used to Refine Material Storage Requirements at Proposed Facility

Household Recycling Stream	Individual Components of Recycling Stream
Glass	Glass
Metal	Steel & Tin
	Aluminum
Plastic	PET (#1)
	HDPE (#2)
	#3 – #7
Paper	Newspaper (ONP)
	Mixed Paper
	Cardboard (OCC)

Using national data available from the EPA, Kleinfelder has estimated the percentage distribution of the individual components of each recycling stream (for metals, percentage of steel cans and percentage of aluminum cans; for plastic, percentage of PET, percentage of HDPE, and percentage of #3 - #7, and similar percentages for newspaper, mixed paper and cardboard of the paper stream). The percentages of the individual components of the glass, metal and plastic recycling streams were derived from solid waste data provided in the EPA document entitled *Municipal Solid Waste Generation, Recycling, and Disposal in the United States, December 2010.*

Kleinfelder compiled data provided in various tables in the EPA document where the data pertains to materials referenced in Table 2.4. The compilation of this data, showing percentages of household recyclables in the solid waste stream, is presented in Table 2.5. As shown in Table 2.5, the theoretical maximum recycling rate for glass, metal, paper and plastic is estimated at 35 percent of the waste stream and based on actual EPA recycling rates for these materials, the national recovery rate is approximately 21 percent.

The theoretical maximum recycling rates for each material type derived and presented in Table 2.5 are used to further refine the individual recycling rates for the individual components of each recycling stream. These component recycling rates for household glass, metal, and plastic materials are calculated and presented in Table 2.6 (Plastic), Table 2.7 (Paper), and Table 2.8 (Metal).

Table 2.5
Percentages of Household Recyclables in the Solid Waste Stream Derived from EPA Data

TOTAL WASTE GENERATION (EPA, 2010), Million Tons

These figures are for all waste materials generated, of which some are not routinely recycled. For example, "plastics" includes durable and non-durable goods, as well as containers and packaging. Of this amount, about half is durable and non-durable goods - and these materials are not readily recyclable. Therefore, the portion of the total material generated that is readily recyclable (mostly containers and packaging) was identified and these materials are summarized in the table below.

Estimated Portion of Total Waste Stream that is a Household Recyclable Material

	TOTAL MSW (EPA Table 1)			Durable Goods (EPA Tables 5&6) (Million Tons)	Non-Durable Goods (EPA Table 15) (Million Tons)			Containers & Packaging (EPA Table 18) (Million Tons)			Total Non-Durable and Containers & Packaging (Million Tons)	Theor % of Material that could be Recycled	Theor % of Total Household Waste Stream that could be Recycled	Actual Recycled (EPA Tables 16 & 20)	
	Material	Million Tons	% of Total		ONP	Books/Mags/ Office Paper	Other	Steel	Aluminum	Other				Mill of Tons	Current Recycle Rate
	Paper	71.3	28.5%	NA	9.88	10.32	NA	NA	NA	37.7	57.9	81%	23.2%	44.57	17.8%
	Yard Waste	33.4	13.4%	NA	NA	NA	NA	NA	NA	NA	0				
EPA Table 7	Plastics	31.0	12.4%	10.96	NA	NA	0.89 α	NA	NA	13.7 β	14.59	47%	5.8%	1.85	0.7%
	Rubber & Leather	7.8	3.1%	NA	NA	NA	NA	NA	NA	NA	0				
	Textiles	13.1	5.2%	NA	NA	NA	NA	NA	NA	NA	0				
EPA Table 6	Metals	22.4	9.0%	17.57	NA	NA	NA	2.74	1.9	NA	4.64	21%	1.9%	2.57	1.0%
	Wood	15.9	6.4%	NA	NA	NA	NA	NA	NA	NA	0				
	Food Waste	34.8	13.9%	NA	NA	NA	NA	NA	NA	NA	0				
EPA Table 5	Glass	11.5	4.6%	2.17	NA	NA	NA	NA	NA	9.4	9.4	82%	3.8%	3.13	1.3%
	Other	8.6	3.4%	NA	NA	NA	NA	NA	NA	0.34	0.34				
	TOTAL	**249.8**	**100.0%**										**34.6%**		**20.9%**

Note: EPA tables referenced in Table 2.5 refer to data tables provided in the EPA document entitled *Municipal Solid Waste Generation, Recycling, and Disposal in the United States, December 2010*.

Plastics:

α = Plates and cups (non-durable goods)

β = No. 1 thru 7 container/packaging plastic

Table 2.6
Percent of Plastic in Waste Stream by Type and Theoretical Maximum that can be Recovered

Plastic ID No.	Description	Generation (Mil tons)[1]	% of Total Plastic	Aggregate % Plastic that can be Recovered[2]	% of Total Waste Stream that can be Recovered
1	PET	3.38	24.7%	5.8%	1.4%
2	HDPE	3.54	25.9%	5.8%	1.5%
3	PVC	0.4	2.9%	5.8%	0.2%
4	LDPE	3.48	25.4%	5.8%	1.5%
5	Polypropylene	2.03	14.8%	5.8%	0.9%
6	Polystyrene	0.55	4.0%	5.8%	0.2%
7	Other	0.3	2.2%	5.8%	0.1%
TOTAL		**13.68**	**100.0%**		**5.8%**

1. Generation tonnage (2010) obtained from Table 7 of EPA's *Municipal Solid Waste Generation, Recycling, and Disposal in the United States, December 2010.*
2. Aggregate % plastic that can be recovered is calculated in Table 2.5.

Table 2.7
Percent of Paper in Waste Stream by Type and Theoretical Maximum that can be Recovered

Type	Generation (Mil Tons)[1]	% of Total Paper	Aggregate % Paper that can be Recovered[2]	% of Total Waste Stream that can be Recovered
Newspaper (ONP)	9.88	13.9%	23.2%	3.2%
Books/Magazines/Tissue	23.69	33.3%	23.2%	7.7%
Cardboard (OCC)	29.05	40.8%	23.2%	9.5%
Gable tops	0.54	0.8%	23.2%	0.2%
Folding Cartons	5.47	7.7%	23.2%	1.8%
Bags & Sacks	1.04	1.5%	23.2%	0.3%
Other Paper	1.49	2.1%	23.2%	0.5%
TOTAL	**71.16**	**100.0%**		**23.2%**

1. Generation tonnage (2010) obtained from Table 4 of EPA's *Municipal Solid Waste Generation, Recycling, and Disposal in the United States, December 2010.*
2. Aggregate % paper that can be recovered is calculated in Table 2.5.

Table 2.8
Percent of Metal Containers in Waste Stream by Type and Theoretical Maximum that can be Recovered

Type	Generation (Mil Tons)[1]	% of Total Metal Containers	Aggregate % Metal that can be Recovered	% of Total Waste Stream that can be Recovered
Steel Cans	2.74	59.1%	1.9%	1.1%
Aluminum Cans	1.9	40.9%	1.9%	0.8%
TOTAL	**4.64**	**100.0%**		**1.9%**

1. Generation tonnage (2010) obtained from Table 18 of EPA's *Municipal Solid Waste Generation, Recycling, and Disposal in the United States, December 2010.*
2. Aggregate % metal that can be recovered is calculated in Table 2.5.

With the individual recycling percentages estimated in Tables 2.6 through 2.8, these percentages can be used to estimate the tonnages of the source separated material that would be brought to the Derry Transfer Station and Recycling Facility under current (2012) and future (2043) conditions. These tonnage distributions for the trash and household recycling streams are presented in Table 2.9 and Table 2.10.

Table 2.9
Tonnage Estimates for Source Separation of Recyclables into Component Streams 2012 Peak Trash and Recycling Tonnages

<table>
<tr><th>Year</th><th>Total Projected Tons (Trash & Household Recyclables)[1]</th><th colspan="2">Recyclable Stream</th><th>% of Total Waste Stream Based on EPA Numbers[2]</th><th>Roll-up - EPA Theoretical Max Recovery</th><th>Using EPA %s to Calculate Individual Recycling Components (Tons)</th><th>Total Roll-up (Tons)</th></tr>
<tr><td rowspan="9">2012</td><td rowspan="9">13,496</td><td>Glass</td><td>Glass</td><td>3.8%</td><td rowspan="6">11.5%</td><td>507.88</td><td rowspan="6">1,547</td></tr>
<tr><td rowspan="2">Metal</td><td>Steel & Tin</td><td>1.1%</td><td>148.04</td></tr>
<tr><td>Aluminum</td><td>0.8%</td><td>102.66</td></tr>
<tr><td rowspan="3">Plastic</td><td>HDPE</td><td>1.5%</td><td>203.99</td></tr>
<tr><td>PET</td><td>1.4%</td><td>194.77</td></tr>
<tr><td># 3 - 7</td><td>2.9%</td><td>389.54</td></tr>
<tr><td rowspan="3">Paper</td><td>Newspaper (ONP)</td><td>3.2%</td><td rowspan="3">23.2%</td><td>434.35</td><td rowspan="3">3,128</td></tr>
<tr><td>Mixed Paper</td><td>10.5%</td><td>1,416.90</td></tr>
<tr><td>Cardboard (OCC)</td><td>9.5%</td><td>1,277.10</td></tr>
<tr><td colspan="4">Maximum Theoretical Recycling Rate & Tonnage (provides conservative basis for sizing recycling storage needs)</td><td>34.6%</td><td></td><td>4,675</td><td>34.6%</td></tr>
<tr><td colspan="6">Net Trash Tonnage (65.4%)</td><td>8,821</td><td>65.4%</td></tr>
<tr><td colspan="6">Until 35% recycling rate can be achieved, assume trash tonnage is 80% of total stream (provides conservative basis for evaluating trash storage needs)</td><td>10,797</td><td>80.0%</td></tr>
</table>

1. Total projected peak rate tonnages for 2012 were obtained from Table 2.2.
2. Waste stream percentages obtained from Tables 2.5 (glass), 2.6 (plastic), 2.7 (paper) and 2.8 (metal).

Table 2.10
Tonnage Estimates for Source Separation of Recyclables into Component Streams
2043 Peak Trash and Recycling Tonnages

Year	Total Projected Tons (Trash & Household Recyclables)[1]	Recyclable Stream		% of Total Waste Stream Based on EPA Numbers[2]	Roll-up - EPA Theoretical Max Recovery	Using EPA %s to Calculate Individual Recycling Components (Tons)	Total Roll-up (Tons)
2043	16,848	Glass	Glass	3.8%	11.5%	634.03	1,931
		Metal	Steel & Tin	1.1%		184.81	
			Aluminum	0.8%		128.15	
		Plastic	HDPE	1.5%		254.66	
			PET	1.4%		243.15	
			# 3 - 7	2.9%		486.29	
		Paper	Newspaper (ONP)	3.2%	23.2%	542.23	3,905
			Mixed Paper	10.5%		1,768.82	
			Cardboard (OCC)	9.5%		1,594.30	
Maximum Theoretical Recycling Rate & Tonnage (provides conservative basis for sizing recycling storage needs)				**34.6%**		**5,836**	**34.6%**
Net Trash Tonnage (65.4%)						11,012	65.4%
Until 35% recycling rate can be achieved, assume trash tonnage is 80% of total stream (provide conservative basis for evaluating trash storage needs)						**13,479**	**80.0%**

1. Total projected tonnages for 2043 were obtained from Table 2.3.
2. Waste stream percentages obtained from Tables 2.5 (glass), 2.6 (plastic), 2.7 (paper) and 2.8 (metal).

The information provided in Tables 2.9 and 2.10 summarizes the quantity of household recyclables that could be delivered to the facility under current and future conditions, where the recycling rates represent the estimated maximum recovery of these materials from the waste stream. As shown in Tables 2.9 and 2.10, the maximum estimated peak recycling rate is 35%, compared to the Town's current rate, which varies between 22% and 25%. The peak recycling rate provides the specific design basis tonnages for the maximum quantities of glass, metal, and plastic materials that will be processed through the new facility. It would follow that if the peak recycling rate is estimated at 35% (34.6% from Tables 2.9 and 2.10), then the resulting trash rate would be 65%. However, for facility sizing purposes, it is more appropriate to assume that the trash disposal rate will initially be in the 80% range (consistent with the current rate) and reduce over time as the recycling rate increases to the peak projected 35% rate. For this reason, 2.10 identifies the projected trash and recycling tonnages that the new facility would be designed around: 1) 5,836 tons of recyclables representing a maximum anticipated recycling rate of 35%; and 2) 13,479 tons of solid waste representing a maximum trash disposal rate of 80%.

The information provided in Tables 2.9 and 2.10 is used to estimate the loose volume storage requirements for trash and source-separated recyclables in the new building, as well as the estimated bale production rate and bale storage requirements. This facility sizing methodology is described in Section Three.

3. FACILITY SIZING

3.1 Bunker Bay Sizing for Recyclable Materials

Determining bunker bay storage requirements for residential drop-off of trash and recyclables represents one of the primary sizing criteria for the proposed facility. Using the annual tonnages for each recycling stream provided in Tables 2.9 and 2.10, we can estimate required bunker sizes for these materials using typical loose density volumes associated with each material. This information is presented in Tables 3.1 and 3.2. Table 3.1 depicts criteria relevant to estimating bunker bay storage requirements based on 2012 peak estimated recycling activities (i.e. a 35 percent recycling rate) and Table 3.2 depicts similar criteria used to estimate future (2043) bunker bay storage requirements.

As shown in Tables 3.1 and 3.2, the estimated annual tonnage of each recyclable material is converted into an average daily and weekly tonnage based on a 5-day operating week. These daily and weekly tonnages are then converted into daily and weekly volumes (cubic yards) using the loose volume densities for each material. The bunker bay sizes required to store these volumes can be determined by establishing a standard bay height and bay depth and then calculating the bunker width required to meet the loose volume storage needs.

For this evaluation, all recycling bunker bays are assumed to have a 10-foot storage height and 20-foot length, resulting in a cross-sectional area of 200 square feet for each bay. Accounting for an angle of repose on the stockpiled material (45 degrees), the effective cross-sectional area that can be stored in a 10-foot high by 20-foot long bunker bay reduces to 150 square feet. Using the effective cross-sectional area of 150 square feet for each bay, the bay width may then be calculated. For example, as shown in Table 7.1, the loose storage volume for steel cans was calculated at 7.8 cubic yards per day. This equates to 210.6 cubic feet per day. Based upon a cross-sectional storage area of 150 square feet for a 10-foot high by 20-foot long bay, the required bunker bay width for one day of storage would be:

210.6 cubic feet/day ÷ 150 square feet = 1.4 feet for one day of storage

One week's worth of storage (5 operating days) for steel cans would be 1.4 x 5 = 7 feet.

In this way, the bunker bay dimensions required to store a day's worth and week's worth of each recyclable material was calculated and the results are shown in Tables 3.1 and 3.2. As shown in the tables, some materials can be provided with small bay widths that will provide for a week's worth of storage (steel and metal cans, for example), while other materials require notably greater widths to meet a day's worth of storage (cardboard). The final column in Tables 3.1 and 3.2 identifies the theoretical bunker width that would be required (for a 10-foot high by 20-foot long bay) to store one bale's worth of material. These "unit widths" are useful in that they can be used to estimate the equivalent bale storage provided in each bay. For example, the bunker bay width required to store one bale's worth of steel cans in a 10-foot by 20-foot bunker is 2.48 feet. Therefore, if a bay width of 20 feet was provided for this material, it would, when full, provide sufficient storage to make approximately 8 bales (20 foot wide ÷ 2.48 feet/bale = 8.06 bales).

Table 3.1
Recyclable Material Bunker Bay Storage Sizing for 2012 Estimated Peak Demands

Material Characteristics		Typical Bale Characteristics						Peak 2012 Tonnage Rates and Equivalent Loose Storage Volumes					Assumed Fixed Bunker Dimensions (ft): Height 10; Depth (front to back) 20		Effective Cross-Section 150
		Bale Density						Estimated Current Peak Tonnages Delivered to Facility (35% Recycle)			Loose Storage Volume Requirements				Unit
Material	Loose Density lb/cy	lb/cf	lb/cy	Bale Volume (cy)	Bale Weight (lbs)	Bale Wt at 90%	Loose Storage Reqd for 1 Bale (cy)	Tons/Yr	Tons/Day	Tons/Week	cy/day	cy/wk	Bunker Width for Current TPD (ft)	Bunker Width for Current TPW (ft)	Bunker Width for 1 bale (ft)
Glass	500	---	---	---	---	---	---	507.88	2.0	9.8	7.8	39.1	1.4	7.0	---
Steel Cans	135	44	1188	1.74	2067	1860	13.8	148.04	0.6	2.8	8.4	42.2	1.5	7.6	2.48
Alum. Cans	50	23	621	1.74	1081	972	19.4	102.66	0.4	2.0	15.8	79.0	2.8	14.2	3.50
PETE	27	28	756	1.74	1315	1184	43.8	194.77	0.7	3.7	55.5	277.5	10.0	49.9	7.89
HDPE	27	28	756	1.74	1315	1184	43.8	203.99	0.8	3.9	58.1	290.6	10.5	52.3	7.89
No. 3-7	27	28	756	1.74	1315	1184	43.8	389.54	1.5	7.5	111.0	554.9	20.0	99.9	7.89
OCC	81	30	810	1.74	1409	1268	15.7	1277.10	4.9	24.6	121.3	606.4	21.8	109.2	2.82
ONP/OMG	216	34	918	1.74	1597	1438	6.7	1851.24	7.1	35.6	65.9	329.6	11.9	59.3	1.20
								4675.23	18.0	89.9			79.9	399.5	

1. Loose material densities are based on typical values provided in solid waste literature, including EPA data and data provided by the American Public Works Association (Solid Waste Pocket Guide).
2. Bale density and bale volumes are based on American Baler (formerly Lindemann) RAM II 75 S1 HP dual ram baler. These criteria are consistent with the type of baler selected for the proposed Derry facility.
3. Bale volume assumes bale size of: 30" high x 45" wide x 60" long = approx 47 cf/bale = 1.74 cy/bale.
4. Tons per year obtained from Table 2.9.

Table 3.2
Recyclable Material Bunker Bay Storage Sizing for Future (2043) Estimated Peak Demands

Material Characteristics		Typical Bale Characteristics[2, 3]						Future Tonnage Rates and Equivalent Loose Storage Volumes					Assumed Fixed Bunker Dimensions (ft): Height 10; Depth (front to back) 20		Effective Cross-Section 150
		Bale Density						Estimated Future (2043) Tonnages Delivered to Facility (35% Recycle)			Loose Storage Volume Requirements				Unit
Material	Loose Density lb/cy[1]	lb/cf	lb/cy	Bale Volume (cy)[3]	Bale Weight (lbs)	Bale Wt at 90%	Loose Storage Reqd for 1 Bale (cy)	Tons/Yr[4]	Tons/Day	Tons/Week	cy/day	cy/wk	Bunker Width for Current TPD (ft)	Bunker Width for Current TPW (ft)	Bunker Width for 1 bale (ft)
Glass	500	---	---	---	---	---	---	634.03	2.4	12.2	9.8	48.8	1.8	8.8	---
Steel Cans	135	44	1188	1.74	2067	1860	13.8	184.81	0.7	3.6	10.5	52.7	1.9	9.5	2.48
Alum. Cans	50	23	621	1.74	1081	972	19.4	128.15	0.5	2.5	19.7	98.6	3.5	17.7	3.50
PETE	27	28	756	1.74	1315	1184	43.8	243.15	0.9	4.7	69.3	346.4	12.5	62.3	7.89
HDPE	27	28	756	1.74	1315	1184	43.8	254.66	1.0	4.9	72.6	362.8	13.1	65.3	7.89
No. 3-7	27	28	756	1.74	1315	1184	43.8	486.29	1.9	9.4	138.5	692.7	24.9	124.7	7.89
OCC	81	30	810	1.74	1409	1268	15.7	1594.30	6.1	30.7	151.4	757.0	27.3	136.3	2.82
ONP/OMG	216	34	918	1.74	1597	1438	6.7	2311.04	8.9	44.4	82.3	411.5	14.8	74.1	1.20
								5836.43	22.4	112.2			99.7	498.7	

1. Loose material densities are based on typical values provided in solid waste literature, including EPA data and data provided by the American Public Works Association (Solid Waste Pocket Guide).
2. Bale density and bale volumes are based on American Baler (formerly Lindemann) RAM II 75 S1 HP dual ram baler. These criteria are consistent with the type of baler selected for the proposed Derry facility.
3. Bale volume assumes bale size of: 30" high x 45" wide x 60" long = approx 47 cf/bale = 1.74 cy/bale.
4. Tons per year obtained from Table 2.10.

3.2 Residential versus Commercial Drop-off of Recyclables

The volumes of recyclable materials and bunker bay sizing presented in Tables 3.1 and 3.2 reflect total volumes expected to be delivered to the facility. To this end, the volumes account for: 1) that portion of the recycling stream delivered to the facility by residents; and 2) that portion delivered by commercial haulers. For the purposes of generating conservative estimates for bunker bay sizing, we have assumed that the recycling quantities provided in Tables 3.1 and 3.2 will be brought to the facility by residents only.

In order to identify options for commercial haulers to bring their commingled recyclable loads to the proposed facility, an understanding of how the haulers currently deliver recyclables to the transfer station is necessary. Based upon our conversations with the Town, it is our understanding that four private haulers are authorized to haul trash and recyclables to the transfer station. These haulers, and the manner in which they collect both trash and recyclables, is summarized below:

Casella: Separate Trash Truck
3 Compartment Recycling Truck (OCC & Box Board/Mixed Paper/Glass, Metal, Plastic)

Pinard: 2 Compartment Truck (Trash/Recyclables), alternates picking up trash and all paper one week and trash and glass, metal and plastic the following week. OCC is not separated from mixed paper.

T&J Waste: Stake Truck, off loads by hand, using barrels, other containers, or bags to keep materials separated.

Stateline: Multi-compartmented truck, off loads by hand.

If the above haulers were to visit the proposed facility and not change the manner in which they haul recyclables (continued comingling of recyclable materials), the facility would need to provide dedicated drop-off areas for the following materials:

1. Cardboard (OCC, with boxboard)
2. Mixed paper (newspaper and magazines)
3. Commingled paper (all types – to meet Pinard's collection method)
4. Commingled glass, metal and plastic

The conceptual layout for the recycling facility (Section Five) will be developed in a manner that considers allowing the existing haulers to continue to deliver their materials to the new facility without any collection changes on their part. To this end, the objective will be to provide dedicated commercial hauler storage bays within the proposed recycling building for: 1) cardboard; and 2) comingled paper (cardboard, boxboard, newspaper and magazines – geared towards Pinard's collection method). These materials would then be baled as delivered. In contrast, commercial delivery of comingled glass, metal and plastic would be directed to a location exterior to the proposed building as this commingled stream cannot be baled (due to glass) and baling of metal and plastic would require separation of these materials that is not part of the Town's current programming for the facility.

For planning purposes, the objective will be to provide commercial bunker bay dimensions within the recycling building (for cardboard and comingled paper) that will, at minimum, equal the bunker bay sizes calculated for the residential drop-off of cardboard and mixed paper.

3.3 Summary of Bunker Sizing and Bale Production Rates

The results of the storage bay sizing for residential drop-off of trash and recyclables are summarized in Table 3.3. For recyclable materials, the table shows the selected bunker widths for each material type and identifies whether the width provides a day's worth of storage or a week's worth of storage. These raw bunker widths are then rounded up and the resulting bay widths are used to calculate the equivalent number of bales that can be stored in each bay. The equivalent bale storage is calculated using the "Unit Bunker Widths" provided in Tables 3.1 and 3.2. The equivalent number of bales are then rounded down to reflect the estimated number of whole bales produced for each material type (for the day or the week, depending on the storage duration provided by the bunker size). This information allows us to estimate the total number of bales that will be produced at the proposed facility on a daily and weekly basis under current and future conditions.

As shown in Table 3.3, the total clear opening linear footage for all recycling bays is estimated at 133 feet. Accounting for partition walls that separate each bunker (assumed to be 12-inches thick), the total recommended recycling building length is 140 feet, which would be appropriate to accommodate the recycling bunker bay storage requirements anticipated under future conditions. The 2012 numbers provided in Table 3.3 are provided as a means of comparing the relative size difference in the building if it were designed to meet current peak demands only. For planning purposes, the data associated with the 2043 future projections will be used as the preferred data around which to size the proposed facility for the recycling bays (140 feet).

It should be noted that the bunker bay sizing includes a dedicated bay for storing commingled #3 through #7 plastic. Currently, these plastics (PVC, LDPE, polypropylene and polystyrene) are not valued highly as a recycling commodity and under current conditions may more likely be disposed of in the trash stream. However, in the interest of estimating the potential space that would be dedicated to this material should it be recovered more deliberately in the future, we have carried it as a separate plastic stream in our evaluation. As shown in Table 3.3, under future conditions, #3 through #7 plastic represents almost 50 percent of the total bay storage dedicated to plastics. For planning purposes, we recommend that the facility be sized to include #3 through #7 plastic and that until this stream becomes a valued commodity, the space reserved for it would be shared between the HDPE bunker and the PET bunker, the bay could be used for the storage of rigid plastic (large plastic items)

Table 3.3

Summary of Bunker Bay Sizing, Trash Floor Storage Needs and Bale Production Estimates for Proposed Facility

Year		1 Glass	2 Steel	3 Aluminum	4 PET	5 HDPE	6 No. 3 thru 7	7 OCC	8 ONP/Mixed Paper	Recyclable Materials Totals[3]	
2012	"Raw" Bunker Width (ft)[1]	7.0	7.6	14.2	10.0	10.5	20.0	21.8	11.9		
	Round Up Size[2]	**10**	**10**	**15**	**10**	**11**	**20**	**22**	**12**	***110***	***Linear Feet***
	Storage Duration	week	week	week	day	day	day	day	day		
	Equiv # Bales	NA	4.0	4.3	1.3	1.4	2.5	7.8	10.0		
	Avg Bales Made	NA	4.0	4.0	1.0	1.0	2.0	7.0	10.0		
	Bales/day	NA	---	---	1.0	1.0	2.0	7.0	10.0	21	Bales/day
	Bales/week	NA	4.0	4.0	5	5	10	35	50	113	Bales/week
2043	"Raw" Bunker Width (ft)[1]	8.8	9.5	17.7	12.5	13.1	24.9	27.3	14.8		
	Round Up Size[2]	**10**	**10**	**18**	**13**	**14**	**25**	**28**	**15**	***133***	***Linear Feet***
	Storage Duration	week	week	week	day	day	day	day	day		
	Equiv # Bales	NA	4.0	5.1	1.6	1.8	3.2	9.9	12.5		
	Avg Bales Made	NA	4.0	5.0	1.0	1.0	3.0	9.0	12.0		
	Bales/day	NA	---	---	1.0	1.0	3.0	9.0	12.0	26	Bales/day
	Bales/week	NA	4.0	5.0	5	5	15	45	60	139	Bales/week

1. Bunker bay widths for recyclables are based on bay heights of 10 feet and lengths of 20 feet (widths shown are from Tables 7.1 for 2012 and 7.2 for 2042). Widths shown reflect clear dimensions for bunker storage (dimensions do not include bunker wall partition widths - see Note 3 below).
2. Round-up sizes for bunker widths are based on rounding up the "raw" widths to the nearest whole number, unless the raw width was less than 10 feet, in which case the bay width was rounded to 10 feet. The minimum clear width for all bays is set at 10 feet for accessibility purposes, reflecting the minimum recommended width for removing recyclables from the bay by skid-steer loader.
3. Total linear footage calculated for recyclable bay storage does not include partition wall widths. For space planning purposes, it is assumed that the width of each bunker wall partition is 12-inches. Based upon the number of bunker bays (eight), a 12-inch partition for each bunker wall partition would add 7 feet to the clear opening bay widths provided in Table 3.3.
4. Bale storage on trailers (based on bale weight ranges and a 20 ton trailer load):
   If all steel bales: 20 bales;
   If all aluminum bales: approximately 37 bales;
   If OCC & ONP/Mixed Paper: approximately 27 bales

3.4 Interior Bale Storage and Loading Dock Recommendations

The projections in Table 3.3 indicate that the facility, under future conditions, may produce as many as 26 bales per day and 139 bales per week. Twenty seven bales is a reasonable quantity to assume will fill a long-haul trailer. Therefore, it is possible that one loading dock could meet the needs of the facility, however, if a replacement trailer is not placed in the loading dock while the loaded trailer is being hauled, this would require some degree of interior bale storage. For planning purposes and flexibility, it is recommended that two loading dock bays be included in the facility design. It is also recommended that a minimum of one week's worth of bale storage be provided within the facility to provide the Town with greater flexibility in responding to market conditions and their potential effect on hauling frequency from the facility.

A week's worth of interior bale storage would require that the facility be designed to provide storage for approximately 145 bales. Based on an individual bale size of approximately 4-feet by 5-feet by 30-inches high, a floor area of 16 feet wide by 60 feet long would provide sufficient storage for bales stacked to a height of 7.5 feet (bales stacked three courses high).

3.5 Trash Storage for Residential Drop-off at Proposed Facility

Table 3.4 shows the estimated trash tonnage that would be brought to the facility under current and future projections and uses this information to estimate the potential tipping floor storage demands that may result from residential drop-off of trash at the proposed facility. As shown in the table, the total tonnage of trash that would be brought to the facility (obtained from Tables 2.9 and 2.10) was reduced by 50 percent to reflect that portion of the trash stream delivered to the facility by residents.

Using a typical loose trash density of 125 pounds per cubic yards, the estimated volume of trash in cubic yards per day was estimated for 2012 and 2043. The floor area storage requirement for these trash volumes was then estimated using a methodology similar to that used to size the recycling bunker bays. These floor area estimates are based upon a drop-off operation whereby residents would dispose of their waste through pass-through windows in the building and onto the tipping floor portion of the transfer station. It should be noted that configuration of the transfer station in a manner that allows residents to direct dump their trash into the transfer trailer located in the trailer pit would eliminate the need to consider floor area storage requirements. However, for planning purposes, Kleinfelder has estimated floor area storage requirements in the event the facility cannot be configured to allow residents to dump their trash directly into the transfer trailer.

For sizing purposes, it was assumed that the trash would be deposited in an area that would provide a storage height of 5-feet and storage length of 15 feet. This is estimated to provide an effective cross-sectional storage area of 56 square feet. Using this cross-sectional area and the total trash storage volume needed, the width of the floor storage area can be calculated.

Table 3.4
Trash "Floor Storage" Estimates for Residential Drop-off in Transfer Station Portion of Proposed Facility

Year	Tons/yr[1]	Tons/day	Percent delivered by Residents[2]	Residential TPD	Loose Density (lb/cy)	Loose Storage cy/day	"Floor" Width Required for Full Day Storage (empty once/day)[3]	Width Required Under Increased Disposal Frequency into Transfer Trailer			
								2 x/day	3x/day	4x/day	5x/day
2012	10,797	41.5	50%	20.8	125	332.2	159.5	79.7	53.2	39.9	31.9
2043	13,479	51.8	50%	25.9	125	414.7	199.1	99.5	66.4	49.8	39.8

1. Tons per year obtained from Tables 2.9 (2012) and 2.10 (2043).
2. Tons delivered to facility by residents is based upon Town data from 2011 showing that approximately 55% of the trash tonnage brought to the transfer station that year came from commercial curbside haulers, leaving 45% brought to the facility by residents. For the purposes of this evaluation, it is assumed that 50% of the trash brought to the proposed transfer station will be brought by residents and 50% by commercial haulers (now and in the future).
3. Floor storage width is based upon a storage height of 5 feet and depth of 15 feet, providing an effective cross-sectional storage area of 56 square feet.

As shown in Table 3.4, if the trash was deposited on the tipping floor at a depth of 5 feet and length of 15 feet (projecting perpendicular from the pass-through window), a floor width of 160 feet would be needed to provide one day's worth of floor storage for residential trash drop-off. Clearly, the material will not be held on the floor for the entire day, but will instead be deposited by the DPW into the transfer trailer multiple times during the day using a front-end-loader or similar equipment. Table 3.4 shows the effect of loading the trailer at various frequencies and how this reduces the floor area storage requirements. For the purposes of this evaluation, it is assumed that the tipping floor would be cleared of trash deposited by residents at a minimum frequency of 5 times per day. It is estimated that this frequency would reduce the floor storage width to approximately 32 feet for 2012 trash volumes and 40 feet for 2043 trash volumes.

3.6 Construction and Demolition Debris Planning

Provisions for accepting construction and demolition (C&D) debris will be included in the conceptual planning for the facility. C&D disposal currently is performed in the open air, where loads dumped on the ground are loaded into a 100 cubic yard long-haul trailer or 50 cubic yard container, depending upon availability. As shown in Table 2.1, the peak per capita generation rate recorded during fiscal years 2008 through 2012 was 0.27 (occurring in 2012). Applying this rate to the population figures for 2012 and 2043 yields the estimated annual C&D disposal tonnages provided in Table 3.5.

Table 3.5
Construction & Demolition Debris Current and Future Tonnage Projections

Year	Population	C&D Per Capita Generation Rate (lbs/person/day)	Total Estimated Tonnage
2012	37,082	0.27	**1,827**
2043	46,292	0.27	**2,281**

The proposed facility layout will be developed in a manner that provides a dedicated area for C&D disposal, where these materials may be kept out of the elements and managed in a manner that allows for more efficient loading into long-haul trailers.

4. BALER EQUIPMENT EVALUATION

4.1 Baler Equipment Evaluation

Three baler equipment manufacturers were evaluated including Harris Equipment, Sierra International Machinery, and Excel Manufacturing. The evaluation included a review of each manufacturer's websites, equipment model brochures/cut sheets, discussions with sales representatives and technical staff, and interviews with equipment users. Derry's projected recyclable tonnages were shared with each manufacturer for the purposes of selecting specific baler models. Table 4.1 provides a list of the baler models recommended (by each manufacturer) with associated budgetary costs provided by each manufacturer for the baler and conveyor equipment.

Table 4.1
Baler Summary Table

Manufacturer	Baler Model	Baler Cost	Conveyor Cost
Harris Equipment	Badger	$290,000 to $320,000	$90,000 to $150,000
Sierra International Machinery	REB-1	$285,000	$87,500 to $103,400
Excel Manufacturing	2R9	$228,180	$22,000 to $140,000

Appendix C contains Table 4.2 – *Baler Equipment Summary Table* that summarizes each baler's Throughput Tonnages, Average Bale Weights, Bale Dimensions, Operating Features, Standard Features, Options, Equipment Dimensions, References and Contact Information. The information contained in this table is as listed on the equipment cut sheets or as otherwise provided by each manufacturer. Appendix D contains equipment brochures and information provided by each manufacturer. The following sections provide a more detailed description of some of the key baler features associated with the specific models recommended by each manufacturer.

4.1.1 Harris Equipment – Badger Model

Kleinfelder contacted Mr. Russ Bennett of Recycling Mechanical of New England, LLC, Allentown, NH who is a local authorized equipment dealer, parts supplier and maintenance service provider for Harris Equipment to discuss key features of the Badger. The following provides a summary of key information provided by Mr. Bennett regarding the Badger:

- The Badger is designed to handle the baling of scrap metal; therefore, is capable of baling OCC, mixed paper, HDPE and PET bottles, aluminum cans, steel cans and rigid plastic. The rigid plastic does not need to be perforated prior to baling.
- The Harris SmartKnife™ System reduces down time for periodic adjustment from 4 – 5 hours to 1 – 1-1/2 hours for two people because shims are not used to make the adjustments.

Adjustment is required every 6 weeks for large facilities to every 3 months for small facilities (Derry would be considered a small facility).

- The touch screen display and computer provides the operator access to diagnostic information and the ability to program baling parameters based on material type. The operator can pre-program the number of wire ties to use and the number of wire ties per location for each material type (OCC (dry), OCC (wet), HDPE, PET, etc.). Once programmed, the operator only needs to select the material type on the screen and begin loading the conveyor with that specific material. The touch screen display and computer will track production (number of bales) by material type which can be relayed to an office via an ethernet connection. Operating diagnostics such as pump pressures can also be displayed to the operator.
- Major pump service is typically required every 8 – 9 years.
- As a rule of thumb, the operator will notice a change in sound when the baler is about to need service or when it is not operating properly.
- Recommend that serrated knives be specified due to their effectiveness and durability (typically last 8 years).
- Recommend that a combination (or separation) door be specified if baling multiple material streams.
- The Uni-Body construction means that the baler body is constructed of a single piece of steel from front to back; which, presumably, provides for increased manufacturing tolerances due to significantly less welds are required to assemble a completed unit.
- The AR500 liners will last 8 to 9 years and provide increased protection (hardness) over the standard AR400 steel liners.

Kleinfelder contacted Mr. Erik Levy of Save-That-Stuff in Charlestown, MA who currently has a Badger baler at his facility. Mr Levy provided the following key recommendations:

- Orient the conveyor perpendicular to the ram direction such that the conveyor feeds the widest hopper dimension to avoid jams in the hopper and charge box.
- Provide an air compressor and hoses near the baler to clean dust and debris off of the wire tie system and the conveyor belt on a daily basis to avoid jams.
- Provide a deep and wide conveyor pit with lighting and electrical outlets for ease of cleaning and clearing jams.
- Provide a way to heat the hydraulic oil in the supply lines and slave pumps; not just heat the hydraulic oil in the oil reservoir.
- Provide variable speed selector for the conveyor belt (this is likely based on the large daily tonnage and variable types of materials being processed by Mr. Levy's facility).

Mr. Levy would recommend the Harris Badger baler and admitted that he has not read the Operations Manual to fully take advantage of all its capabilities and did not involve an engineer in the planning or layout of the facility, which has resulted in post installation modifications. Appendix E contains a copy of the "Baler Reference Call Questionnaire" and the answers provided to Kleinfelder during our telephone conversation.

4.1.2 Sierra International Machinery – REB-1 Model

Kleinfelder contacted Mr. Joe Droukas, local sales associate for Sierra International Machinery to discuss key features of the REB-1. Mr. Aracely Mendez, Assistant Sales Coordinator in Bakersfield, CA was also on the call and provided input. The following provides a summary of our conversation with Mr. Droukas and Mr. Mendez regarding the REB-1.

- The REB-1 is designed to bale aluminum sheet, aluminum extrusions, copper wire, copper tubing, radiators, stainless steel, aluminum cans, PET bottles, OCC, ONP and solid waste.
- A modem is provided for direct communication between the baler and Sierra allowing Sierra to review diagnostic information and trouble shoot operating issues.
- The panel view HMI (human machine interface) is a 4-inch screen that allows the operator to select from up to 16 materials with pre-programmed baling parameters such as wire tie spacing and number of wire ties per location. The screen will also display diagnostic information such as ram ejector pressure and oil temperature.
- Major pump service is typically required only after many years or never.
- Recommend that serrated knives be specified.
- Available separation door with bale relief.
- Hopper has sensors to detect when there is a material change that signals when to start a new bale. The sensors work best with materials like PET bottles or aluminum cans, which provide a consistent flow; unlike aluminum extrusions or large pieces of OCC which can have gaps in the material.
- The baler will automatically shut down if no material is received within a programmed time limit.
- Accent wire tie system is the default system if the L&P Wire Tie System (a division of Leggett & Pratt) is not specified as the other option. Customer preference should be specified.
- Adjustable Ram guides are adjustable from outside the machine and are independent of the hopper.
- Recommend installing the conveyor perpendicular to the ram direction to avoid potential jams in the hopper due to material bridging. Recommend "over-the-top" loading only for aluminum extrusion.
- Avoid peaks in loading the conveyor which can cause bridging; spread out the material on the conveyor as evenly as possible.

- The Hardox 450 replaceable liners will be provided.
- 2 year, 4,000 hour warranty including parts and labor.
- Closest service technician is located in New Jersey.

Kleinfelder contacted Mr. Mark Shikles of Winfield Alloy in Atkinson, NH who currently has a REB-1 baler at his facility. Mr Shikles provided the following key points:

- Had issue with ram piston soon after start-up. Sierra replaced it within 20 hours.
- Low maintenance baler. Staff uses compressed air to keep wire tie system clean twice a day.
- Binding or jams are rare and are due to overfeeding.
- Upgrade to a steel conveyor belt.
- Had Harris and other balers prior to the Sierra and prefers the Sierra baler.

Mr. Shikles would recommend the Sierra REB-1 baler. Appendix E contains a copy of the "Baler Reference Call Questionnaire" and the answers provided to Kleinfelder during our telephone conversation.

4.1.3 International Baler Corporation

Kleinfelder made several attempts to contact International Baler Corporation (main office and distributors) over the course of two months. Eventually, we were able to reach Mr. Dan Odenwelder, sales representative, to discuss this project. Kleinfelder provided Mr. Odenwelder with Derry's recycling tonnages to allow him to recommend a specific International Baler Corporation baler. As of this writing, Kleinfelder has yet to receive a response from International Baler Corporation.

4.1.4 Excel Manufacturing – 2R9 Model

Kleinfelder contacted Mr. Cory Gardner, National Accounts Manager at JWR Inc. to discuss key features of the 2R9. The following provides a summary of our conversation with Mr. Gardner regarding the 2R9.

- The 2R9 model can bale office paper, newspaper, OCC, magazines, PET, HDPE, aluminum cans, tin cans, painted aluminum siding, insulated wire, aluminum extrusions, radiators, copper wire and other materials.
- EXCEL Autonetics with Absolute Ram Position Sensor with Electronic Display averages how much of a charge it adds to the bale while it builds half of the bale. During the second half of the bale, it records how many inches it adds to each bale. This is adjusted with every charge it takes so it knows how much is left in the bale and how much more it can take so it does not over charge.

- Linear transducers on both cylinders – transducers are protected and enclosed inside the cylinder taking the measurement from the back of the piston internally for distance traveled. This system also allows the Wire Tier to place straps with more accuracy.

- Automatic Shear Jam Correction – in the event of a shear jam, the baler will automatically back up and try five (5) times before any input from the operator is needed.

- Automatic Stuck Bale Correction – If the baler is not able to push a completed bale out of the chamber on the first attempt, automatically, the main ram will back up relieving some of the pressure on the completed bale allowing it to push it out easier.

- U.S. Wire Tie Systems Automatic 342 Tier with Turbo Motor. The standard is a L&P Wire Tie System (a division of Leggett & Pratt). An Accent wire tie system is available upon request. Excel offers a 12 gauge wire tier as standard. The benefit of 12 gauge ultra-high tensile wire instead of an 11 gauge wire tier is the savings on wire. Wire is sold by the pound and based on a 1,500 lb stump of 12 gauge wire there is 9.46 miles of wire. A 1,500 lb stump of 11 gauge wire will have only 7.38 miles of wire. The savings is that the 12 gauge ultra and the 11 gauge high tensile wire cost the same; resulting in an extra 2.08 miles of wire with the 12 gauge wire.

- Upper, Middle and Lower photo eyes: the 2R9 provides three photo eyes to sense the amount of material in the baler's charge box. The upper eye is integrated with the conveyor so that the conveyor stops when the charge box is full and in the process of compacting a bale of material. The middle photo eye is used to pre-charge or feed on top of the ram allowing some material to be fed on top of the ram without fear of causing a shear jam. Harder to shear materials typically lose time waiting for the chamber to fill up. The middle eye eliminates the wait. The lower photo eye cycles the ram and turns the conveyor on and off if set there.

- Inferred glass lens photo eyes – These are much less susceptible to dust as compared to using reflectors and plastic lenses. Plastic lenses can get scratched easily which could lead to the photo eye intermittently thinking there is material in the chamber when there is not any. This will cause the baler to cycle continuously.

- Modem for on-line diagnostics allows Excel to view operating data to diagnose a problem; the information is not reportable.

- Bale counter is an LED display that is resettable; bale counts by material type is not possible with this model.

- Control panel features an "Absolute Ram Position Display". This LED displays the ram position at all times.

- Excel uses a 5 micron absolute hydraulic oil filter standard.

- Electronic safety interlock on the hopper door, pad lock provided for electrical lock-out/tag out.

- The standard cutting knives are hardened, serrated and turnable (meaning they have two edges and can be flipped when one edge becomes dull).

- Main cylinder is supported from the center. The mounting point is positioned so that when the platen is shearing, the piston is inside the cylinder from the end and it pivots eliminating any bowing of the cylinder when fully extended.
- Interlocking construction – The sub floor interlocks with the sides, cylinder mounts and chamber ends. This allows the interlocking notches to bare most of the operating stresses.
- Recommends preventative maintenance every 500 hours or 3 months, whichever comes first. Preventative maintenance includes replacing filters, lubrication, cleaning and alignment adjustment. Also recommends filtering the oil once a year. Maintenance during the first year is required to be performed by an approved service technician to maintain warranty coverage. Excel has an agreement with Lake Fabrication of Salisbury, MA to service their equipment in this region. Note: Excel does not have a baler located in New England.

Kleinfelder contacted Mr. Paul Pieper of Rice County, MN who currently has an Excel 2R9 baler at his facility. Mr. Pieper provided the following key points:

- New baler that replaced a 12 year old Harris baler. Biggest issue was learning how to use the baler.
- Bales mostly OCC (100 tons/week on average).
- Only issue is overloading the conveyor/loading in clumps, which causes jams in the hopper.
- Recommends having a pressure gauge.

Mr. Pieper would recommend the Excel 2R9 baler. Appendix E contains a copy of the "Baler Reference Call Questionnaire" and the answers provided to Kleinfelder during our telephone conversation.

4.2 Key Baler Design Considerations

Based on the information gathered by Kleinfelder during the Baler Evaluation, the following key design components should be included and/or considered as equipment specifications are prepared during the design phase:

1. Provide a programmable control panel/touch screen that can be connected to an office computer for reporting production data.
2. Specify serrated knives.
3. Specify a combination/separation door.
4. Install the conveyor perpendicular to the main ram direction such that it feeds the widest dimension of the hopper and charge box.
5. Provide an air compressor near the baler for daily cleaning of the wire tie system and conveyor pit.

6. Provide lighting and electrical outlets in the conveyor pit to assist in periodic pit cleaning. Provide a wider and deeper pit than minimally required for better access during cleaning activities.
7. Specify which automatic wire tie system is preferred and the wire gauge to be provided.
8. Specify a steel belt conveyor.
9. Investigate options for heating oil in supply lines and slave motors (typically only the oil in the reservoir tank is heated).

5. CONCEPTS FOR TRANSFER STATION AND RECYCLING FACILITY

Three layout concepts were prepared based on two site development themes: 1) retaining existing facilities to the extent possible and 2) "clean slate" facility development. As expressed by the Town during the RFQ process, the new facility should meet certain operational objectives through the consideration of the following design and planning elements:

- Improved traffic throughput capacity.
- Improved public safety by eliminating equipment/resident interface and eliminating or reducing large commercial vehicle/resident vehicle interface.
- Site layout shall be centralized, being sensitive to the limited number of staff available to observe various drop-off locations.
- Provide flexibility in the manner in which recyclables are separated and stored.
- Enclosing trash and recycling activities to improve security, minimize windblown litter, and protect recyclable commodities from the elements.
- Minimize double-handling of waste.
- Re-use of the existing baler building.
- Delivery, handling and/or storage of waste and comingled recyclables.
- Options for isolating scale traffic.
- Segregating transfer station traffic from Highway Department and Sewer Department traffic.
- Identifying construction options to ensure that existing trash and recycling activities, as well as other site activities, continue unencumbered during construction.

Kleinfelder presented the three layout concepts to representatives of the DPW at a progress meeting held on October 4, 2012. After the meeting, the DPW indicated that Layout 3, particularly, Option 3B, is the preferred layout as it most closely addresses the operational objectives mentioned above. To put this preferred concept, as well as the other concepts, into context relative to existing site operations, a brief summary of existing operations is presented in the following section, followed by a discussion of each of the layout concepts developed as part of the feasibility study.

5.1 Existing Operations

The Town provided Kleinfelder with an AutoCAD file of the project site that includes the Highway Department facility, the transfer station, the wastewater treatment facilities and existing conditions such as topography, wetlands, utilities, edge of pavement, and other features. Appendix F contains an existing conditions site plan that depicts these features and identifies the locations where solid waste and recyclables are collected and stored.

Since the early 1980s when the existing transfer station was constructed the Town has changed how it collects, stores and transports waste materials at the facility. These changes have occurred in response to increased waste throughput resulting from Derry's population growth over the past 30 years (almost double the population of 30 years ago), as well as an increased effort to recover recyclable materials from the waste stream. It should be noted that the existing transfer station was designed prior to the Town offering recycling services at the facility.

Currently, the Town's municipal solid waste stream continues to be deposited in the transfer station by both residents and private haulers. Materials diverted from the transfer station trash stream include comingled recyclables (glass, metal, plastic), aluminum cans, scrap metal, cardboard, newspaper, waste oil, cooking oil, TVs, electronics, white goods, propane tanks, tires, rigid plastic, fluorescent bulbs and rubble. Drop-off locations for these materials are located throughout the site and are accessible for direct drop-off by both residents and private haulers. Construction and demolition (C&D) debris is deposited on a concrete pad located adjacent to the scrap metal area.

Tables 5.1 and 5.2 summarize where waste and recyclable materials are deposited at the site, how various materials may be hauled from one node of the site to another (intra-site hauling), what the on-site storage nodes consist of (containers, trailers, etc.), availability of the disposal container (continuous load versus live load), and how the materials are hauled from the site, by whom, and where the ultimate disposal or recycling facility is located.

Table 5.1
Trash & Recycling Drop-off, Loading, and Hauling Summary

Material	On-Site Drop-Off Location	Hauler	Loading Method	Hauling Container	Hauled To
Trash	Transfer Station	Town	Continuous Load[1]	100-yd Open Top Trailer	MERC, Biddeford, ME (through Jan 2013)
Glass/Metal/Plastic (Comingled glass bottles (all colors), PET, HDPE and Steel Cans)	Adj. to Transfer Station (outside)	Empire	Live Load[2]	100-yd Open Top Trailer	Empire Recycling, Billerica, MA
Aluminum Cans	30 yd Roll-Off (outside) in OCC Bunker	Town	Continuous Load	30-yd Roll-Off	Windfield Alloy, Atkinson, NH LL&S Recycling (Devito), Salem, NH J. Schwartz, Manchester, NH
Mixed Paper (ONP, OMP, Books, and Box Board	50-yd Closed Container at Transfer Station	Town (intra-site haul)[3]	Continuous Load	50-yd Closed Container	Mixed Paper Open Top Trailer (adj. to Baler Building)
	100-yd Open Top Trailer at Baler Bldg	Empire	Continuous Load	100-yd Open Top Trailer	Empire Recycling Billerica, MA
Cardboard (OCC and Box Board)	Cardboard Bunker (outside)	Town (intra-site haul)	Continuous Load	Bobcat	Baler Building
	Baler Building	Empire	Live Load	100-yd Closed Container	Empire Recycling, Billerica, MA
C&D	C&D Drop Off Area	Devito	Live Load	100-yd Open Top Trailer	LL&S Recycling Salem, NH

1. Continuous Load means the trailer or container is located within its dedicated bay and available for material loading at all times (recognizing some unavailability due to container change-out when full).
2. Live Load means the trailer is loaded upon arrival and hauled off immediately (i.e. no container available when it is being hauled).
3. Intra-site haul highlights those hauling activities performed by Town forces where materials are moved from one on-site disposal node (a residential drop-off node) to another on-site node where it is aggregated prior to off-site disposal (or stockpiling in the case of rubble).

Table 5.1 (Continued)
Trash & Recycling Drop-off, Loading, and Hauling Summary

Material	On-Site Drop-Off Location	Hauler	Loading Method	Hauling Container	Disposal Location
TVs	Bunker	Town (intra-site haul)	Continuous Load	Bobcat	Baler Building
	Town puts TVs on pallets	URT (through NRRA)	Live Load (using a pallet jack)	Closed Container	Universal Recycling Technologies (URT), Dover, NH
Fluorescent Bulbs	50-yd Closed Container	URT (Through NRRA)	Live Load	Closed Container	Universal Recycling Technologies (URT), Dover, NH
A/C Units & Refrigerators	Bunker (R.A.D removes freon)	Town	Live Load	50-yd Roll-Off	Windfield / LL&S / J. Schwartz
Propane Tanks	Bunker	R.A.D	Live Load	15-yd Trailer	Haverhill, MA
Tires	Bunker	Town	Live Load	50-yd Roll-Off	LL&S Recycling
Rigid Plastic	Bunker	Town	Live Load	50-yd Roll-Off	LL&S Recycling
Rubble	Bunker	Town (intra-site haul)	Live Load	Loader	Material Stockpile (on-site)
Yard Waste	Yard Waste Drop-off Area	Various	Live Load	50 or 100-yd Open Top Trailers	Nelson's Farm, Derry, NH JNF Farms, Derry, NH Remillard Composting, Chester, NH

1. Continuous Load means the trailer or container is located within its dedicated bay and available for material loading at all times (recognizing some unavailability due to container change-out when full).
2. Live Load means the trailer is loaded upon arrival and hauled off immediately (i.e. no container available when it is being hauled).
3. Intra-site haul highlights those hauling activities performed by Town forces where materials are moved from one on-site disposal node (a residential drop-off node) to another on-site node where it is aggregated prior to off-site disposal (or stockpiling in the case of rubble).

Table 5.2
Summary of Off-Site Hauling to Final Disposal and Recycling Facilities

Material	On-Site Drop-Off Location	Hauler	Loading Method	Hauling Container	Disposal Location
Trash	Transfer Station	Town	Continuous Load[1]	100-yd Open Top Trailer	MERC, Biddeford, ME (through Jan 2013)
Glass/Metal/Plastic (Comingled glass bottles (all colors), PET, HDPE Aluminum Cans and Steel Cans)	Adj. to Transfer Station (outside)	Empire	Live Load[2]	100-yd Open Top Trailer	Empire Recycling, Billerica, MA
Mixed Paper (ONP, OMP, Books, and Box Board	100-yd Open Top Trailer (Adj. to Baler Building	Empire	Continuous Load	100-yd Open Top Trailer	Empire Recycling Billerica, MA
Cardboard (OCC and Box Board)	Baler Building	Empire	Live Load	Closed Container	Empire Recycling, Billerica, MA

1. Continuous Load means the trailer or container is located within its dedicated bay and available for material loading at all times (recognizing some unavailability due to container change-out when full).
2. Live Load means the trailer is loaded upon arrival and hauled off immediately (i.e. no container available when it is being hauled).

Existing operations are also influenced by private (commercial) haulers who dispose of trash and household recyclables at the facility. Table 5.3 provides a summary of private haulers who are authorized to dispose of these materials at the transfer station site. The table highlights the collection equipment used by these haulers, which provides insight into how the design of a new facility, particularly new recycling facility operations, would relate to the manner in which these haulers currently collect recyclables (see Section 3.2).

Table 5.3
Private Hauler Curbside Collection Disposal at Transfer Station
Hauler and Collection Method Summary

Private Hauler ("Curbside Collection Hauler")	Collection Method
Casella	• Separate Trash Truck; • Three (3) Compartment Recycling Truck (OCC & Box Board/Mixed Paper/Glass, Metal, Plastic) • Deposited 2,583 tons of trash at transfer station in calendar year 2011.
Pinard	• Two (2) Compartment Truck (Trash/Recyclables), alternates picking up trash and all paper one week and trash and glass, metal and plastic the following week. **OCC is not separated from mixed paper**. • Deposited 1,657 tons of trash at transfer station in calendar year 2011.
T&J Waste	• Stake Truck, off loads by hand, using barrels, other containers, or bags to keep materials separated. • Deposited 150 tons of trash at transfer station in calendar year 2011.
Stateline	• Multi-compartmented truck, off loads by hand. • Deposited 66 tons of trash at transfer station in calendar year 2011

5.2 Layout 1 – Retain Existing Facilities

This layout attempts to re-use or maintain existing facilities such as the existing truck scale, transfer station building and baler building to the extent possible. This option consists of the following primary design elements:

1. A new transfer station building would be constructed behind the existing transfer station building and would include trailer storage and maintenance building.
2. The baler building would be expanded and used to collect, bale and store recyclables.
3. A new truck scale and scale house would be located in the yard waste storage area.
4. The existing office would be maintained.

5. The metals drop-off area and "recycling row" would be located in the yard waste storage area.
6. The yard waste storage area would be relocated west of the existing baler building.
7. Parking lots would be located in front of the transfer station (24 spaces) and recycling facility (30 spaces), replacing the existing drive-through traffic model.

This layout includes two options. Option 1A provides a 14-foot grade separation at the solid waste transfer station while Option 1B provides a 10-foot grade separation. The 14-foot grade separation would allow trash to be pushed directly into the transfer trailers without the need for a push wall or for the front end loader to lift trash up and over the side of the trailer. Option A would also elevate the parking lot and require a retaining wall to be constructed around the parking spaces at the transfer station building. This configuration would require users to complete a U-Turn to exit.

Option 1B privides a 10-foot grade separation between the tipping floor and the transfer trailer floor, consistent with what is currently provided at the exiting transfer station. The 10-foot grade separation would require the front end loader to use a push wall to fill it's bucket with trash. The bucket would then need to be lifted up and over the top of the transfer trailer for loading. Option 1B would also eliminate the need for the retaining wall around the parking area and allow users to exit the parking area heading towards the site exit, which is the current practice. Appendix G contains half-size drawings that depict Layout 1A and 1B.

5.3 Layout 2 – New Facility in Yard Waste Area

This layout attempts to locate all facilities on the eastern half of the site (east of the main access road); however, due to site constraints some activities are located west of the Baler Building. This option consists of the following primary design elements:

1. A new combined transfer station/recycling building would be built in the existing yard waste storage area and would include trailer storage and maintenance building and a new office.
2. The existing transfer station building would be demolished to make room for a new C&D and metal drop-off area.
3. The baler building would be used for bale storage.
4. A new loading dock would be provided in the area now occupied by the metal drop-off area.
5. The yard waste area and the "recycling row" items would be relocated to an area west of the existing baler building.
6. A new truck scale and scale house would be located in the area now occupied by the office building to provide better sight lines to the operations.
7. A parking lot would be located in front of the transfer station/recycling facility (28 spaces), replacing the existing drive-through traffic model.

This layout includes two options. Option 2A provides a 14-foot grade separation at the solid waste transfer station while Option 2B provides a 10-foot grade separation. The traffic pattern doesn't change with a change in the grade separation height. Appendix G contains half-size drawings that depict Layout 2A and 2B.

5.4 Layout 3 – New Facility in Soil Stockpile Area

This layout is based on the preliminary design concepts outlined in the Town's January 17, 2012 *Town Counsel Workshop Presentation*. This layout attempts to centralize all facilities on the western half of the site (west of the baler building). This layout includes two options: Layout 3A and 3B, which are described below.

5.4.1 Layout 3A

Layout 3A consists of the following primary design elements:

1. A new combined transfer station/recycling building would be built in the area now occupied by the Town soil stockpile and would include trailer storage and maintenance facilities, loading dock and a new office.
2. The C&D and metals drop-off area would be relocated between the new building and the existing baler building. The proposed C&D operations would be performed in the "open-air", similar to current operations.
3. A new truck scale and scale house would be located in the area now occupied by the office building to provide better sight lines to the flat-fee recycling operations.
4. The existing transfer station building would be demolished to make room for a new "recycling row" location.
5. The baler building would be used for bale storage.
6. The yard waste area would not be altered.
7. A parking lot would be located in front of the transfer station/recycling facility (38 spaces), replacing the existing drive-through traffic model.

Appendix G contains a half-size drawing that depicts Layout 3A.

5.4.2 Layout 3B

This layout is similar to Layout 3A but further centralizes all facilities on the western half of the site (west of the baler building) by including the truck scale and "recycling row" in this area. This layout consists of the following primary design elements:

1. A new combined transfer station/recycling building would be built in the area now occupied by the Town soil stockpile and would include a trailer maintenance and storage area, a loading dock and a new office.

2. A portion of the new building would be dedicated to managing C&D waste as an interior disposal and loading operation (located adjacent to the proposed transfer station operations).
3. The metals drop-off area would be relocated between the new building and the existing baler building.
4. A new truck scale and scale house would be located in the area now occupied by the recently filled lagoon area used by the Sewer Department.
5. "Recycling row" would be relocated near the new truck scale to provide improved sight lines to the area.
6. The yard waste area would not be altered.
7. A parking lot would be located in front of the transfer station/recycling facility (38 spaces), replacing the existing drive-through traffic model.
8. In bound and out bound site access would be shifted to the west in front of the Highway Department facility to separate Highway Department traffic from transfer station traffic.

Appendix G contains a half-size drawing that depicts Layout 3B.

5.5 Final Layout Development

Following the October 4, 2012 progress meeting Kleinfelder further developed the preferred layout, Layout 3B, based on subsequent discussions with the Town and a further review and refinement of the solid waste and recycling projections, as well furthering the baler equipment evaluation. These additional considerations, as well as further consideration of site constraints and site accessibility issues, led to the development of a modified Layout 3B, referred to as Layout 3B-Revised. The concepts related to this option are presented below, followed by a description of the Town's preferred feasibility concept – Layout 3C, which incorporates the majority of the features provided in Layout 3B-Revised.

5.5.1 Layout 3B-Revised

Layout 3B–Revised represents modifications to Layout 3B that were progressively developed and reflect actual building size requirements based on bunker bay sizing, bale storage needs, and vehicle access requirements, both inside and outside the building. These modifications include the following:

1. A second truck scale has been added.
2. The travelled way between the two rows of parking spaces was increased from 16 feet to 24 feet.
3. A second exit from the parking lot is provided at the northwestern corner to provide additional vehicular egress from this area.
4. Minor site grading changes on the western and northern side of the facility.

5. The office/administration space has been conceptually programmed to include a computer room, womens bathroom, mens bathroom, locker room/shower room, kitchen, two offices, and mechanical and electrical rooms.
6. The retaining wall located adjacent to the office/administration space has been removed.
7. The size of the recycling building, transfer station and C&D building have been modified based on the solid waste projections, bunker bay sizing, baler equipment dimensions, bale storage calculations, and estimated vehicle access needs.
8. The trailer maintenance area has been removed from the proposed recycling building. Trailer maintenance area is conceptually shown as being located within the existing baler building.
9. The existing baler building is shown as being divided into two halves along its roof line. The western half could be used for bale storage and the eastern half could be modified to provide a heated space for trailer maintenance and tool storage. Potential modifications to the baler building include an interior wall and ceiling, removal of the existing loading dock and installation of an overhead door large enough to fit the transfer trailer. **Based upon conversations with the DPW, it is assumed that the modifications to the existing baler building would be made in the future and would not be included in the design of the new transfer station and recycling facility.**
10. Bale storage will primarily occur in the new recycling building to eliminate moving bales between buildings for loading. Only long-term bale storage will occur in the existing bale storage building.
11. The existing, newly re-skinned trailer storage canopy (Quonset Hut) will continue to be used for trailer storage. The Town may want to evaluate relocating the trailer storage canopy to a location near the proposed transfer station and recycling building.
12. Accommodations have been made for private haulers to off-load OCC and comingled paper within the new recycling building. Two storage bunkers will be provided for this material.
13. Comingled GMP (glass, metal and plastic) delivered by private haulers will be off-loaded into the trailer currently used to collect mixed paper from the private haulers. The Town may want to evaluate upgrades to this area to limit windblown litter such as installing netting and baffles.
14. The entrance area to the truck scales has been widened and the access road shifted closer to the treatment lagoons in this area to provide better sight lines and turning radii.
15. The baler and conveyor equipment location and configuration have been conceptually located within the recycling building.
16. Two loading dock bays are provided for loading bales into long-haul trailers (reduced from three bays shown in Layout 3B).

Appendix G contains a half-size drawing that depicts Layout 3B-Revised.

5.5.2 Layout 3C

Layout 3C represents modifications to the C&D portion of the facility. These modifications were necessitated due to access constraints for the trash trailer and C&D trailer associated with Layout 3B-Revised.

Based upon discussions with the DPW, Layout 3C reflects the Town's preferred development option. In summary, Option 3C includes the following additional modifications to Layout 3B-Revised:

1. The C&D building has been eliminated and replaced with an outdoor concrete pad in the same general area. This modification, given the existing and projected tonnages for C&D debris, allows the Town to continue to manage this material in the same manner as it does today while providing flexibility with the site grading for the remainder of the proposed facility.
2. The floor elevation of the recycling building was raised from elevation 250 to 255 to achieve an optimal grade separation of seven (7) feet between the residential drop-off area elevation (el. 262) and the recycling building floor elevation (el. 255).
3. The location where residents dispose of their trash has been moved from along the exterior of the transfer station to an interior pedestrian drop-off corridor that will run parallel to the length of the trash trailer (allowing residents to directly dump their trash into the transfer trailer). An eight foot wide corridor is provided between the recycling area and the trash trailer pit for this purpose. This feature will allow the tipping floor to be dedicated to private hauler trash disposal, with the expected benefit of reducing the frequency of loading the trash trailers by front-end-loader.
4. Two stairways have been added to provide access to the recycling building floor from the office and from the upper drop-off area.

Appendix G contains a half-size drawing that depicts Layout 3C, with a full-size drawing provided in Appendix H.

5.5.3 Schematic Floor Plan

A schematic floor plan was developed to illustrate the primary facility programming elements, dimensions and room layout within the new facility, particularly within the recycling building and office area. Final programming, room sizing and layout will determined during the final design phase. Appendix G contains a full-size drawing of the schematic floor plan.

Appendix A
Traffic Observations Field Data Sheets

TRANSFER STATION AND RECYCLING AREA
Derry Transfer Station - Traffic Observations
Saturday August 25, 2012

NOTES 1 - Vehicle designation C = car/sedan, T = truck, PU = pickup truck, PK = packer truck, or RO = Roll-off

2 - GMP = Comingled glass, metal and plastic

K:\SEW\Derry NH\SEW Traffic Observation Tables w-Data.xlsx

Vehicle Information			Transfer Station & Recycling Area														Comments
					Trash Drop-off			Recycling Drop-off									
									Materials								
Plate No.	Color	Vehicle Designation (C / T / PU / PK / RO)	Vehicle Time (In)	Position	Drop-off Start Time	Drop-off Finish Time	Time to Complete Trash Drop-off	Drop-off Start Time	Glass & Plastic	Cardboard & Metals Bunker	Mixed Paper (ONP/other)	Waste Oil	Drop-off Finish Time	Vehicle Time (Out)	Total Time (from arrival to departure)	No. of Cars in Queue	How far does queue stretch, note commercial drop-off vs residential, people leaving their cars far back in queue to begin drop-off
		c	7:30:00		7:31:00				x					7:32:00	0:02:00		Approximately 8 cars were waiting outside the gate when SEW arrived just before 7 AM
		c	7:30:00						x					7:31:00	0:01:00		
		pu	7:30:00											7:31:00	0:01:00	7	
		suv	7:30:00														
	red	pu	7:32:00											7:34:45	0:02:45		Unloading from pick-up bed
			7:32:00														
			7:33:00											7:37:00			
	blue	minivan	7:36:00		7:43:00	7:44:00	0:01:00	7:44:00		x			7:46:00	7:46:00	0:10:00		Could not leave, car blocked by car in front of him
																7 at 7:39	7 cars in queue at 7:39
		suv	7:51:00		7:52:00	7:54:00	0:02:00		x	x			7:54:00	7:55:00	0:04:00	11 at 7:51	11 cars in queue at 7:51
		suv	7:51:00										7:54:00	7:56:00	0:05:00		
		pu			7:59:00				x	x	x			8:00:33			
		c	8:00:33		8:01:35	8:03:18	0:01:43	8:04:00		x			8:05:00	8:05:31	0:04:58	5 at 8:00:03	car arrived at end of 5 car queue
																9 at 8:06:47	
		pu			8:09:40		0:01:18	8:10:30		x			8:10:58	8:13:56			
			8:15:31	4	8:18:12	8:22:56	0:04:44	8:20:38	x	x			8:22:56	8:23:04	0:07:33		
		pu	8:24:14		8:25:50			8:26:53	x					8:28:00	0:03:46		
		suv	8:37:30		8:40:15	8:41:43	0:01:28							8:41:43	0:04:13		car arrived one full car from TS

TRANSFER STATION AND RECYCLING AREA
Derry Transfer Station - Traffic Observations
Saturday August 25, 2012

NOTES 1 - Vehicle designation C = car/sedan, T = truck, PU = pickup truck, PK = packer truck, or RO = Roll-off
2 - GMP = Comingled glass, metal and plastic

K:\SEW\Derry NHISEW Traffic Observation Tables w-Data.xlsx

Vehicle Information					Transfer Station & Recycling Area												Comments
					Trash Drop-off			Recycling Drop-off									
									Materials								
Plate No.	Color	Vehicle Designation (C / T / PU / PK / RO)	Vehicle Time (In)	Position	Drop-off Start Time	Drop-off Finish Time	Time to Complete Trash Drop-off	Drop-off Start Time	Glass & Plastic	Cardboard & Metals Bunker	Mixed Paper (GMP/other)	Waste Oil	Drop-off Finish Time	Vehicle Time (Out)	Total Time (from arrival to departure)	No. of Cars in Queue	How far does queue stretch; note commercial drop-off vs residential, people leaving their cars far back in queue to begin drop-off
		c	9:00:07	7													
			9:00:30	4													
			9:02:49	A	9:02:49	9:04:17	0:01:28						9:04:17				Had to wait to leave; trash only drop-off
																	NOTE: mattresses and stuffed furniture is disposed of in the TS
		c	9:27:46	1													
			9:30:18	Z			0:00:37	9:30:18	x				9:30:55	9:30:55	0:03:09		glass & plastic drop-off only
		suv	9:33:00	9													
			9:36:30	4	9:36:30	9:38:20	0:01:50							9:38:20	0:05:20		left from position 4 (drove out around back side of TS
		pu	9:43:33	6													
			9:46:00	B	9:46:00	9:49:15	0:03:15										
			9:49:15	Z				9:49:15	x	x				9:50:00	0:06:27		Multiple bags of trash; two people unloading
	town truck (w/strobe)	pu			9:51:50		0:01:36				x		9:53:26	9:53:26		0 at 9:54	
		suv	9:55:00	3													
			9:56:50	1	9:56:50	9:58:00	0:01:10							9:58:49	0:03:49	see comment	Queue out to pos 9 when pu left
		pu	10:01:00	4													
			10:03:00	1	10:03:00	10:05:04	0:02:04	10:06:58	x				10:08:10	10:08:10	0:07:10		Queue out to position 9 when vehicle left
		c	10:09:46	3													
			10:12:21	1	10:12:39	10:13:23	0:00:44							10:13:23	0:03:37		Trash only disposal; queue at 2 cars past metal contr (position 11)

TRANSFER STATION AND RECYCLING AREA
Derry Transfer Station - Traffic Observations
Saturday August 25, 2012

NOTES: 1 - Vehicle designation C = car/sedan, T = truck, PU = pickup truck, PK = packer truck, or RO = Roll-off

2 - GMP = Comingled glass, metal and plastic

K:\SEW\Derry NH\SEW Traffic Observation Tables w-Data.xls

Vehicle Information			Transfer Station & Recycling Area														Comments
					Trash Drop-off			Recycling Drop-off									
									Materials								
Plate No.	Color	Vehicle Designation (C / T / PU / PK / RO)	Vehicle Time (In)	Position	Drop-off Start Time	Drop-off Finish Time	Time to Complete Trash Drop-off	Drop-off Start Time	Glass & Plastic	Cardboard & Metals Bunker	Mixed Paper (ONP/other)	Waste Oil	Drop-off Finish Time	Vehicle Time (Out)	Total Time (from arrival to departure)	No. of Cars in Queue	How far does queue stretch, note commercial drop-off vs residential, people leaving their cars far back in queue to begin drop-off
		c	10:14	11													
			10:17:29	4	10:18:04	10:20:40	0:02:36										car left from pos 4 and drove out back side of TS. Queue was at pos 9 when he left
	silv	minivan	10:26:34	6													
			10:27:30	3													
			10:24:44	1													
			10:30:34	A	10:30:34	10:31:39	0:01:05			x			10:32:00	10:32:28	0:05:54		
	silv	pu (Ridgline)	10:33:41	7													At 10:33:41 pu is at pos 7 (end of queue)
			10:35:04	2	10:35:27	10:37:58	0:02:31										Total queue unchanged at 10:37:51
			10:39:30	Z				10:39:30	x				10:40:50	10:40:50	0:07:09		Queue when pu departs grows to pos 9
	Blk	pu	10:44:03	5													
			10:46:41	1	10:46:51	10:50:32	0:03:41							10:50:32	0:06:29		
			10:49:24	A													
	tan	c	10:54:42		10:54:42		0:01:08		x	x			10:55:50	10:57:20	0:02:38		Delay in leaving was because car was bocked in when he finished drop-off
	silv	pu	11:13:37	6													
			11:18:30	B	11:18:30		0:02:44			x	x		11:21:14	11:21:14	0:07:37		Queue at 4 when pu left
	silv	c (civic)	11:23:42	1													
			11:24:29	Z	11:24:40	11:25:50	0:01:10		x				11:26:00	11:26:00	0:02:18		
	wh	pu	11:27:26	6													
			11:29:05	1	11:29:05	11:31:12							11:34:28	11:34:28	0:05:23		
	TOWN ROLL-OFF				11:33:00	11:34:28	DROPPED NEW CONTAINER FOR MIXED PAPER										
						0:03:16	Time white pick-up was kept from leaving due to roll-off										
	blk	suv	11:37:13	11				11:37:13		x			11:37:52				Unloaded cardboard from pos 11
			11:38:40	8	11:38:40	11:39:20	0:00:40							11:39:20	0:02:07		brought trash to TS from pos 8 then left by end-running TS (rear of bldg)
	red	minivan	11:41:30	8													
			11:42:30	3													
			11:44:47	A	11:44:47	11:46:50	0:02:03							11:46:50	0:05:20		Mostly trash disposal

TRANSFER STATION AND RECYCLING AREA
Derry Transfer Station - Traffic Observations
Saturday August 25, 2012

NOTES 1 - Vehicle designation C = car/sedan, T = truck, PU = pickup truck, PK = packer truck, or RO = Roll-off
2 - GMP = Comingled glass, metal and plastic

K:\SEW\Derry NH\SEW Traffic Observation Tables w-Data.xlsx

Vehicle Information			Transfer Station & Recycling Area														Comments
					Trash Drop-off			Recycling Drop-off									
									Materials								
Plate No.	Color	Vehicle Designation (C / T / PU / PK / RO)	Vehicle Time (In)	Position	Drop-off Start Time	Drop-off Finish Time	Time to Complete Trash Drop-off	Drop-off Start Time	Glass & Plastic	Cardboard & Metals Bunker	Mixed Paper (ONP/other)	Waste Oil	Drop-off Finish Time	Vehicle Time (Out)	Total Time (from arrival to departure)	No. of Cars in Queue	How far does queue stretch; note commercial drop-off vs residential, people leaving their cars far back in queue to begin drop-off
	silv	minivan	11:41:08	<>	pos near start of office		START OF LARGEST QUEUE										Elderly person helped by workers. Queue at
			11:51:57	7													departure (11:57:13) to back side of office (about
			11:52:52	3													same location as when minivan arrived)
			11:55:22	A	11:55:22	11:56:54	0:01:32		x	x			11:56:54	11:57:13	0:16:05		
	silv	suv (FJ)	12:00:18	10													Queue at 12:09:33 was about the same as when
			12:03:24	5	12:03:24	started unloading OCC				x							this vehicle arrived (near start of office)
		Drop-off perf'd in this pu	12:05:00	5													
			12:06:00	1	12:06:00												
			12:07:38	A		12:09:33	0:03:33		x				12:09:33	12:09:33	0:09:15		
	blu	pu	12:13:18	A	12:13:18												Resident spent short time talking to us. Queue
			12:14:57	Z		12:18:33	0:05:15	Observed trash drop-off only						12:18:33	0:05:15		still at start of office when this car left
	blu	suv	12:21:30	<>													
			12:28:19	2													
			12:29:49	1	12:30:32	12:31:44	0:01:12	Trash only drop-off					12:31:44	12:31:44	0:10:14		At 12:31:44, queue out to near side (TS side) of office
			12:39:00		AT 12:39 QUEUE DROPPED TO POS 9											9	
	red	pu	12:44:58	6													
			12:49:29	B	12:49:29	12:54:39	0:05:10		x	x	x		12:54:39	12:54:39	0:09:41		
			12:51:45	Z													
	RECORDING STOPPED AT 12:55 TO REVIEW SCALE HOUSE OPERATIONS AND GENERAL SITE OPS																

Time Interval	No. of Vehicles In Queue	Vehicle Observed	Queue Duration (Start/End Time)	Offload Duration (Start / End Time)	Nodes Visited	Comments
Nodes:	1 = Paper/Glass 7 = Cooking Oil	2 = Solid Waste 8 = Metal Pile	3 = Metal Cans 9 = C&D	4 = OCC 10 = Recycling Row	5 = Books/Mags 11 = Truck Scale	6 = Motor Oil 12 = Other
7:30 – 7:45	(17) 12					Open 8 [illegible] 2 [illegible] Back to 180
7:37		CRV	7:30 - 7:39	7:35 - 7:37	2,5,4,1	
		Wh Food [illegible]	- 7:44	7:38 - 7:41	2,4,1	Back To OCC
		Blu Chevy [illegible]	7:42 - 7:45	7:43 - 7:44	4,2,5,1	
7:45 – 8:00	(10)	Wh Van	7:44 - 7:48	7:46 - 7:48	5,2,1	Crossing [illegible]
		Red PU [illegible]	[illegible] 7:53 - 7:59	7:51 - 7:59	4,4,2	
		Gold SUV	7:50 - 7:56	7:53 - 7:56	4,5,2	Parked @ 75 [illegible]
8:00 – 8:15	(7) 6	Wh Mini Van	8:00 - 8:03	8:00 - 8:03	2,4,5,3,1	All From 1 Stop
		Red Sedan	8:02 - 8:05	8:03 - 8:06	4,2,1	[illegible]
		Van	8:03 - 8:07	8:03 - 8:07	2,2,4	From 6
		Bk PU	8:08 - 8:11	8:08 - 8:11	4,2,1	

Time Interval	No. of Vehicles In Queue	Vehicle Observed	Queue Duration (Start/End Time)	Offload Duration (Start / End Time)	Nodes Visited	Comments

Nodes: 1 = Paper/Glass 2 = Solid Waste 3 = Metal Cans 4 = OCC 5 = Books/Mags 6 = Motor Oil 7 = Cooking Oil 8 = Metal Pile 9 = C&D 10 = Recycling Row 11 = Truck Scale 12 = Other

8:15 - 8:30	14	WH. HRR	8:15 - 8:16	8:15 8:16	2	From D. Back out
		GR PU	8:17 - 8:24	8:20 - 8:23	2,1,4	@Turn
		WH VAN MINI	8:17 - 8:23	8:20 - 8:25	2,4,4 5	Parked @ Metal [illegible]
		WH. Tahoe	8:23	8:23	4,2,1	
8:30 – 8:45	7	Jeep SUV	8:31 - 8:35	8:31 - 8:33	2,1,4, 5	3 cars not in line 2 Parked @ C&D 1 Parked @ Metal PO
8:36	5	BK PU	8:37 8:39	8:37 - 8:39	1,2	Parked Metal PO
	10	GOLD SUV	8:40 8:44	8:40 8:44	2,2,1 4,5	
8:45 – 9:00	8	RD PU	8:45 8:48	8:45 8:48	5,2,1	
		RD PU	8:45 8:52	8:49 8:52	2,2,4	@ TS
	8	BK SUV	8:53 9:01	8:57 - 9:01	2,5,1,4	~~Accident PU Backing [illegible] Metal @ OP~~

Time Interval	No. of Vehicles In Queue	Vehicle Observed	Queue Duration (Start/End Time)	Offload Duration (Start / End Time)	Nodes Visited	Comments

Nodes: 1 = Paper/Glass, 2 = Solid Waste, 3 = Metal Cans, 4 = OCC, 5 = Books/Mags, 6 = Motor Oil, 7 = Cooking Oil, 8 = Metal Pile, 9 = C&D, 10 = Recycling Row, 11 = Truck Scale, 12 = Other

10:30 – 10:45	6	WH. Honda	10:32 10:39	10:37 10:39	1, 2	
	15 10:39	Silver Impala	10:39 10:48	10:45 – 10:48 10:48	1, 2	
		WH PU	10:49 – 10:55	10:50 10:53 10:55	2, 1	
10:45 – 11:00	14					
11:00 – 11:15	7					
		Break				

Time Interval	No. of Vehicles In Queue	Vehicle Observed	Queue Duration (Start/End Time)	Offload Duration (Start / End Time)	Nodes Visited	Comments
Nodes:	1 = Paper/Glass 7 = Cooking Oil	2 = Solid Waste 8 = Metal Pile	3 = Metal Cans 9 = C&D	4 = OCC 10 = Recycling Row	5 = Books/Mags 11 = Truck Scale	6 = Motor Oil 12 = Other

Time Interval	No. of Vehicles In Queue	Vehicle Observed	Queue Duration (Start/End Time)	Offload Duration (Start / End Time)	Nodes Visited	Comments
11:15 – 11:30	17 + 1 outlier	Honda CRV	10:15 10:18	10:15 10:18	2, 1, 4	Parked before Metals RO
		Mercury	10:23 10:27	10:26 : 10:27	2	
11:30 – 11:45	17	Honda Pilot	11:33 – 11:39	11:37 – 11:39 11:36 11:37	2, 4, 1	2-3 C&D [illegible]
+ 2 outliers @ DPW	17	Silver Toyota PU	11:39 11:48	11:46 11:48	2.1	
11:45 – 12:00	20 B	Blk Ford	11:48 11:54	11:52 11:53	5, 1, 2	
	11:59 24 B	Wk Lexus	11:54 12:03	11:58 12:00	5, 1, 2	2 outliers @ DPW Start @ Turn inside [illegible]

Time Interval	No. of Vehicles In Queue	Vehicle Observed	Queue Duration (Start/End Time)	Offload Duration (Start / End Time)	Nodes Visited	Comments

Nodes: 1 = Paper/Glass; 2 = Solid Waste; 3 = Metal Cans; 4 = OCC; 5 = Books/Mags; 6 = Motor Oil; 7 = Cooking Oil; 8 = Metal Pile; 9 = C&D; 10 = Recycling Row; 11 = Truck Scale; 12 = Other

9:00 – 9:15	12	Bl Sdan	9:02 - 9:06	9:04 ; 9:05	2	1 Parked @ DPO Bins. 1 Parked @ GP
9:09	20 D	Bl SUV Toyota	9:03 - 9:08	9:04 9:08	2	1 Parked GP 1 DPO Bins
		BL VW	9:08 - 9:16	9:13 9:15	2,5,1	1 Mini Van forms 3rd line
		Blk PU	9:23 - 9:27	9:23/9:26-927	4,2,1	Drop of OCC – Then wait in line
		Rd Dodge PU	9:10 9:18	9:17 9:18	4,2,1	
9:19		Grey Acura	9:18 9:22	9:19 9:22	2,2,4	entered Turn Bin Doors, MIRROR
9:15 – 9:30						
9:30 – 9:45	9	KIA	9:30 9:31	9:30 9:31	1,2	
		Blk Tahoe	9:32 9:37	9:32 9:35	4,2,1	
		Gry FD PU	9:34 9:40	9:34/9:36 937 - 9:39	4,5,2,1	has Yard Waste
		GRY SUV	9:36 9:43	9:41 9:43	2,3,4,1 2	

Time Interval	No. of Vehicles In Queue	Vehicle Observed	Queue Duration (Start/End Time)	Offload Duration (Start / End Time)	Nodes Visited	Comments

Nodes: 1 = Paper/Glass; 2 = Solid Waste; 3 = Metal Cans; 4 = OCC; 5 = Books/Mags / News; 6 = Motor Oil; 7 = Cooking Oil; 8 = Metal Pile; 9 = C&D; 10 = Recycling Row; 11 = Truck Scale; 12 = Other

9:45 – 10:00	11	Red Ford P.U.	9:45 9:50	9:47 9:50	1,2,4	
		Gray Acura	9:49 9:51	9:49 9:51	2	@ Turn start offloading - Does end around
		Silver Toyota	9:50 9:54	9:53 9:54	2,1	
	11	Maxima	9:56 10:02	9:59 10:02	1	
10:00 – 10:15	16	Silver Subaru	10:02 10:07	10:05 10:07	5,1	At turn
		Red PU	10:08 10:14	10:11/10:13 10:14	2	@ Turn
		Bk Toyota w/trailer	10:11 10:18	10:11/10:15 10:18	4,2	@ Road/Turn
10:15 – 10:30	18	Red Toyota PU	10:19 10:23	10:21 10:23	2,1	
		Honda Element Gray	10:24 10:29	10:24 10:27 / 10:27 10:29	2,1	

Time Interval	No. of Vehicles In Queue	Vehicle Observed	Queue Duration (Start/End Time)	Offload Duration (Start / End Time)	Nodes Visited	Comments
Nodes:	1 = Paper/Glass 7 = Cooking Oil	2 = Solid Waste 8 = Metal Pile	3 = Metal Cans 9 = C&D	4 = OCC 10 = Recycling Row		5 = Books/Mags 11 = Truck Scale 6 = Motor Oil 12 = Other
12:00 – 12:15	[illegible] 24	wH Ford SUV	12:02 12:20	12:15 – 12:20	2, 14.	12:06 [illegible]
12:08	25					
12:15 – 12:30	24 12:22	Yellow Mustang	12:23 12:[illegible]	12:27 12:28	1,2	
12:30 – 12:45	20	white mercedes	12:30 12:34	12:32 12:34	2, 2, 1	Turned Around Park at Metal [illegible]
12:39 [illegible]	14					

Time Interval	No. of Vehicles In Queue	Vehicle Observed	Queue Duration (Start/End Time)	Offload Duration (Start / End Time)	Nodes Visited	Comments
Nodes:	1 = Paper/Glass 7 = Cooking Oil	2 = Solid Waste 8 = Metal Pile	3 = Metal Cans 9 = C&D	4 = OCC 10 = Recycling Row		5 = Books/Mags 6 = Motor Oil 11 = Truck Scale 12 = Other
12:45 – 1:00	10	1316 Dodge PU	12:46 12:53	12:46 – 12:53	2, oil	went to Metals Pile walked back & forth then to Scale for wood waste
1:00 – 1:15						
1:15 – 1:30						

Appendix B

Traffic Summary Tables

Table 1.1

Raw Data Summary of Vehicles Tracked[1]

Time Interval		No. Vehicles At Facility	Time In	Wait Time	Start Time	End Time	Total Offload Time	Wait Time	Time Out	Total Visit Time	No. of Nodes	Offload Time per Node
7:30	7:45	17	7:30:00	0:05:00	7:35:00	7:37:00	0:02:00	0:02:00	7:39:00	0:09:00	4	0:00:30
			7:30:00	0:08:00	7:38:00	7:41:00	0:03:00	0:03:00	7:44:00	0:14:00	3	0:01:00
			7:30:00	0:01:00	7:31:00				7:32:00	0:02:00		
			7:30:00						7:31:00	0:01:00		
			7:30:00						7:31:00	0:01:00		
			7:32:00						7:34:45	0:02:45		
			7:33:00						7:37:00	0:04:00		
			7:36:00	0:07:00	7:43:00	7:46:00	0:03:00	0:00:00	7:46:00	0:10:00	2	0:01:30
			7:42:00	0:01:00	7:43:00	7:44:00	0:01:00	0:01:00	7:45:00	0:03:00	4	0:00:15
7:45	8:00	10	7:45:00	0:01:00	7:46:00	7:48:00	0:02:00	0:00:00	7:48:00	0:03:00	3	0:00:40
			7:51:00	0:01:00	7:52:00	7:54:00	0:02:00	0:01:00	7:55:00	0:04:00	3	0:00:40
			7:51:00						7:56:00	0:05:00		
			7:53:00	0:04:00	7:57:00	7:59:00	0:02:00	0:00:00	7:59:00	0:06:00	3	0:00:40
			7:50:00	0:03:00	7:53:00	7:56:00	0:03:00	0:00:00	7:56:00	0:06:00	3	0:01:00
8:00	8:15	7	8:00:00	0:00:00	8:00:00	8:03:00	0:03:00	0:00:00	8:03:00	0:03:00	5	0:00:36
			8:00:33	0:01:02	8:01:35	8:05:00	0:03:25	0:00:31	8:05:31	0:04:58	2	0:01:43
			8:02:00	0:01:00	8:03:00	8:06:00	0:03:00	0:00:00	8:06:00	0:04:00	3	0:01:00
			8:03:00	0:00:00	8:03:00	8:07:00	0:04:00	0:00:00	8:07:00	0:04:00	3	0:01:20
			8:08:00	0:00:00	8:08:00	8:11:00	0:03:00	0:00:00	8:11:00	0:03:00	3	0:01:00
					8:09:40	8:10:58	0:01:18				2	0:00:39
8:15	8:30	14	8:14:00	0:01:00	8:15:00	8:16:00	0:01:00	0:00:00	8:16:00	0:02:00	1	0:01:00
			8:15:31	0:02:41	8:18:12	8:22:56	0:04:44	0:00:08	8:23:04	0:07:33	3	0:01:35
			8:17:00	0:03:00	8:20:00	8:23:00	0:03:00	0:00:00	8:23:00	0:06:00	3	0:01:00
			8:24:14						8:28:00	0:03:46		
8:30	8:45	10	8:31:00	0:00:00	8:31:00	8:33:00	0:02:00	0:00:00	8:33:00	0:02:00	4	0:00:30
			8:37:00	0:00:00	8:37:00	8:39:00	0:02:00	0:00:00	8:39:00	0:02:00	2	0:01:00
			8:37:30	0:02:45	8:40:15	8:41:43	0:01:28	0:00:00	8:41:43	0:04:13	1	0:01:28
			8:40:00	0:00:00	8:40:00	8:44:00	0:04:00	0:00:00	8:44:00	0:04:00	5	0:00:48
8:45	9:00	8	8:45:00	0:00:00	8:45:00	8:48:00	0:03:00	0:00:00	8:48:00	0:03:00	3	0:01:00
			8:49:00	0:00:00	8:49:00	8:52:00	0:03:00	0:00:00	8:52:00	0:03:00	3	0:01:00
			8:53:00	0:04:00	8:57:00	9:01:00	0:04:00	0:00:00	9:01:00	0:08:00	4	0:01:00
9:00	9:15	20	9:02:00	0:02:00	9:04:00	9:05:00	0:01:00	0:01:00	9:06:00	0:04:00	1	0:01:00
			9:00:07	0:02:42	9:02:49	9:04:17	0:01:28	0:00:00	9:04:17	0:04:10	1	0:01:28
			9:03:00	0:01:00	9:04:00	9:07:00	0:03:00	0:01:00	9:08:00	0:05:00	1	0:03:00
			9:08:00	0:05:00	9:13:00	9:15:00	0:02:00	0:01:00	9:16:00	0:08:00	3	0:00:40
			9:10:00	0:07:00	9:17:00	9:18:00	0:01:00	0:00:00	9:18:00	0:08:00	3	0:00:20
9:15	9:30		9:19:00	0:00:00	9:19:00	9:22:00	0:03:00	0:00:00	9:22:00	0:03:00	3	0:01:00
			9:23:00	0:00:00	9:23:00	9:26:00	0:03:00	0:01:00	9:27:00	0:04:00	3	0:01:00
			9:27:46	0:02:32	9:30:18	9:30:55	0:00:37	0:00:00	9:30:55	0:03:09	1	0:00:37
9:30	9:45	9	9:30:00	0:00:00	9:30:00	9:31:00	0:01:00	0:00:00	9:31:00	0:01:00	2	0:00:30
			9:32:00	0:00:00	9:32:00	9:33:00	0:01:00	0:04:00	9:37:00	0:05:00	3	0:00:20
			9:33:00	0:03:30	9:36:30	9:38:20	0:01:50	0:00:00	9:38:20	0:05:20	1	0:01:50
			9:34:00	0:00:00	9:34:00	9:39:00	0:05:00	0:01:00	9:40:00	0:06:00	4	0:01:15
			9:36:00	0:05:00	9:41:00	9:43:00	0:02:00	0:00:00	9:43:00	0:07:00	5	0:00:24
			9:43:33	0:02:27	9:46:00	9:49:15	0:03:15	0:00:45	9:50:00	0:06:27	3	0:01:05
9:45	10:00	11	9:45:00	0:02:00	9:47:00	9:50:00	0:03:00	0:00:00	9:50:00	0:05:00	3	0:01:00
			9:49:00	0:00:00	9:49:00	9:51:00	0:02:00	0:00:00	9:51:00	0:02:00	1	0:02:00
			9:50:00	0:03:00	9:53:00	9:54:00	0:01:00	0:00:00	9:54:00	0:04:00	2	0:00:30
					9:51:50	9:53:26	0:01:36				2	0:00:48
			9:55:00	0:01:50	9:56:50	9:58:00	0:01:10	0:00:49	9:58:49	0:03:49	3	0:00:23
			9:56:00	0:03:00	9:59:00	10:02:00	0:03:00	0:00:00	10:02:00	0:06:00	1	0:03:00
10:00	10:15	16	10:01:00	0:02:00	10:03:00	10:08:10	0:05:10	0:00:00	10:08:10	0:07:10	2	0:02:35
			10:02:00	0:03:00	10:05:00	10:07:00	0:02:00	0:00:00	10:07:00	0:05:00	2	0:01:00
			10:08:00	0:03:00	10:11:00	10:14:00	0:03:00	0:00:00	10:14:00	0:06:00	1	0:03:00
			10:09:46	0:02:53	10:12:39	10:13:23	0:00:44	0:00:00	10:13:23	0:03:37	1	0:00:44
			10:11:00	0:04:00	10:15:00	10:18:00	0:03:00	0:00:00	10:18:00	0:07:00	2	0:01:30
10:15	10:30	18	10:19:00	0:02:00	10:21:00	10:23:00	0:02:00	0:00:00	10:23:00	0:04:00	2	0:01:00
			10:24:00	0:00:00	10:24:00	10:29:00	0:05:00	0:00:00	10:29:00	0:05:00	2	0:02:30
			10:26:34	0:04:00	10:30:34	10:32:00	0:01:26	0:00:28	10:32:28	0:05:54	2	0:00:43
10:30	10:45	15	10:32:00	0:05:00	10:37:00	10:39:00	0:02:00	0:00:00	10:39:00	0:07:00	2	0:01:00
			10:33:41	0:01:46	10:35:27	10:40:50	0:05:23	0:00:00	10:40:50	0:07:09	2	0:02:41
			10:39:00	0:06:00	10:45:00	10:48:00	0:03:00	0:00:00	10:48:00	0:09:00	2	0:01:30
			10:44:03	0:02:48	10:46:51	10:50:32	0:03:41	0:00:00	10:50:32	0:06:29	1	0:03:41

Table 1.1
Raw Data Summary of Vehicles Tracked[1]

Time Interval		No. Vehicles At Facility	Time In	Wait Time	Start Time	End Time	Total Offload Time	Wait Time	Time Out	Total Visit Time	No. of Nodes	Offload Time per Node
10:45	11:00	14	10:49:00	0:01:00	10:50:00	10:55:00	0:05:00	0:00:00	10:55:00	0:06:00	2	0:02:30
			10:54:42	0:00:00	10:54:42	10:55:50	0:01:08	0:01:30	10:57:20	0:02:38	3	0:00:23
11:00	11:15	7	11:13:37	0:04:53	11:18:30	11:21:14	0:02:44	0:00:00	11:21:14	0:07:37	3	0:00:55
11:15	11:30	17	11:15:00	0:00:00	11:15:00	11:18:00	0:03:00	0:00:00	11:18:00	0:03:00	3	0:01:00
			11:23:00	0:03:00	11:26:00	11:27:00	0:01:00	0:00:00	11:27:00	0:04:00	1	0:01:00
			11:23:42	0:00:58	11:24:40	11:26:00	0:01:20	0:00:00	11:26:00	0:02:18	3	0:00:27
			11:27:26	0:01:39	11:29:05	11:34:28	0:05:23	0:00:00	11:34:28	0:07:02	3	0:01:48
11:30	11:45	17	11:33:00	0:03:00	11:36:00	11:39:00	0:03:00	0:00:00	11:39:00	0:06:00	3	0:01:00
			11:37:13	0:00:00	11:37:13	11:39:20	0:02:07	0:00:00	11:39:20	0:02:07	2	0:01:03
			11:39:00	0:07:00	11:46:00	11:48:00	0:02:00	0:00:00	11:48:00	0:09:00	2	0:01:00
			11:41:08	0:14:14	11:55:22	11:56:54	0:01:32	0:00:19	11:57:13	0:16:05	3	0:00:31
			11:41:30	0:03:17	11:44:47	11:46:50	0:02:03	0:00:00	11:46:50	0:05:20	1	0:02:03
11:45	12:00	24	11:48:00	0:04:00	11:52:00	11:53:00	0:01:00	0:01:00	11:54:00	0:06:00	3	0:00:20
			11:54:00	0:04:00	11:58:00	12:00:00	0:02:00	0:03:00	12:03:00	0:09:00	3	0:00:40
12:00	12:15	25	12:00:18	0:03:06	12:03:24	12:09:33	0:06:09	0:00:00	12:09:33	0:09:15	3	0:02:03
			12:02:00	0:13:00	12:15:00	12:20:00	0:05:00	0:00:00	12:20:00	0:18:00	3	0:01:40
			12:13:18	0:00:00	12:13:18	12:18:33	0:05:15	0:00:00	12:18:33	0:05:15	1	0:05:15
12:15	12:30	24	12:23:00	0:04:00	12:27:00	12:28:00	0:01:00	0:01:00	12:29:00	0:06:00	2	0:00:30
			12:21:30	0:09:02	12:30:32	12:31:44	0:01:12	0:00:00	12:31:44	0:10:14	1	0:01:12
12:30	12:45	20	12:30:00	0:02:00	12:32:00	12:34:00	0:02:00	0:00:00	12:34:00	0:04:00	3	0:00:40
			12:44:58	0:04:31	12:49:29	12:54:39	0:05:10	0:00:00	12:54:39	0:09:41	4	0:01:17
12:45	13:00	10	12:46:00	0:00:00	12:46:00	12:53:00	0:07:00	0:00:00	12:53:00	0:07:00	2	0:03:30

1 Compiled data from notes recorded by Stephen E. Wright and Ronald St. Michel on August 25, 2012

Table 1.3
Saturday Traffic Count Summary

Time Interval		August 25, 2012[1]		July 18, 2009[2]	June 21, 2008[2]	July 2, 2006[2]		June 24, 2006[2]		Average[3]
7:30	7:45	61	97	78	150	95	181	66	130	154
7:45	8:00	36				86		64		
8:00	8:15	34	151	126	316	78	327	47	227	290
8:15	8:30	30				80		48		
8:30	8:45	37				77		57		
8:45	9:00	50				92		75		
9:00	9:15	45	181	170	297	82	362	59	202	287
9:15	9:30	48				90		58		
9:30	9:45	41				94		45		
9:45	10:00	47				96		40		
10:00	10:15	45	174	177	**367**	93	298	62	287	317
10:15	10:30	47				79		66		
10:30	10:45	43				53		79		
10:45	11:00	39				73		80		
11:00	11:15	44	**199**	**172.5**	306	**82**	**377**	**84**	**328**	**337**
11:15	11:30	**48**				**86**		**87**		
11:30	11:45	**49**				**102**		**92**		
11:45	12:00	**58**				**107**		**65**		
12:00	12:15	**50**	164	152.5	283	82	303	68	281	289
12:15	12:30	40				63		59		
12:30	12:45	37				77		79		
12:45	13:00	37				81		75		
13:00	13:15	38	159	144.5	280	76	317	79	288	295
13:15	13:30	33				98		84		
13:30	13:45	47				66		69		
13:45	14:00	41				77		56		
14:00	14:15	41	164	149	255	102	321	59	265	280
14:15	14:30	32				70		66		
14:30	14:45	40				73		77		
14:45	15:00	51				76		63		
15:00	15:15	44	75	86	175	80	156	73	147	159
15:15	15:30	31				76		74		
Total Vehicles		1,364	1,364	1,256	2,429	2,642	2,642	2,155	2,155	2,409
Average Hour		171	171	157	304	330	330	269	269	301
Average 15 Minutes		43	43	39	76	83	83	67	67	75
Peak Hour		205	199	177	367	377	377	328	328	337
Peak 15 Minute		58				107		92		100
Peaking Factor[4]		136.07%				129.60%		136.61%		134.09%

1 Traffic data obtained from observing Town video taken from the Transfer Station entrance (the point).
2 Traffic data otained from traffic count data prepared by the Town of Derry, NH.
3 Average of the three busiest days (June 21, 2008, July 2, 2006 and June 24, 2006).
4 Peaking Factor is the calculated peaking factor for the 15 minute peak traffic flow above the average 15 minute (Average Hour divided by four).

Table 1.4
Vehicle Traffic Projections

	Units	Kleinfelder Observation Date August 25, 2012	Busy Saturday Average	(a Peak Day) 2012	2043
Population	people	37,082[1]	34,071[2]	37,082[1]	46,292[1]
Total No. of Vehicles	veh/day	1,364	2,409[3]	2,409	2,409
Population Increase Factor	veh/day			213	864
Participation Increase (10%) Factor	veh/day			262	327
Projected Total No. of Vehicles	veh/day	**1,364**	**2,409**	**2,884**	**3,600**
Projected No. of Vehicles (average hour)	veh/hour	**171**	**301**	**360**	**450**
Average 15 minutes	veh/15 minutes	43	75	90	112
Peak 15 minutes	veh/15 minutes	**58**			
Calculated Average Peaking Factor	percentage		**134.09%** [4]		
Calculated Peak 15 minutes	veh/15 minutes		**100**	**121**	**151**
No. of Off-Load Positions	spaces			38[5]	38[5]
Required Average Hour Usage Rate	veh/hr/space			9.49	11.84
Required Turn-over Rate	minutes/veh/space			**6.33**	**5.07**
Time	hr/mm/ss			**0:06:20**	**0:05:04**
Required Peak 15 Minute Usage Rate	veh/hr/space			3.18	3.97
Required Turn-over Rate	minutes/veh/space			**4.72**	**3.78**
Time	hr/mm/ss			**0:04:43**	**0:03:47**
Estimated Required Time at the Facility				**Average**	**Maximum**
Walking Distance (vehicle to vehicle)	feet			335	460
Average Human Walking Speed	feet/second			4.0[6]	4.0[6]
Average Human Walking Speed	feet/minute			240	240
Walking Time	minutes/veh/space			1.40	1.92
Estimated Off-Loading Time	minutes/veh/space			4.24	4.24
Estimated Total Time	minutes/veh/space			**5.64**	**6.16**
Time	hr/mm/ss			**0:05:38**	**0:06:10**
Current Average Required Time at the Facility					
Waiting to Off-Load Time	minutes/veh/space	2.68			
Off-Load Time	minutes/veh/space	2.65			
Waiting to Leave Time	minutes/veh/space	0.33			
Average Total Time On-Site	minutes/veh/space	**5.50**[7]			
Time	hr/mm/ss	**0:05:29**			

1 Population projections for 2012 and 2043 based on population estimates provided in the March 2010 Town of Derry Master Plan, prepared by the Southern New Hampshire Planning Commission (SNHPC). The population projection data provided in the Master Plan for 2010 and 2015 was used to estimate the 2012 population of 37,082 (straight line projection). The population figure of 46,292 was obtained from Appendix D - *Derry New Hampshire Buildout Report,* prepared by SNHPC in connection with the I93 Community Technical Assistance Program. The population figure of 46,292 represents the Community Scenario, provided on Page D-20 of the Buildout Report (2043 population).

2 Population number under the Busy Saturday Average represents Derry's population in 2008.

3 Average of the three busiest days (June 21, 2008, July 2, 2006 and June 24, 2006). See Saturday Traffic Count Summary table.

4 From Saturday Traffic Count Summary Table (See Table 1)

5 Based on Option 3B -Revised Conceptual Layout, final parking space count may change during final design due to unanticipated layout considerations.

6 Manual of Uniform Traffic Control Devices as referenced in "A History of Pedestrian Signal Walking Speed Assumptions", 3rd Urban Street Symposium, June 24-27, 2007, Seattle, WA, by John LaPlante, PE, PTOE and Thomas P. Kaeser, PE, PTOE

7. Average total time on-site obtained from Table 2 - Traffic Observation Summary and is calculated from the raw data recorded on August 25, 2012.

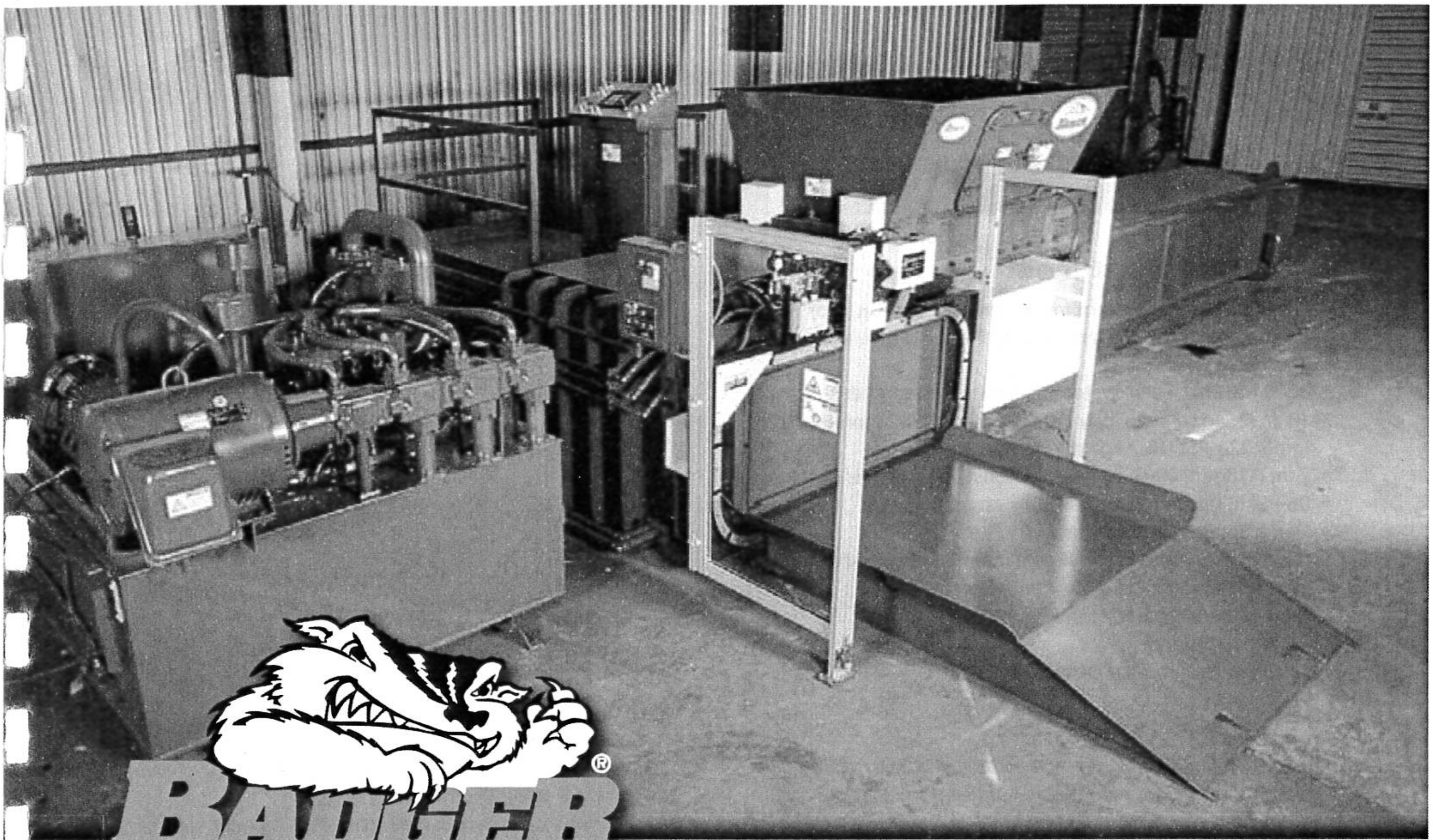
Appendix C

Baler Equipment Summary Table

Table 4.2
Baler Equipment Summary Table

Manufacturer:	Harris	Sierra	Excel
Baler Model:	Badger L125S-4-11/8	REB-1	2R9
	(recommended)	(recommended)	(recommended)
Through-Put Tonnages (tons/hour)			
Plastic	4.0 - 9.6		
PETE (#1 Plastic)		4 - 5	6
HDPE (#2 Plastic)			5
Non-Ferrous	8.0 - 14.4		6
Aluminum Cans	5.9 - 9.6		6
Steel Cans	14.4 - 20.8		15
ONP	13.6 - 18.4	14 - 16	15
OCC	8.8 - 13.6	8 - 12	8
Magazines			20
Bale Weight, lbs (Density, lbs/cu. ft.)			
Plastic	1150 - 1450, (23 - 29)		
PETE (#1 Plastic)		1100 - 1200 lbs	1200 lbs
HDPE (#2 Plastic)			1300 lbs
Non-Ferrous	1050 - 2700 (21 - 54)		1500 lbs
Aluminum Cans	1000 - 1200 (20 - 24)	1000 - 1100 lbs	800 lbs
Aluminum Sheet		1500 - 2000 lbs	
Aluminum Extrusions		1200 - 1400 lbs	
Copper Tubing		3800 - 4200 lbs	
Copper Wire		3300 - 5500 lbs	3500 lbs
Stainless Steel		3500 - 4500 lbs	
Steel Cans	1500 - 2400 (30 - 48)		2000 lbs
ONP	1300 - 1600 (26 - 32)	1200 - 1600 lbs	1600 lbs
OCC	1250 - 1550 (25 - 31)	1400 - 1600 lbs	1400 lbs
Magazines			2400 lbs
Bale Dimensions (inches)	46"W x 31"H x 61"L	46"W x 31"H x 62"L	45"W x 30"H x 60"L
Operating Features			
Motor Size	125 HP/460V/3PH/60HZ, 1750 RPM, ODP	75HP - 460V - 3PH - 60HZ - TEFC	50 HP TEFC Motor, 460V/60 Hz/3 Phase
Cooling Fan	(2) 1 HP/460V/3PH/60HZ, 1750 RPM TEFC		
Bore Size	11" bore, 8" rod, 135" stroke	9" bore	9" bore, 106" stroke, 6" hardened chrome rod
Oil Reservoir	700 gallons	500 gallons	300 gallons
Oil Cooler	Air-to-Oil Thermostatically Controlled	included	
Oil Heater	3000-Watt Thermostatically Controlled	included	
Filtration	10-micron		
Main Pump Flow	378 gpm	153 gpm	100 gpm
Circulation Pump	107 gpm		
Stapper Pump	12 gpm		
Total Force	166 tons, 60% Ram penetration	143 tons (286,000 lbs)	190,851 lbs / 206,756 lbs Maximum
Shear/Baling Force	137 tons (274,000 lbs) (166 tons	143 tons (286,000 lbs)	
RAM Face Pressure	288 psi	241 psi	154 psi / 166 psi Maximum
Ejector Cylinder	8" bore, 5.5" rod, 73" stroke / 88 tons of force	8" bore	9" bore, 6" chrome rod
Ejector Ram Face Pressure	111 psi	110 psi	
Hydraulic System Operating Pressure	3,500 psi	4,500 psi	3,000 psi Automatic Mode (3,250 psi
Cycle Time (no load)	11.8 sec		20 seconds
Dry Cycle Time		15 sec	
Dry Cycle Capacity		12,000 cu. ft./hour	
Shipping Weight	57,000 lbs (w/combo door)	55,000 lbs	47,500 lbs (w/sep. door)
Construction & Standard Features			
	Uni-body full frame construction	Heavy duty Frame and Ram Construction	EXCEL® Autonetics™ with Absolute Ram Position Sensor with Electronic Display
	Non-ferrous floor strips	Allen Bradley PLC	Operator-Free Operation
	Clevis and pin cylinder mounts	Panelview HMI provides for material selection and diagnostics	U.S. Wire Tie Systems Automatic 342 Tier with Turbo Motor
	Harris Smartknife shimless knife adjustment	Modem for on site diagnostics	Industrial Hardened Logic Controller
	Plug bale compatible	Automatic Operations on Most Materials	Fully lined with Hardox® 400 Replaceable Wear liners
	Touchscreen operator interface terminal	Conveyor Controls	Upper, Middle, and Lower Photo Eyes
	Optional Harris Combo Door (bale separation & oversize release door	Main Ram penetration 60% of bale chamber	NEMA 12 rated Enclosures and Controls with Conveyor Starter
		Automatic Wire Tier (Accent or L&P)	Installed and working modem for On-Line Diagnostics
		Operator's platform	Automatic Bale Release Door
		Bale Table	Atuomatic Shear Jam Correction
		Wye Delta main motor starting	Bale Discharge Platform
		Filtration: 5 micron return-line, 3 micron kidney loop	Air to Oil Heat Exchanger
		Flooded suction power unit	UL, CUL Approved (CE Available)
		Oil Cooler/Heater	Bale Counter
		Adjustable Ram guides	Hour Meter
		Separation Door with Bale relief	Integrated Steel Platen Wiper
		Tongue and Groove floor liner plates	Hardened, Serrated, Turnable Cutting Knives
		Hardox 450 Replacement liners	
Equipment Dimensions			
Layout Considerations	"L" layout & "I" layout	"T" layout	"T" layout & "I" layout
Overall dimensions	68.5' L x **33' W x 16.5' H** (L layout) (long pit with flat)	30' L x 15' W x 7' H(not including conveyor)	29' L x 13.5' W x 9' H (not incl. conveyor)
	72.5' L x 20' W x 14' H (I layout) (long pit with flat)	**(63' L x 35' W x 15'H)** (long pit with flat)	30' L x **29' W** x 14.5' H (ground sys.)
			53.5' L x 14.5' W x **15' H** (long pit with flat)
Hopper opening	65" x 94" (5.5' x 8')	60"W x 77" L	40"W x 65"L
Charge box opening	41"W x 72"L	41"W x 72"L	
Schemetic Drawings	YES	YES	YES
AutoCAD drawings	NOT PROVIDED	YES	NOT PROVIDED
Equipment Cost Estimates			
Baler	$290,000 to $320,000	$285,000	$228,180
Conveyor	$90,000 to $150,000	$87,800 to $103,400	$22,000 to $140,000
Total	**$380,000 to $470,000**	**$372,800 to $388,400**	**$250,180 to $368,180**
References (Nearby Users)			
	Erik Levy (or Wayne) (Contacted)	Mark Shikles (Contacted)	Paul Pieper (Contacted)
	Save-That-Stuff	Winfred Alloy	Rice County Hazardous Waste &
	Charlestown, MA	Atkinson, NH	Recycling Coordinator
	617.241.9998	603.329.1200	507.332.6833
			Minnesota
		Charlie Van Hall	
	Matucheo Scrap	Metro Metals	Jesse Samuelson
	Everett, MA	Albany, NY	LJP Enterprises, Inc.
	617.884.2562	518.273.9979	2160 Ringhofer Drive
			North Mankato, MN 56003
			507.385.3428
Contact Information	Randy Hengst	Richard Harris	Cory Gardner
	704.661.5816	817.337.7111	888.699.2848
	randy.hengst@harrisequip.com	rharris@sierraintl.net	cory@jwrinc.net
	www.harrisequip.com	www.sierraintl.net	www.excelmfg.com
			www.jwrinc.net
	Russ Bennett	Joe Droukas	
	603.370.1397	603.490.7100	
	russ@recmech.com	jpdltd@earthlink.net	
	www.recmech.com		

Appendix D
Equipment Brochures and Manufacturer's Information



BADGER®

Two Ram Baler

Processes:

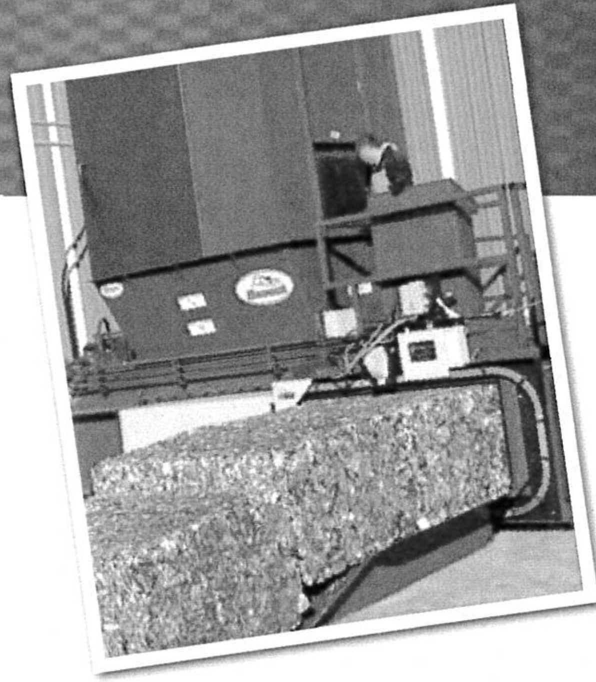
- Newspaper (ONP)
- Cardboard (OCC)
- High Grade Paper
- Solid Waste (MSW)
- Plastics (PET, HDPE, Film)
- Cans (Steel/Aluminum)
- White Goods
- Non-Ferrous Metals

Harris Badger® is a narrow box, multi-purpose baler providing

an economical price. The Badger® produces high density bales with the highest baling force in its class.

Harris

BADGER®



Standard Features:

- Laser positioning system for all ram and bale exit door movements, provides a reliable and virtually maintenance free operation.
- 3500 PSI (241 bars) system operating system pressure.
- 10 in. (254mm) main cylinder, 137 tons (124.2 tonnes) of force, 223 PSI (15.7 kg/cm2) ram face pressure.
- 7 in. (178mm) eject cylinder, 67 tons (60.8 tonnes) of force,
- 85 PSI (6.0 kg/cm2) ram face pressure
- Harris Smartknife™ System.
- High Quality Abrasion Resistant material replaceable liners including tongue and groove floor liners.
- Multi-Material controller with:
  - Phone modem
  - Operator Interface Display (OIT)
  - Diagnostics
  - English/Spanish display
- Heavy-duty main cylinder incorporates Harris' designed heavy wall cylinder tube, flame hardened cylinder rod and TFE piston seal.
- Full automatic operation on the majority of materials.
- Heavy-duty uni-body frame construction.
- Choice (by customer) of serrated or flat shear knife.
- Penetrating main ram (L series incorporates 60% penetration into the bale chamber).
- Plug bale compatible.
- Auto Tier – 11 or 12 gauge high tensile wire.
- 3 phase, 60 Hz, 460 V electrical.
- Harris standard warranty.

Options:

- Harris Combo Door™
- 11 in. (279mm) main cylinder, 166 tons (150 tonnes) of force, 269 PSI (18.9 kg/cm2) ram face pressure.
- 8 in. (203mm) eject cylinder, 88 tons (79.8 tonnes) of force, 110 PSI (7.7 kg/cm2) ram face pressure.
- Hopper extension (up to 92 in. (2438mm) high).
- Bale discharge table.
- Elevated operator's platform.
- Climate controlled operator's cab.
- Feed conveyor(s).
- Wye Delta main motor starting.
- CE rating.
- Alternative power unit locations.
- Other languages, electrical voltages, & options on request.

Call today for more information

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800-373-9131

www.harrisequip.com

Harris®

HARRIS MODEL - BADGER L125S-4-11/8

Automatic Two-Ram Baling Press
General Specification Number 1000005
Revised 09-03-2010

*PERFORMANCE

Bale Size	46 in. wide x 31 in. high x 61 in. long
Bale Volume	50 cubic feet expanded (approximate)
Cycle Time	11.8 seconds (No Load)
Capacity	18,700 cubic feet per hour (no load)

GENERAL SPECIFICATIONS

Hopper Opening (Top)	65 in. x 94 in.
Charge Box Opening	42 in. x 85 in.
Strapper	Automatic Wire Tie
Non-ferrous liners	Main frame floor and ram
Approximate Shipping Weight	26 tons (w/out combo door) 28.5 tons (w/combo door)

*BALING MATERIAL SPECIFICATIONS

Material	Bale Weight (lbs)	Density (lbs/cu. ft.)		w/ Combo Door (tons/hr) 125HP	w/o Combo Door (tons/hr) 125 HP
		Loose	Baled		
BULK OCC	1250-1550	3.0-6.0	25-31	8.8-13.6	10.4-15.2
SOLID WASTE	1900-2400	7.0-12.0	38-48	18.4-26.4	22.4-30.4
NEWSPRINT	1300-1600	6.8-8.0	26-32	13.6-18.4	17.6-22.4
WHOLE ALUMINUM CANS	1000-1200	1.5-4.5	20-24	5.6-9.6	6.4-11.2
STEEL CANS	1500-2400	6.0-9.0	30-48	14.4-20.8	16.8-24.0
PLASTIC	1150-1450	1.2-4.0	23-29	4.0-9.6	4.8-10.4
NON-FERROUS	1050-2700	3.0-6.5	21-54	8.0-14.4	9.6-16.8

*Performance rates and/or production rates are subject to material input density, feed rates, and other variables of production outside the control of HWMG, Inc.

OPTIONS

Reduced Voltage Starting	Hopper Extension
Conveyors	Combination Bale Release and Separation Door (Combo Door)
Climate-Controlled Operator's Cabin	Oversize Bale Release Door
Bale Run out Table	Installation Assistance
Elevation of Platform	

HYDRAULICS

Main Pumps	378 gpm
Circulation Pump	107 gpm
Strapper Pump	12 gpm
System Pressure	3500 psi
Harris Main Cylinder	11 in. bore, 8 in. rod, 135 in. stroke 166 tons of force, 60% ram penetration
Main Ram Face Pressure	288 psi
Ejector Cylinder	8 in. bore, 5.5 in. rod, 73 in. stroke 88 tons of force
Ejector Ram Face Pressure	111 psi
Oil Reservoir	700 gallons capacity (Standard HP)
Oil Cooler	Air-to-Oil Thermostatically-Controlled
Oil Heater	3000-Watt Thermostatically-Controlled
Filtration	10-micron

Hydraulic Power Unit	
Motors	Main (1) 125HP 460/3/60, 1750 RPM, ODP Cooling Fan (2) 1 HP 460/3/60, 1725 RPM, TEFC
Starters	Across-the-line motor starters with overload protection (reduced voltage starting available as an option)
Location	3 Standard power unit positions to choose from (refer to layout sheet attached). Optional power unit locations positions at additional cost.

Electrical	
Functions	Automatic or manual baling cycles. Pushbuttons and joystick mounted on operator's console. Self-diagnostics display. Multiple baling and strapping modes.
Controls	UL and CUL listed Operator Interface Terminal (OIT), 20 material selection and setup with color touch screen display/phone modem. Solid-state programmable controller with operator console
Location	Operator control console mounted over compression chamber
Enclosures	NEMA 12 rated (Not rated for outdoor operation)
Photo Eyes	Adjustable Multi-level material control
Conveyor Controls	(1) 10HP (Standard)

Construction	
Main Frame and Compression Chamber	Constructed of heavy steel plate and reinforcing ribs. Wear surfaces are replaceable abrasion resistant plate. Back wall is reinforced solid steel plate. Flooring constructed of tongue and groove abrasion-resistant wear plates.
Rams	Both the gathering and eject rams are heavy steel weldments with abrasion-resistant liner plates.
Piping	ASTM A-106 Schedule 160
Fixed Knife	Harris' patented "Smart-knife" adjusting system. No shims are required.

Tying Unit	
Model Number	L & P Wire-Tie System 11 or 12 gauge or equivalent Other major brands available. Pricing available upon request.

Testing	
Factory Test	Machine is fully assembled and tested prior to shipping

Startup Service	
Services provided by your distributor or HWMG	Qualified startup technicians are required. Pricing is available upon request.

Purchaser To Provide	
Hydraulic Oil	Approximately 800 Gallons
Electric Power	Provide to Main Control Panel
Concrete Foundation Floor	Refer to foundation load drawing for details
Unloading Equipment	Personnel, equipment and tools required to unload assemble and install baler. Spreader bars are required for lifting equipment
Wire	Correct wire for strapping
Baling Material	Adequate and appropriate materials for processing during the start-up/training period
Safety	Refer to Safety and Installation Guidelines attached.,
Maintenance	Tools and spare parts for performing maintenance, adjustments and troubleshooting

Acceptable and Non-Acceptable Materials

This baler is intended to process the following materials. Any materials other than these could severely damage the machine and will void the warranty.

ACCEPTABLE

- Empty Aluminum Cans
- Empty Tin Cans, buckets or barrels, 55 gallons or less

THE FOLLOWING MATERIALS ARE BASED ON SHEARING A SINGLE LAMINATION ONLY:

- High-grade paper (conditioned)
- Corrugated Cardboard
- Solid Waste (Exclusions below)
- Drywall
- Wooden Pallets
- Empty PET (Plastic) Bottles
- "White goods" without motors and transmissions
- Newsprint (conditioned)
- Aluminum Sheeting, less than 16-gauge thick
- Aluminum Siding and aluminum cable less than 1/2" diameter
- Aluminum Extrusions less than 3/16" thick and less than ½ sq. in. in cross-section
- Copper less than ½ sq. in. in cross-section
- Radiators(automobile only, made of aluminum or brass)
- Steel Cable less than 1/2" in diameter
- Non-magnetic ferrous material with a thickness no greater than 1/16" nor greater than ¼ sq. inch in cross-section
- Rags
- Ferrous material with a tensile strength of less than 50,000 Lbs/sq. inch, a thickness of no more than 1/16" and a cross-section of no more than 1/4 sq. in.

NON-ACCEPTABLE

- Pressurized cylinders or cans of any description
- Large pieces of masonry, steel or other such non-compressibles
- Ferrous metals greater then 1/16" thickness or ¼" diameter or ¼" cross section

SOLID WASTE EXCLUSIONS

- Masonry or concrete greater than 1 square inch in cross-section or 6" in length
- Glass, masonry, and other such abrasive non-compressibles can cause excessive wear or damage and can interfere with baler functions such as shearing or the operation of the door

Limited Warranty: All Harris Waste Management Group, Inc. Manufactured Products
This machine is covered under Harris WARRANTY (HWMG, Inc. 990101W-STD) which is attached.

NOTES:

1) Some bridging may occur in the hopper depending upon the material being processed and how the material is being presented to the hopper. Wet solid waste may tend to extrude the plug bale if the baler has no baling door. Some materials may require pre-conditioning. Consult your Harris representative for recommendations.
2) The knife edges and the vertical blade clearance must be maintained within the limits described in the Operator/Service manual.
3) Bales must be broken apart and loose prior to rebaling.

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

Harris INSTALLATION SAFETY GUIDELINES

- All operators and support personnel should be trained in the safe operation of the baler, including proper material feeding techniques in accordance with the Harris Operator/Service Manual and ANSI Z245.5 standard – Baling Equipment – Safety Requirements for Installation, Maintenance and Operation.
- All operators and employees must be instructed as to the location and use of all emergency stop devices associated with the baler and all ancillary equipment.
- All emergency stops on baler, in-feed conveyor and other ancillary equipment are to be interlocked so that any emergency stop will shut down the baler, in-feed conveyor and any ancillary equipment. Emergency stop devices must be installed on both sides of the in-feed section of the conveyor.
- All electrical power for baler, in-feed conveyor and other ancillary equipment must be from a single source with a single electrical disconnect to insure all equipment can be locked out at a single location in accordance with OSHA 1910.147.
- The operator must have an unobstructed view of the baler in-feed and baler discharge area from the operator's console.
- Entry to the hopper or hopper extension must be in accordance with OSHA standards by means of access doors, and fixed or mobile platforms. **Never use the in-feed conveyor as a means to access the hopper or hopper extension.**
- Proper guarding between the hopper or hopper extension and conveyor must be provided in compliance to OSHA/ANSI guarding standards.
- Conveyor should be located so that material discharged into the hopper does not cause bridging.
- Conveyor belt width should not be wider than the baler charging box opening in the direction of entry to avoid possible bridging.
- The maximum size of material should be no greater than the size of the baler charging box to minimize bridging.
- Obstructions, protrusions, and transitions in the hopper should be avoided to minimize bridging.
- Insure that all decals are in place. A decal location chart is provided in the Harris Operator/Service Manual.

Harris Waste Management Group, Inc. - Cordele Operations ♦ P O Box 998 ♦Cordele, GA 31015 ♦ 1-800-710-4994
Harris Waste Management Group, Inc. - Baxley Operations ♦ P O Box 406 ♦ Baxley, GA 31515 ♦ 1-800-447-3526

SIERRA
INTERNATIONAL MACHINERY, LLC.
SCRAP PROCESSING | RECYCLING EQUIPMENT | SOLID WASTE HANDLING

November 28, 2012

Mr. Ron St. Michel
Kleinfelder

Regarding: Derry, NH

Dear Mr. St Michel,

Please receive the information that you requested on the REB 1and REB 2 balers.

REB 1:
Ram face pressures: Main Ram 241psi, Eject Ram 110psi
Reservoir capacity: 500 gallons
Total force: Main Ram 143 tons, Ejector Ram 88 tons
Cylinder sizes: Main Ram 9 inches, Eject Ram 8 inches
Oil heater and cooler included.

REB 2:
Ram face pressure: Main Ram 304 psi, Eject Ram 210 psi
Reservoir capacity: 1400 gallons
Total force: Main ram 254 tons, Ejector Ram 113 tons
Cylinder sizes: Main cylinder 12 inches, Eject cylinder 8 inches
Oil heater and cooler included

Explanation of high pressure system: The high pressure system allows the machine to utilize a smaller cylinder that will achieve greater force than larger cylinders. The benefits of this system include faster cycle times and more energy efficiency.

If you have any questions please feel to contact me.

Sincerely,

Joe Droukas
Eastern Sales Manager

Ph. 661.327.7073 | USA. 800.343.8503 | Fax. 866.473.4303
1620 E. Brundage Lane · Bakersfield, CA 93307 | P.O. Box 1340 · Bakersfield, CA 93302
www.sierraintl.com

SIERRA
INTERNATIONAL MACHINERY, LLC.
SCRAP PROCESSING | RECYCLING EQUIPMENT | SOLID WASTE HANDLING

Equipment Price

DESCRIPTION:

• (1) REB-1 Two Ram Baler	$ 285,000.00
• (1) 60" Conveyor with 15'inground	$ 81,000.00
• (1) REB-2 Two Ram Baler (2) 75HP	$ 458,000.00
• (1) REB-2 Two Ram Baler (2) 125HP	$ 495,000.00
• (1) 72" Conveyor 15'inground	$ 96,600.00
• Conveyor Installation	$ 6,800.00

FOB: Jesup, GA Delivery: TBD

Not included in quoted price:

- Sales Tax
- Freight
- Hydraulic oil
- Crane Service (unloading and installation)
- Pit Plats and Installation

PROPOSAL GOOD FOR: 5 days

TERMS: (20%) DEPOSIT WITH SIGNED CONTRACT, (70%) PRIOR TO SHIPPING, (10%) FULL UPON RECEIPT OF MACHINE BY PURCHASER.

NOTE: SALES, USE, FEDERAL, STATE OR ANY OTHER APPLICABLE TAXES ARE NOT INCLUDED IN TOTAL PRICE AND ARE PURCHASER'S RESPONSIBILITY.

AGREED TO BY:________________________ DATE:__________

Ph. 661.327.7073 | USA. 800.343.8503 | Fax. 866.473.4303
1620 E. Brundage Lane • Bakersfield, CA 93307 | P.O. Box 1340 • Bakersfield, CA 93302
www.sierraintl.com

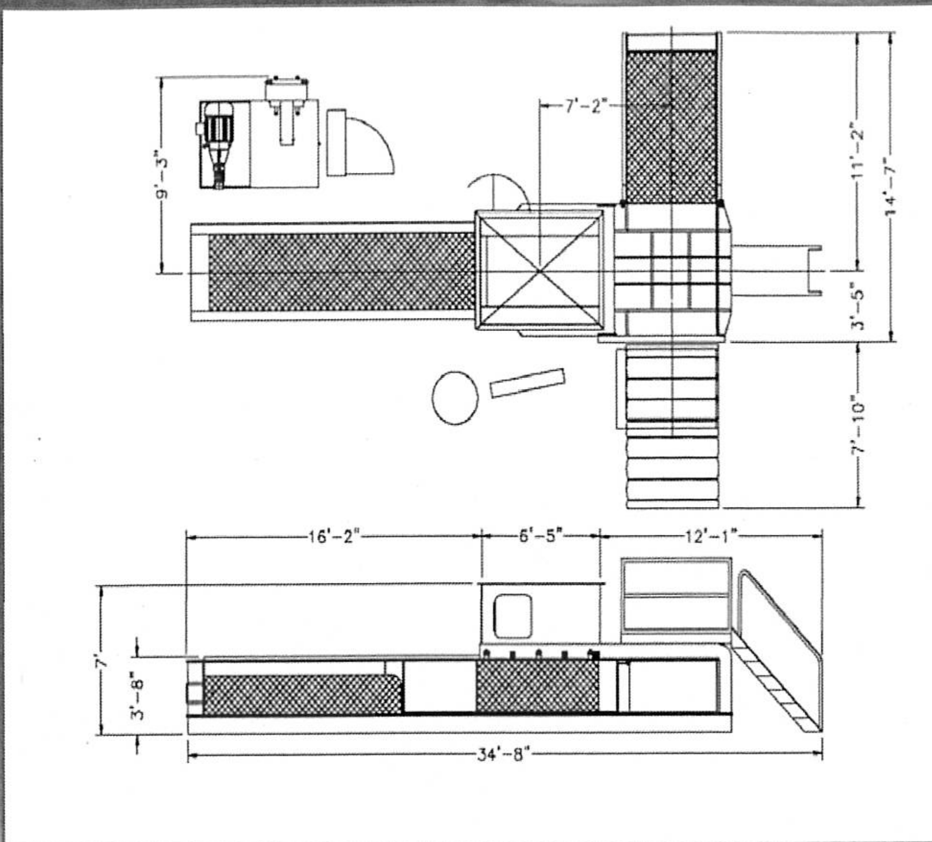
REB-1
TWO-RAM BALER

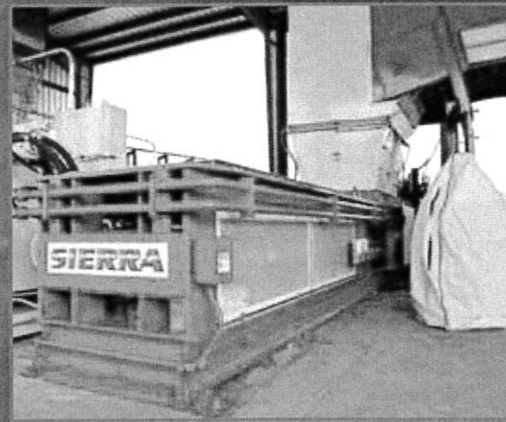
Aluminum, Extrusions, Cans, Stainless Steel, Copper, Radiators and Wire are easy work for the Sierra REB-1. The REB-1 will also bale ALL your OCC, Paper and PET.

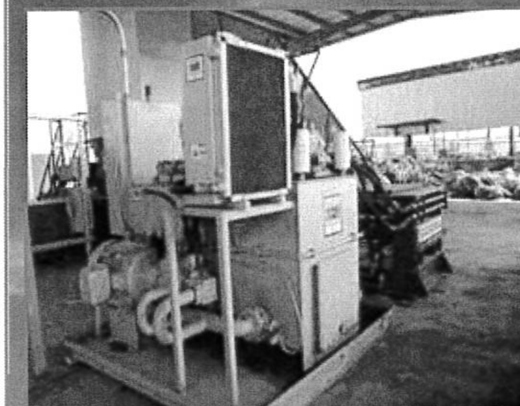
Standard Features

- 75 HP (56kw), 480 volt, 3 phase, 60 hertz
- 4500 PSI (306 bar) hydraulic system operating pressure
- Wye Delta main motor starting
- Filtration: 5 micron return-line, 3 micron kidney loop
- Flooded suction power unit
- Oil Cooler/Heater
- Adjustable Ram guides "patent pending"
- Separation Door with Bale relief
- Tongue and Groove floor liner pTanque and Groove floor liner plates
- Hardox 450 Replaceable liners
- Allen Bradley PLC
- Panelview HMI provides for material selection and diagnostics
- Modem for on site diagnostics
- Automatic Operations on Most Materials
- Conveyor controls
- Main Ram penetration 60% of bale chamber
- Heavy Duty Frame and Ram construction
- Automatic Wire Tier (Accent or L&P at customer's choice)
- Operator's platform
- Bale Table

SIERRA







Overall dimensions:	360"L x 175"W x 84"H
Hopper opening:	60"W x 77"L
Charge box opening:	41"W x 72"L
Bale size expanded:	46"W x 31"H x 62"L
Dry cycle capacity:	12,000 CU.FT./ HR
Dry cycle time:	15 SECONDS
System pressure:	4500 PSI
Shear / Baling force:	143 TONS
Ramface pressure:	241 PSI
Main pump flow:	153 GPM
Main motor:	75HP – 460V – 3 PH – 60 HZ – TEFC
Shipping weight:	55,000 Lbs

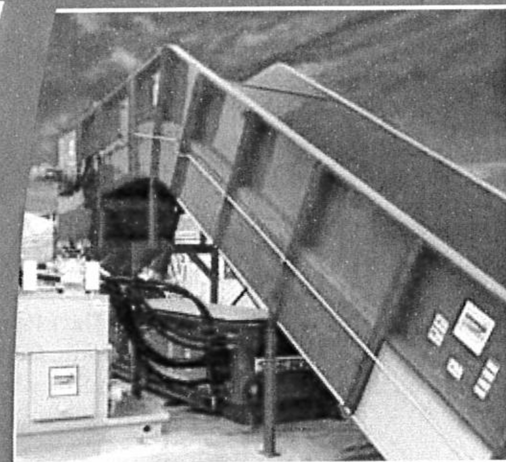
Material	Bale Weight
*Aluminum Sheet	1500 - 2000 Lbs.
*Aluminum Extrusions	1200 - 1400 Lbs
*Copper Wire	3300 - 5500 Lbs.
*Copper Tubing	3800 - 4200 Lbs.
*Radiators	2800 - 3500 Lbs.
*Stainless Steel	3500 - 4500 Lbs.
*Aluminum Cans	1000 - 1100 Lbs.
*PET Bottles	1100 - 1200 Lbs.
*OCC	1400 - 1600 Lbs.
*News	1200 - 1600 Lbs.
*Solid Waste	2300 - 2500 Lbs.

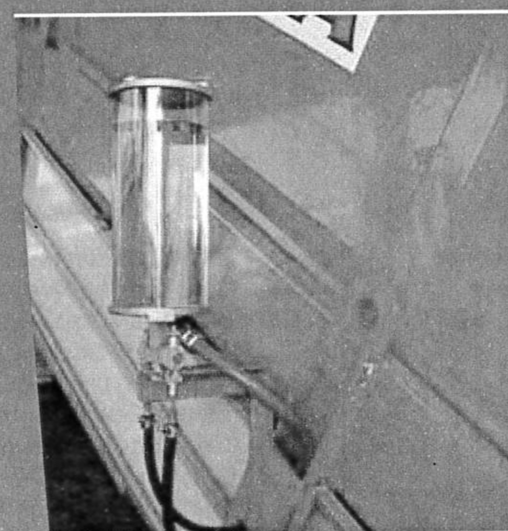
*Note: Performance rates, bale weights and bale densities are subject to moisture content, material pre-bale densities, feed rates and other variables in baling.

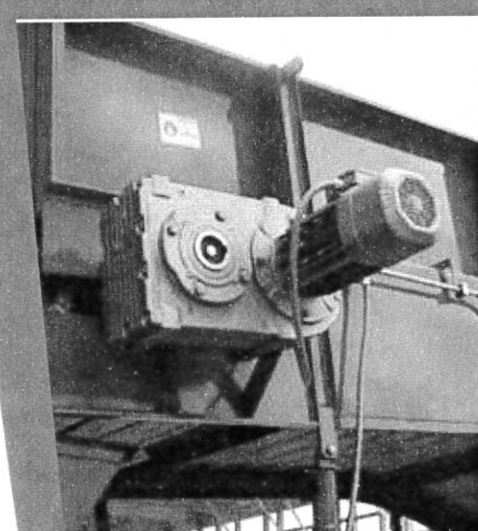
*Sierra Reserves the right to change specifications without notice. Rev. 2-3-12

SC6-15-2.5

Heavy Duty Steel Belt Conveyor







Conveyor Style: S-style with 15' Lower Horizontal, 21'0" Incline Section at 30°, 2'-6' Upper Horizontal with 5° nose down.

Belt Width: 72" Nominal (Between Skirts 69 ½")

Discharge Height: Approx. 10'- 4"
Centerline of drive shaft to floor

Belting:

- 9" Pitch, ¼" Thick Precision Die Formed Hinge Pans
- 9" Pitch, 4" High, ¼" Thick Precision Formed Interlocking Side wings Welded To Hinge Pan
- 1/4" x 2" Precision Die Formed Side bars
- [illegible] hardened RC50-60 press fit into [illegible]
- [illegible] diameter sing[illegible] rollers
- ¾" diameter thru pin CR1045 Material, Ends Milled, Drilled for ¼" Dia. Cotter Pin
- .970 OD x .760 ID 1008 Tubing
- Cotter pin locking style
- Angle Cleats ¼" x 3" x 4" on 72" centers
- Impact Shoes 1" x 3" x 3" every 2nd pitch

Frame:

- Open, structural steel construction, completely shop fitted and welded
- 4" x 3" x 3/8" track with ¼" wear strip
- Solid metal side covers
- Inspection panels-bolted construction.
- Electric/Gravity feed chain oiler
- Side Skirts 36" high Incline and Upper Horizontal 12" High Pit Section
- Load Impact Beams, 1 centered for 60" & 2 equally spaced for 72"
- Adjustable Supports

Bearings & Drives:

- 7 ½ HP, 460 volt, 3 phase, Direct Coupled Motor Reducer w/brake
- 3-7/16" Dia. Head Shaft and 2-15/16" Dia. Tail Shaft c1045, Machined alignment
- 6 Tooth Sprocket, 9" Pitch, 18" Pitch Dia., Machined alignment

Speed: 40 feet per minute fixe40 feet per minute fixed

Live Load Capacity: 6,500 lbs

Guarding: Supplied in areas of personnel access up to 8'0"

*Sierra Reserves th[illegible]nge specifications without notice. Rev. 08-29-11

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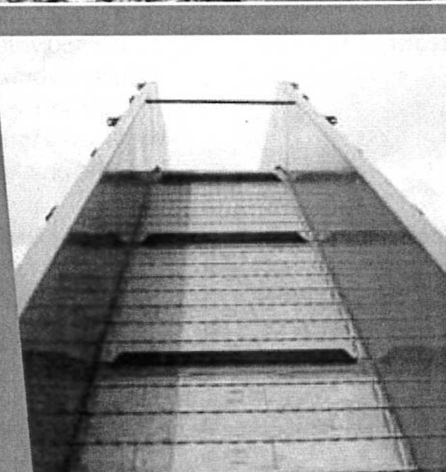
SIERRA

SC6-15-7

Heavy Duty Steel Belt Conveyor



Conveyor Style: S-style with 15' Lower Horizontal, 21'0" Incline Section at 30°, 7' Upper Horizontal with 5° nose down.

Belt Width: 60" Nominal (Between Skirts 57 ½")

Discharge Height: Approx. 10'- 4"
Centerline of dr[illegible]

Belting:
- 9" Pitch, ¼" Thick Precision Die Formed Hinge Pans
- 9" Pitch, 4" High, ¼" Thick Precision Formed Interlocking Side wings Welded To Hinge Pan
- 1/4" x 2" Precision Die Formed Side bars
- [illegible]ngs, hardened RC50-60 press fit into [illegible]
- [illegible]meter single flange rollers
- ¾" diameter thru pin CR1045 Material, Ends Milled, Drilled for ¼" Dia. Cotter Pin
- .970 OD x .760 ID 1008 Tubing
- Cotter pin locking style
- Angle Cleats ¼" x 3" x 4" on 72" centers
- Impact Shoes 1" x 3" x 3" every 2nd pitch

Frame:
- Open, structural steel construction, completely shop fitted and welded
- 4" x 3" x 3/8" track with ¼" wear strip
- Solid metal side covers
- Inspection panels-bolted construction.
- Electric/Gravity feed chain oiler
- Side Skirts 36" high Incline and Upper Horizontal 12" High Pit Section
- Load Impact Beams, 1 centered for 60" & 2 equally spaced for 72"
- Adjustable Supports

Bearings & Drives:
- 7 ½ HP, 460 volt, 3 phase, Direct Coupled Motor Reducer w/brake
- 3-7/16" Dia. Head Shaft and 2-15/16" Dia. Tail Shaft c1045, Machined alignment
- 6 Tooth Sprocket, 9" Pitch, 18" Pitch Dia., Machined alignment

Speed: 40 feet per minute fixed40 feet per minute fixed

Live Load Capacity: 6,500 lbs

Guarding: Supplied in areas of personnel access up to 8'0"

*Sierra Reserves the [illegible] change Specifications without notice. Rev. 08-29-11

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Ph: (661) 327-7073 | USA - (800) 343-8503

SIERRA

SIERRA
INTERNATIONAL MACHINERY, LLC.
SCRAP PROCESSING | RECYCLING EQUIPMENT | SOLID WASTE HANDLING

REB Customer's References:

REB 1:
Winfield Alloy, Mr. Mark Shikles- Atkinson NH.603-329-1200
Metro Metals, Mr. Charlie Van Hall-Albany NY, 518-273-9978

REB 2:
Full Circle Recycling, Mr. Louis Vinagro-Johnston RI 401-300-1051
George Apkin and Sons, Mr. Bill Apkin- N. Adams Mass 413-664-4936

Ph. 661.327.7073 | USA. 800.343.8503 | Fax. 866.473.4303
1620 E. Brundage Lane • Bakersfield, CA 93307 | P.O. Box 1340 • Bakersfield, CA 93302
www.sierraintl.com

Model 2R9 & 2R10

EXCEL® couples interlocking construction with the most advanced control system in the industry for an indestructible, automated 2RAM Baler. EXCEL's® design for automated operation eliminates the need for a full-time operator. EXCEL's® superior quality means reduced down time, automatic operation and dramatic labor savings.

The EXCEL® Model 2R9/2R10 bales the following materials:

Office Paper, Newspaper, OCC, magazines, PET, HDPE, Aluminum Cans, Tin Cans, Painted Aluminum Siding, Insulated Wire, Aluminum Extrusions, Radiators, Copper Wire and Other Materials

Standard Features Include

- The 2R9/2R10 is manufactured standard with either left-hand or right-hand eject
- Operator-Free Operation
- 50 HP TEFC Motor, Standard Voltage - 460 Volt, 60 Hertz, 3 Phase (2-50 HP, 2R10)
- EXCEL® Autonetics™ with Absolute Ram Position Sensor with Electronic Display
- U.S. Wire Tie Systems Automatic 342 Tier with Turbo Motor
- Industrial Hardened Logic Controller
- Fully Lined with Hardox® 400 Replaceable Wear Liners
- 300 Gallon Hydraulic Reservoir with Regenerative Circuit (600 gallon 2R10)
- One Year EXCEL® Limited Warranty US only
- Upper, Middle, and Lower Photo Eyes
  (sender/receiver upper photo eye with integrated conveyor control)
- NEMA 12 rated Enclosures and Controls with Conveyor Starter
- Installed and Working Modem for On-Line Diagnostics
- Castle Key Safety Interlocking Entry System
- Bale Chamber Penetration (2R9 - 27")(2R10 - 24")
- Automatic Bale Release Door
- Automatic Shear Jam Correction
- Bale Discharge Platform
- One Spool of 12 Gauge Ultra High Tensile Galvanized Wire
- Sandblasted, Primed, and Painted Excel Blue for Long Lasting Durability
- Air to Oil Heat Exchanger
- Integrated Steel Platen Wiper
- UL, CUL Approved (CE Available)
- Bale Counter
- Hardened, Serrated, Turnable Cutting Knives
- Hour Meter
- 9" Eject Cylinder
- Separation Door for Solid Waste and Scrap Applications (Available Option)
- Available with EXCEL® integrated conveyors with rubber or steel belts for a turn-key system

GENERAL SPECIFICATIONS

STRUCTURAL

Overall dimensions and shipping weight may vary with options

	2R9	2R10
OVERALL LENGTH (A)	28'7" (8.75 meters) w/stairs	33'10" feet (10.09 meters) w/stairs
OVERALL WIDTH (B)	13'3" (4.05 meters)	13'5" (4.11 meters)
OVERALL HEIGHT (C)	8'8" (2.68 meters)	8'8" (2.68 meters)
FEED OPENING (D)	40"W x 65"L (102cm x 165cm)	40"W x 90"L (102cm x 229cm)
CHAMBER FLOOR	3/4" Thick Plate plus 3/8" Hardox 400 Liner	1" Thick Plate plus 3/8" Hardox 400 Liner
CHAMBER SIDEWALLS	3/4" Plate plus 3/8" Hardox 400 Liner	3/4" Plate plus 3/8" Hardox 400 Liner
SHIPPING WEIGHT	47,500 lbs (21,545kg)	58,000 lbs (26,308kg)
(APPROXIMATE)	(with bale separation door)	(with bale separation door)

PERFORMANCE DATA

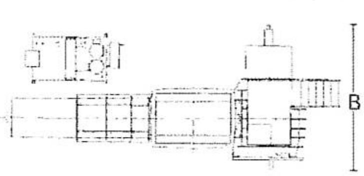
	2R9	2R10
MAIN CYLINDER	9"(22.9cm) bore x 106" (269cm) stroke	10"(25.4cm) bore x 130" (330cm) stroke
	6"(15.2cm) hardened chrome rod	7"(17.8cm) hardened chrome rod
EJECT CYLINDER	9"(22.9cm) bore - 6"(15.2cm) chrome rod	9"(22.9cm) bore - 6"(15.2cm) chrome rod
OIL RESERVOIR	300 gallons (1,137 liters)	600 gallons (2,273 liters)
INDEPENDENT PUMPS	100 GPM (379 liters)	200 GPM (758 liters)
MOTORS	50 HP TEFC 460V, 3 Phase	2-50 HP, TEFC, 460V, 3 Phase
SYSTEM PRESSURE	3,000 PSI Automatic Mode (3,250 PSI Maximum)	3,000 PSI Automatic Mode (3,250 PSI Maximum)
OVERALL PLATEN FORCE	190,851 lbs. / 206,756 lbs. Maximum	235,619 lbs. / 255,254 lbs. Maximum
PLATEN FACE PSI	154 PSI / 166 PSI Maximum	190 PSI / 205 PSI Maximum
CYCLE TIME	20 seconds	16 seconds
ESTIMATED BALE SIZE	60"L X 45"W X 30"H (152cm x 114cm x 76cm)	60"L x 45"W x 30"H (152cm x 114cm x 76cm)
(ADJUSTABLE)	46.88 cu.ft. (1.33m^3)	46.88 cu.ft. (1.33 m^3)

BALE WEIGHTS*

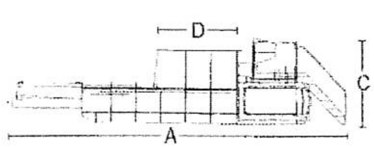
	2R9	2R10
OCC	1,400 lbs (635kg) 8 TPH	1,500 lbs (680kg) 15 TPH
MAGAZINES	2,400 lbs (1,088kg) 20 TPH	2,400 lbs (1,087kg) 25 TPH
NEWSPRINT	1,600 lbs (726kg) 15 TPH	1,700 lbs (771kg) 25 TPH
HDPE PLASTICS	1,300 lbs (589kg) 5 TPH	1,350 lbs (612kg) 8 TPH
PET PLASTICS	1,200 lbs (544kg) 6 TPH	1,325 lbs (601kg) 9 TPH
SOLID WASTE	2,000 lbs (907kg) 15 TPH	2,200 lbs (997kg) 25 TPH
ALUMINUM CANS	800 lbs (362kg) 6 TPH	1,000 lbs (453kg) 9 TPH
TIN CANS	2,000 lbs (907kg) 15 TPH	2,200 lbs (998kg) 20 TPH
ALUMINUM EXTRUSIONS	1,400 lbs (635kg) 6 TPH	1,500 lbs (680kg) 9 TPH
PAINTED ALUMINUM SIDING	2,000 lbs (907kg) 7.5 TPH	2,200 lbs (998kg) 11.5 TPH
RADIATORS	1,800 lbs (816kg) 8 TPH	2,000 lbs (907kg) 12 TPH
INSULATED COPPER WIRE	3,500 lbs (1,587kg) 15 TPH	3,700 lbs (1,678kg) 22 TPH
MISC. NON-FERROUS SCRAP	1,500 lbs (680kg) 6 TPH	1,700 lbs (771kg) 10 TPH

Note: To provide our customers with the best possible equipment, and offer the latest in product improvements, these specifications are subject to change without notice, and without incurring responsiblity to unites previously sold.

Due to Equipment Upgrades * Bale Weights are based on actual customer surveys, and may differ due to moisture content, material density, etc.



TOP VIEW



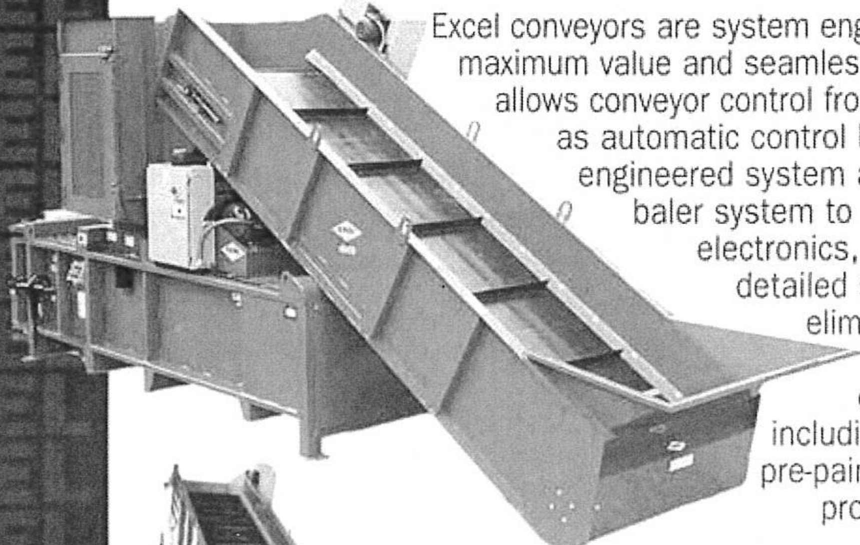
SIDE VIEW

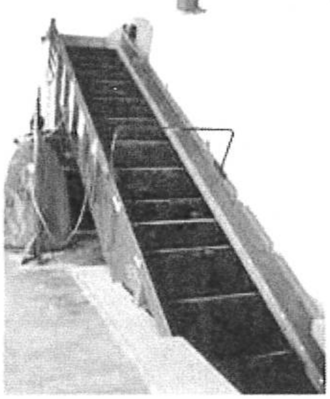
EXCEL
Manufacturing, Inc.
P.O. Box 428 · 778 W. 12th St.
St. Charles, MN 55972
(507) 932-4680 · fax (507) 932-4683
www.excelmfg.com
(800) 475-8812

Form 2
Revised Oct. 2008

CONVEYORS

Excel Manufactures rubber and steel belt conveyors for both above ground and in-ground applications.



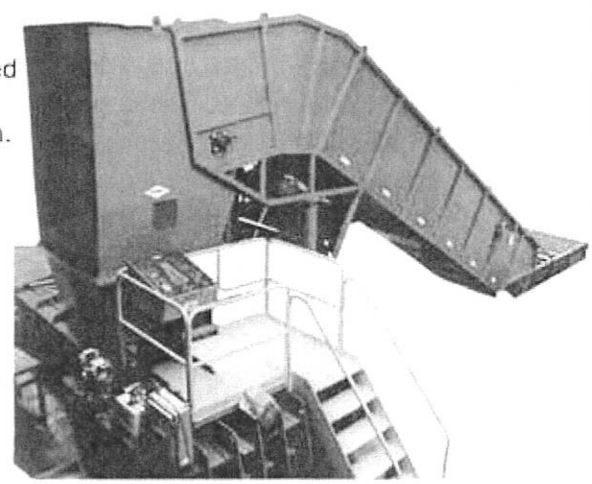


Excel conveyors are system engineered for our balers to provide maximum value and seamless integration. This full integration allows conveyor control from the baler control panel as well as automatic control by the baler control system. The engineered system approach enables the conveyor/ baler system to be pre-wired with all contactors, electronics, and conduits then shipped with detailed service documentation. Beyond eliminating the cost, risk, and delays of field wiring, Excel eliminates other common surprise costs by including hinged/removable pit plates, pre-painted safety yellow to complete a professional job and allow for easy cleanout of conveyor pit.

Once installed, Excel conveyors are virtually maintenance free using continuous duty energy efficient motors and high efficiency helical or planetary gear drives. The energy savings and long service life of these quality components easily outweigh the short term cost savings of low duty cycle - energy hungry worm gear reducers and "economy" motors supplied with some conveyor packages.

Features

- Generous conveyor sidewall heights are designed for specific baling systems.
- Flat "In Ground" sections available in any length.
- UL Approved controls with standard over belt E-stop emergency shut off.
- Self-cleaning under-belt system, axial flow wing pulleys, and full flashing protect belt and minimize cleaning.
- Remote start/stop pre-wired to baler controls.
- Replaceable Hardox wear surfaces ensure virtually endless service life.
- Standard installation kits include painted pit plates, anchor bolts and misc. hardware.



EXCEL Manufacturing, Inc.
P.O. Box 428
778 W. 12th St.
St. Charles, MN 55972

(507) 932-4680 • fax (507) 932-4683
(800) 475-8812

www.excelmfg.com

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NATIONAL SERVICE & INSTALLATION OF IND. WASTE EQUIPMENT

P.O. Box 356 - Johnson Creek, WI 53038
Phone: 920-541-7083 - Fax: 920-699-2847 - e-mail: service@jwrinc.net

A Waste & Recycling Equipment Management Company

Quotation For:
Kleinfelder

Kleinfelder - Store # :
2 Wall Street Suite #450
Manchester, NH 03101

Date : 11/21/2012
Quotation # : 2308
Customer ID: 1,185

Quotation valid until: 12/21/2012
Prepared by : Cory Gardner

Salesperson : Cory Gardner

Comments or Special Instructions :

Payment Terms : See terms below

Quote for Excel 2R9 Horizontal Auto Tie baler. Bale Seperation Door, Heater & Tongue & Groove Floor liner prices broken out for comparision to competition.

Qty	Description	UnitPrice	Tax	LineTotal
1.00	Excel 2R9 Horizontal Baler	$203,355.00	No	$203,355.00
1.00	Bale Seperation Door	$19,995.00	No	$19,995.00
1.00	Tongue & Groove Floor liners	$3,130.00	No	$3,130.00
1.00	Oil Heater	$1,700.00	No	$1,700.00

NOTES :

9-11 week leadtime. Freight, Installation, Electrical and applicable taxes are above and beyond this quotation.

SUBTOTAL	$228,180.00
TAX RATE	0.00
SALES TAX	$0.00
SHIPPING	$0.00
OTHER	$0.00
TOTAL	$228,180.00

Quotation approved by : ____________________

Date : ____________________

THANK YOU FOR YOUR BUSINESS!

Payment Terms: 10% Down Payment (Non-Refundable), 30% within thirty days of order, 40% at time of paint, 20% final payment when equipment is completed and ready for shipment.

Appendix E
Baler Reference Call Questionnaire Forms

Baler Reference Call Questions

Baler Manufacturer: Harris Badger

Contact Person & Info: Erik Levy (Save-That-Stuff

617.241.9998 x 561, 617.365.6568 (cell)

erik@savethatstuff.com

1. **What model baler do you have and how long have you had it?**

   Badger, 3 years

2. **Explain how the baler & assessory equipment has performed and note any significant malfunctions or equipment failure? If yes to significant malfunctions or equipment failure how was it recified?**

   Jams in the hopper occur when loading plastic buckets or big pieces of OCC, partly due to the conveyor being "over the top" style. When jams occur need to climb into the hopper to clear jams. Recommend not using over the tops alignment and provide an access door or easy access and view window or camera to view loading of hopper. Conveyor system was used equipment and pieced together.

3. **Who performs routine preventive maintenance? What PM activities are performed and how often?**

   STS does some PM themselves, sometimes call Russ Bennett at Recmech. Recmech can be slow to respond. Daily cleaning of the conveyor pit and wire tie system is most important – use air hose to blow dust off of tie wire and feed system and conveyor. Routinely (monthly) clean out debris that falls into the conveyor pit. Recommend having air compressor close to baler and provide deeper and wider pit with lighting and electrical outlets for ease of access during cleaning.

4. **What materials do you bale on a regular basis? In what volumes?**

   STS processes 80 to 100 tpd, 12 hours/day. Materials include OCC, office paper, mixed paper, single stream recyclables, rigid plastics, pallets, some trash.

5. **What densities are you achieving? Do densities change over time or before/after preventative maintenance activities?**

   OCC = 1200 to 1400 lbm/bale, Mixed Paper = 1400 – 1500 lbm/bale, Single Stream = 1500+ lbm/bale

   Densities have been consistent.

6. **Have there been any instances of binding or jams? or issues with the wire tie system?**

   As mentioned above the key is to keep the tie wire and feed system clean of dust and debris.

7. **What options do you have? (Oil Cooler, Oil Heater, Separation Door, Touch Screen Operational Diagnostics / SCADA system)**

   STS has an oil heater but only heats the oil that is in the reservoir and doesn't heat the oil in the lines or in the wire tie motor. Need to manually cycle the wire tie motor at first start-up in the morning. STS has no separation door which makes it difficult to gage when to switch material types, particularly from paper to OCC. Would recommend havin g three speed settings (slow, medium, fast) for the conveyor belt [or programmed in to the material type selected in the control panel]. The control panel doesn't record number of bales produced. Erik admitted that he hasn't read the Operations Manual though.

8. **What assessory equipment do you have? (Converyor system, dump carts, etc.)**

   Used conveyor system. Load using a front end loader.

9. **Explain the procurement process and equipment delivery and installation experience.**

   Procurement process was fine. Had to move baler after installation due to permitting and landlord issues. Installation took a couple of weeks due to use of salvaged conveyor. Leveling of the baler was an issue. Used cleats to secure the baler to the metal plate instead of welding which allowed for some movement of the baler during operations.

10. **What improvements or additional features would you suggest?**

    Include a bale scale and think about how material will be loaded.

    Variable speed drive on the conveyor motor programmed speed based on material type being processed.

11. **Would you recommend this baler?**

    Yes. Would go with bigger and faster baler and conveyor system.

Baler Reference Call Questions

Baler Manufacturer: Sierra Internatinal Machinery, LLC.

Contact Person & Info: Mark Shikles

Windfield Alloy, Atkinson, NH

603.329.1200

1. **What model baler do you have and how long have you had it?**

   Sierra REB-1, 1.5 years

2. **Explain how the baler & assessory equipment has performed and note any significant malfunctions or equipment failure? If yes to significant malfunctions or equipment failure how was it recified?**

   Had an issue with the piston soon after start-up. Sierra replaced it within 20 hours. No issues since. "Loves it".

3. **Who performs routine preventive maintenance? What PM activities are performed and how often?**

   Own staff performs PM which includes cleaning and checking the oil every 3 months. Low maintenance baler.

4. **What materials do you bale on a regular basis? In what volumes?**

   Plastics, OCC, Aluminum Cans, Aluminum, Electronics, Stainless Steel, Insulated Wire. Aluminum can cycle is 4 – 4.5 minutes, OCC is slower.

5. **What densities are you achieving? Do densities change over time or before/after preventative maintenance activities?**

   1100 lbs/bale for plastic, 900 to 1100 lbs/bale for OCC and 1100 – 1200 lbs/bale for cans

6. **Have there been any instances of binding or jams? or issues with the wire tie system?**

   Binding or jams are rare and due to overfeeding which causes binding in the hopper. The wire tie system requires more maintenance; they clean it twice a day ("blow it out").

7. **What options do you have? (Oil Cooler, Oil Heater, Separation Door, Touch Screen Operational Diagnostics / SCADA system)**

   Upgraded to a Steel conveny belt. All other options were standard. Operator uses touch screen to select material type and baler adjusts baling pressure to optimize densities. Baler counts bales.

8. **What assessory equipment do you have? (Converyor system, dump carts, etc.)**

   Pit conveyor, 6'wide conveyor. They use both a bobcat and a graple to load materials.

9. **Explain the procurement process and equipment delivery and installation experience.**

   Equipment purchase, delivery and installation went according to plan. Installation took 3 days and the crew was business like. Windfield Alloy completed the preparatory work themselves ahead of time.

10. **What improvements or additional features would you suggest?**

    None.

11. **Would you recommend this baler?**

    Yes, Windfield had Harris and other balers in the past and prefers Sierra over the others. He completed a lot of research before selecting Sierra.

    Mark invited us (Town and Kleinfelder) to his facility to see the baler in operation.

Baler Reference Call Questions

Baler Manufacturer: Excel Manufacturing / JWR Inc.

Contact Person & Info: Paul Pieper

Rice County Recycling Coordinator, MN

507.332.6833

1. **What model baler do you have and how long have you had it?**

   2R9, since August 2012

2. **Explain how the baler & assessory equipment has performed and note any significant malfunctions or equipment failure? If yes to significant malfunctions or equipment failure how was it recified?**

   Only purchased the baler which replaced a 12 year old Harris baler. Using existing conveyor system. No major issues. Biggest issue is learning how to use a new machine.

3. **Who performs routine preventive maintenance? What PM activities are performed and how often?**

   Signed a 1-yr service contract to bring service through end of warrantee period. JWR will be performing first PM soon.

4. **What materials do you bale on a regular basis? In what volumes?**

   Bales mostly OCC from businesses. 100 tons/week on average.

5. **What densities are you achieving? Do densities change over time or before/after preventative maintenance activities?**

   1400 to 1450 lbs/bale. Densities have been constant.

6. **Have there been any instances of binding or jams? or issues with the wire tie system?**

   Only issues are with overloading the conveyor/loading in clumps.

7. **What options do you have? (Oil Cooler, Oil Heater, Separation Door, Touch Screen Operational Diagnostics / SCADA system)**

   No Separation door, didn't use it on previous baler. Bought a basic model with no options. Operators would have prefered a pressure guage.

8. **What assessory equipment do you have? (Converyor system, dump carts, etc.)**

   Using existing conveyor system. Use front end loader to load.

9. **Explain the procurement process and equipment delivery and installation experience.**

   Only glitch was that the delivery truck broke down, but the baler was delivered and set up within the alotted time, facility was down for one day.

10. **What improvements or additional features would you suggest?**

    Would add a pressure gauge.

11. **Would you recommend this baler?**

    Yes. Was told that due to the way the Excel baler is installed (with shims) that it will not damage the concrete floor (which the Harris model did).

Appendix F
Existing Conditions Site Plan (full size)

CONCEPT LAYOUT, GRADING, AND DIMENSIONAL INFORMATION SHOWN ON THIS SHEET IS SCHEMATIC IN NATURE AND REPRESENTS THE PLANNING LEVEL EVALUATION PERFORMED BY KLEINFELDER IN CONNECTION WITH THE FEASIBILITY STUDY PHASE FOR THE PROJECT. ALL INFORMATION SHOWN IS APPROXIMATE AND WILL BE SUBJECT TO MODIFICATION AND REFINEMENT IF THIS OPTION IS SELECTED BY THE TOWN OF DERRY FOR ADVANCEMENT INTO PRELIMINARY AND FINAL DESIGN.

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NO.	DESCRIPTION	DATE
	REVISIONS	

DATE	DECEMBER 2012
PROJECT NO.	
DRAWN BY	RSM
CHECKED BY	SEW
FILE NAME	layout options drawing 12-10-12.dwg

OPTION 1A LAYOUT
RETAINING EXISTING FACILITIES
(10FT GRADE SEPARATION)

TRANSFER STATION FEASIBILITY STUDY
TOWN OF DERRY, NEW HAMPSHIRE
TRANSFER LANE, DERRY, NEW HAMPSHIRE 03038

SHEET xxx of xxx
1A

CONCEPT LAYOUT, GRADING, AND DIMENSIONAL INFORMATION SHOWN ON THIS SHEET IS SCHEMATIC IN NATURE AND REPRESENTS THE PLANNING LEVEL EVALUATION PERFORMED BY KLEINFELDER IN CONNECTION WITH THE FEASIBILITY STUDY PHASE FOR THE PROJECT. ALL INFORMATION SHOWN IS APPROXIMATE AND WILL BE SUBJECT TO MODIFICATION AND REFINEMENT IF THIS OPTION IS SELECTED BY THE TOWN OF DERRY FOR ADVANCEMENT INTO PRELIMINARY AND FINAL DESIGN.

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NO.	DESCRIPTION	DATE
	REVISIONS	

DATE	DECEMBER 2012
PROJECT NO.	2012184.01-A
DRAWN BY	RSM
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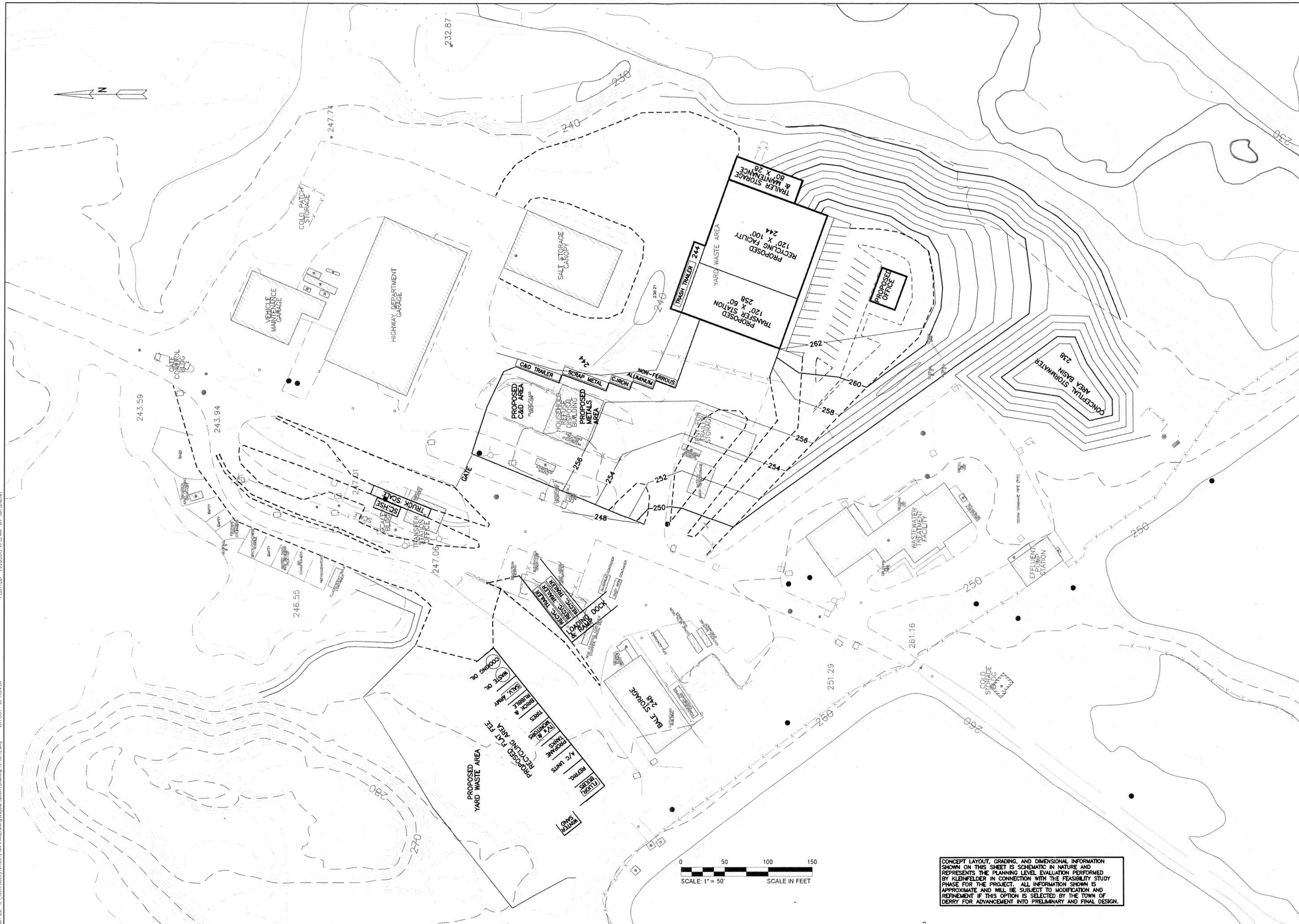
FILE NAME	layout options drawing 12-10-12.dwg

OPTION 1B LAYOUT
RETAIN EXISTING FACILITIES (14FT GRADE SEP.)

TRANSFER STATION FEASIBILITY STUDY
TOWN OF DERRY, NEW HAMPSHIRE
TRANSFER LANE, DERRY, NEW HAMPSHIRE, 03038

SHEET 1 of 1

1B



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FILE NAME	layout options drawing 12-10-12.dwg

NO.	DESCRIPTION	DATE

REVISIONS

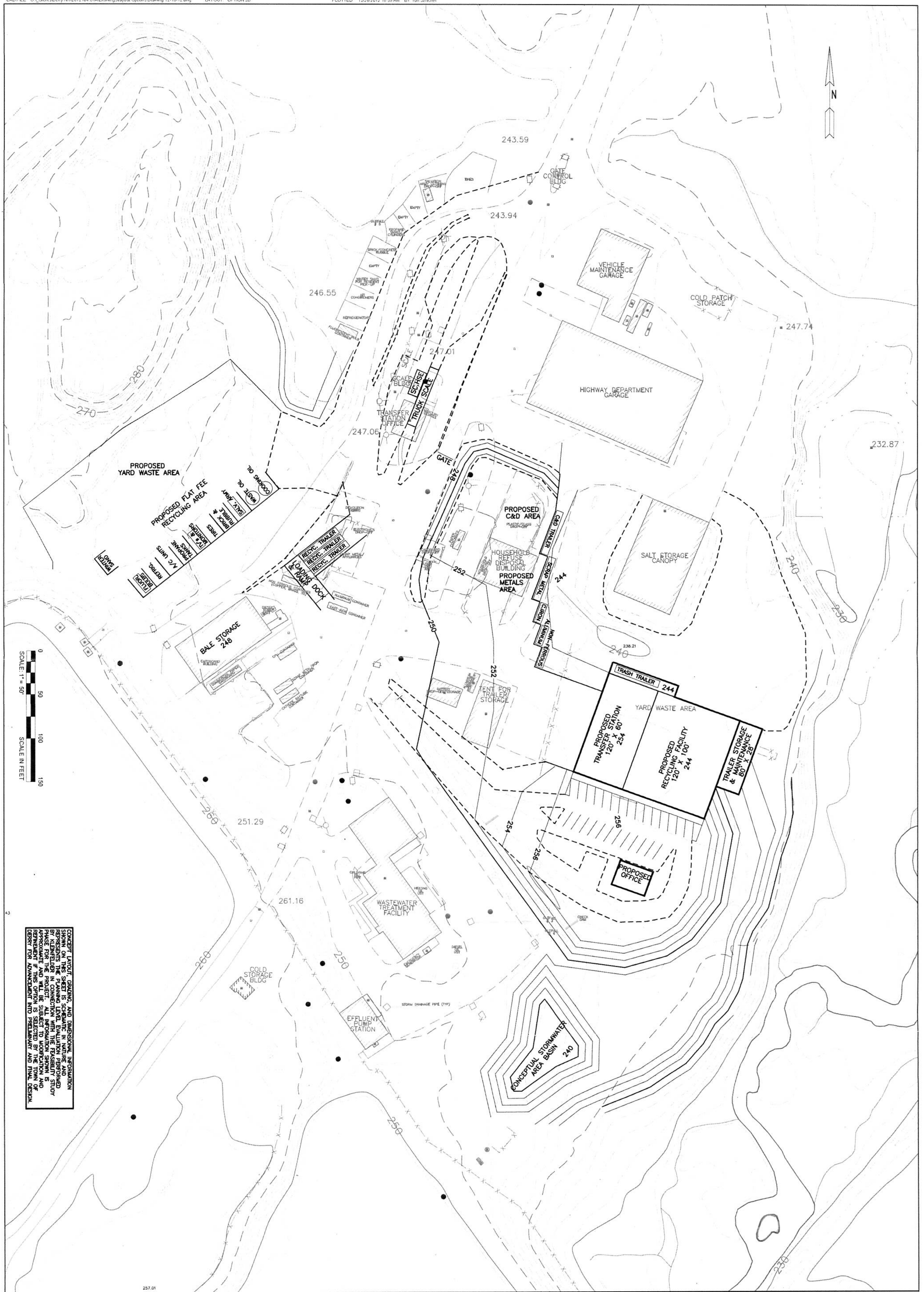
OPTION 2A LAYOUT
NEW FACILITY IN YARD WASTE AREA
(10FT GRADE SEP.)

TRANSFER STATION FEASIBILITY STUDY
TOWN OF DERRY, NEW HAMPSHIRE
TRANSFER LANE, DERRY, NEW HAMPSHIRE

SHEET 1 of 1

2A

CADFILE G:_clients\Derry NH\20121 84.01A\Drawings\layout Options Drawing 12-10-12.dwg LAYOUT OPTION 2B PLOTTED 12/28/2012 10:59 AM BY ron.zimichel



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OPTION 2B LAYOUT
NEW FACILITY IN YARD WASTE AREA (14FT GRADE SEP.)

TRANSFER STATION FEASIBILITY STUDY
TOWN OF DERRY NEW HAMPSHIRE
TRANSFER LANE, DERRY, NEW HAMPSHIRE

DATE	DECEMBER 2012
PROJECT NO.	2012184.01-A
DRAWN BY	RSM
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FILE NAME	layout options drawing 12-10-12.dwg

NO.	DESCRIPTION	DATE
	REVISIONS	

SHEET 2B
1 of 1

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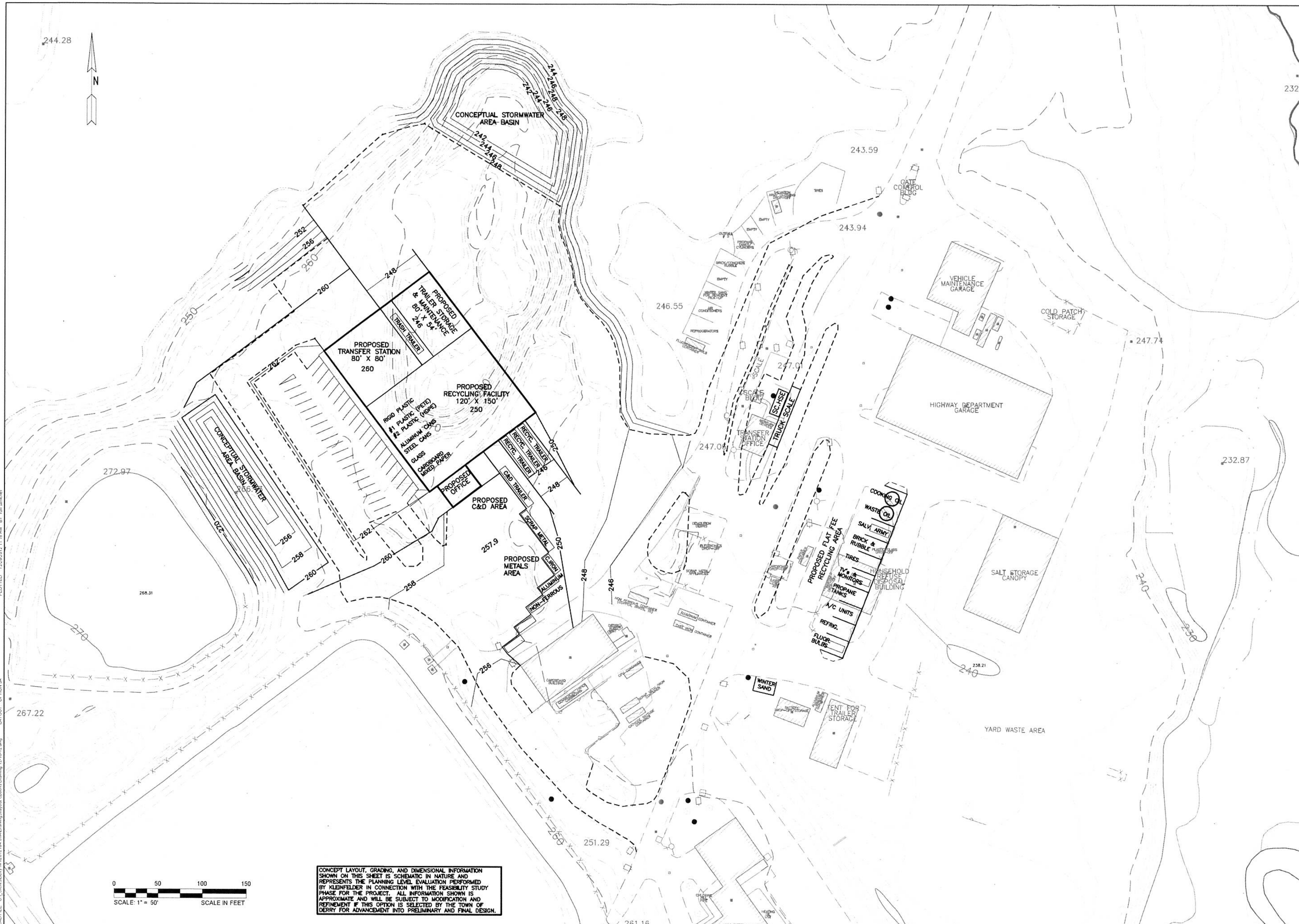

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PROJECT NO.	2012184.01-A
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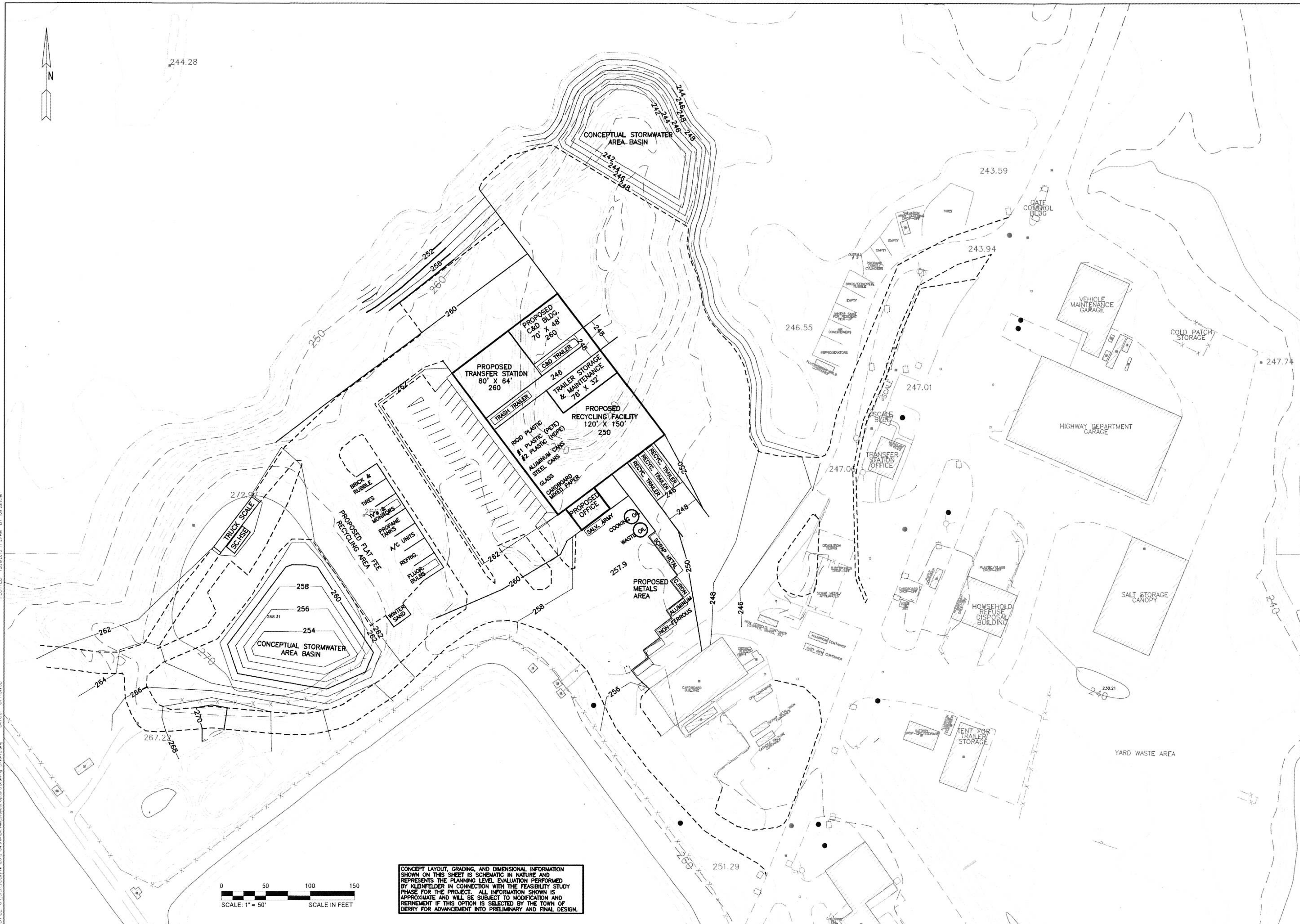
FILE NAME	layout options drawing 12-10-12.dwg

OPTION 3A LAYOUT
NEW FACILITY IN SOIL STOCKPILE AREA
(SCALE NEAR CURRENT LOCATION)

TRANSFER STATION FEASIBILITY STUDY
TOWN OF DERRY NEW HAMPSHIRE
TRANSFER LANE, DERRY, NEW HAMPSHIRE

SHEET 1 of 1

3A



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	REVISIONS	

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FILE NAME	layout options drawing 12-10-12.dwg

OPTION 3B LAYOUT
NEW FACILITY IN SOIL STOCKPILE AREA (SCALE NEAR NEW BUILDING)

TRANSFER STATION FEASIBILITY STUDY
TOWN OF DERRY NEW HAMPSHIRE
TRANSFER LANE, DERRY, NEW HAMPSHIRE

SHEET 1 of 1
3B

CONCEPT LAYOUT, GRADING, AND DIMENSIONAL INFORMATION SHOWN ON THIS SHEET IS SCHEMATIC IN NATURE AND REPRESENTS THE PLANNING LEVEL EVALUATION PERFORMED BY KLEINFELDER IN CONNECTION WITH THE FEASIBILITY STUDY PHASE FOR THE PROJECT. ALL INFORMATION SHOWN IS APPROXIMATE AND WILL BE SUBJECT TO MODIFICATION AND REFINEMENT IF THIS OPTION IS SELECTED BY THE TOWN OF DERRY FOR ADVANCEMENT INTO PRELIMINARY AND FINAL DESIGN.

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	REVISIONS	

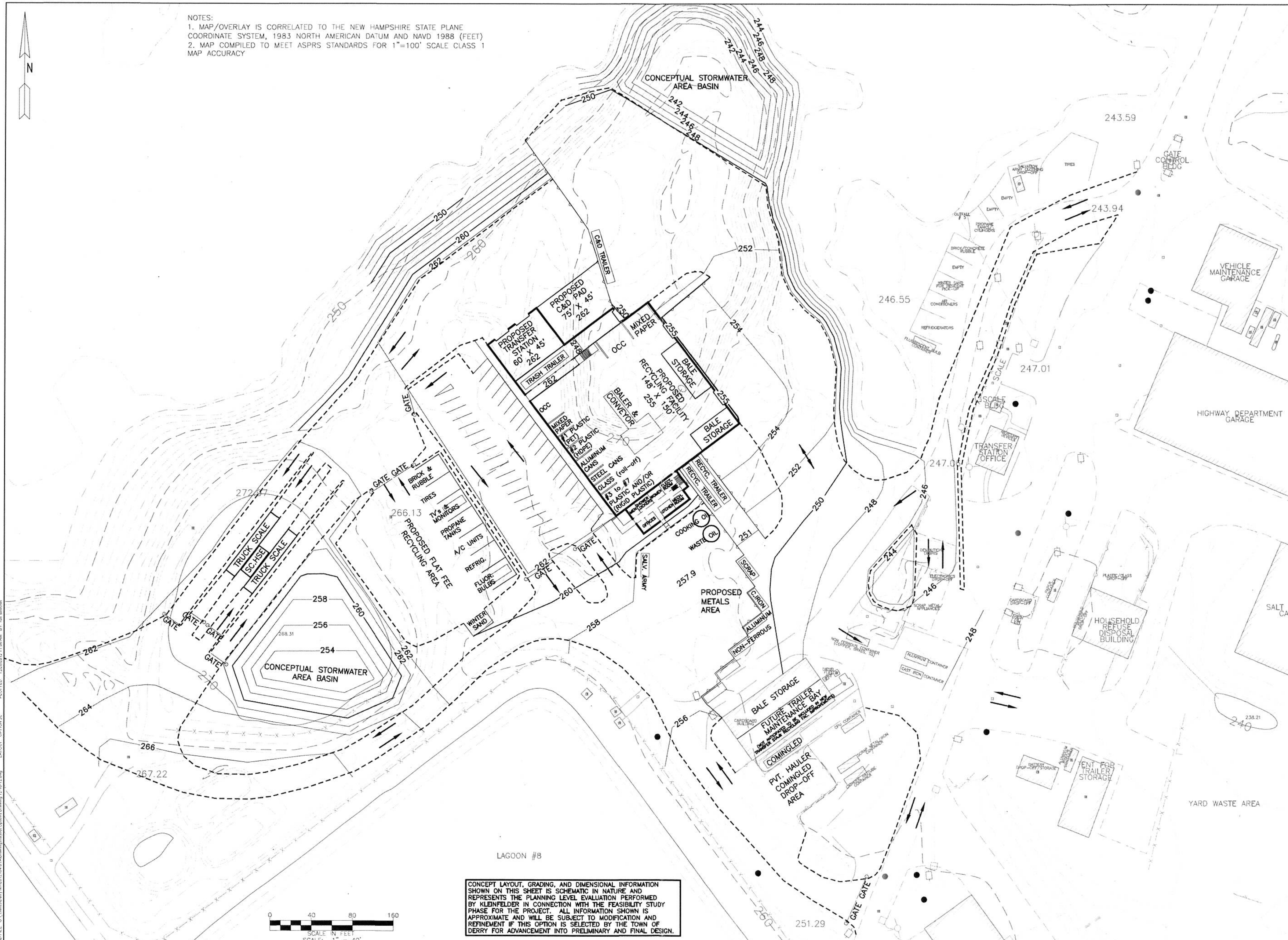
DATE	DECEMBER 2012
PROJECT NO.	2012184 01-A
DRAWN BY	RSM
CHECKED BY	SEW
FILE NAME	layout options drawing 12-10-12.dwg

OPTION 3B REVISED LAYOUT
NEW FACILITY IN STOCKPILE AREA WITH REVISIONS

TRANSFER STATION FEASIBILITY STUDY
TOWN OF DERRY NEW HAMPSHIRE
TRANSFER LANE, DERRY, NEW HAMPSHIRE

SHEET 1 of 1
3B-R

NOTES:
1. MAP/OVERLAY IS CORRELATED TO THE NEW HAMPSHIRE STATE PLANE COORDINATE SYSTEM, 1983 NORTH AMERICAN DATUM AND NAVD 1988 (FEET)
2. MAP COMPILED TO MEET ASPRS STANDARDS FOR 1"=100' SCALE CLASS 1 MAP ACCURACY



CONCEPT LAYOUT, GRADING, AND DIMENSIONAL INFORMATION SHOWN ON THIS SHEET IS SCHEMATIC IN NATURE AND REPRESENTS THE PLANNING LEVEL EVALUATION PERFORMED BY KLEINFELDER IN CONNECTION WITH THE FEASIBILITY STUDY PHASE FOR THE PROJECT. ALL INFORMATION SHOWN IS APPROXIMATE AND WILL BE SUBJECT TO MODIFICATION AND REFINEMENT IF THIS OPTION IS SELECTED BY THE TOWN OF DERRY FOR ADVANCEMENT INTO PRELIMINARY AND FINAL DESIGN.

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DATE	DECEMBER 2012
PROJECT NO.	20121640 01-A
DRAWN BY	RSM
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FILE NAME	layout options drawing 12-10-12.dwg

OPTION 3C
LAYOUT - PREFERRED OPTION

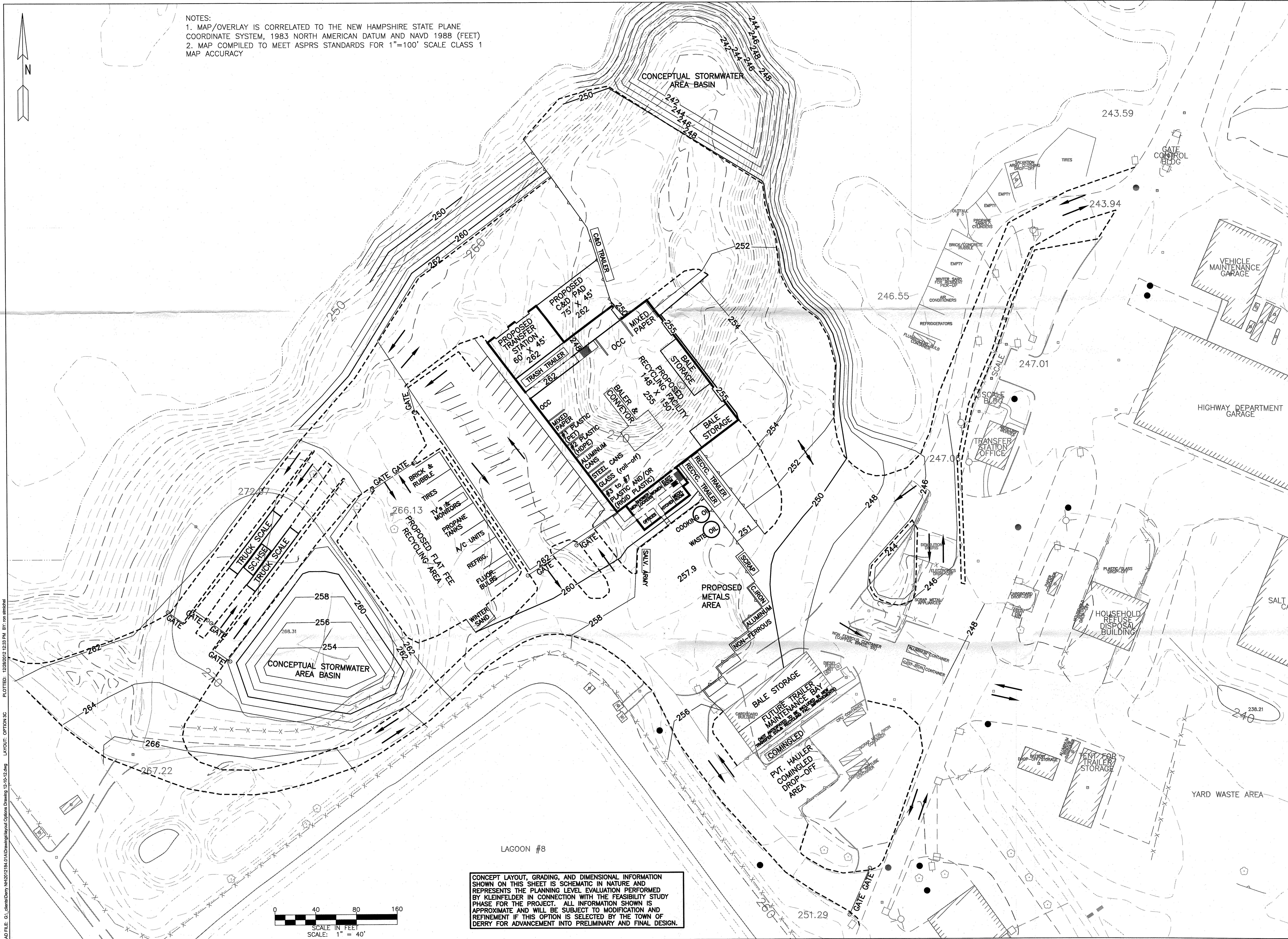
TRANSFER STATION FEASIBILITY STUDY
TOWN OF DERRY, NEW HAMPSHIRE
TRANSFER LANE, DERRY, NEW HAMPSHIRE, 03038

SHEET 1 of 1
3C

Appendix G

Concept Layout Drawings (half size)

NOTES:
1. MAP/OVERLAY IS CORRELATED TO THE NEW HAMPSHIRE STATE PLANE COORDINATE SYSTEM, 1983 NORTH AMERICAN DATUM AND NAVD 1988 (FEET)
2. MAP COMPILED TO MEET ASPRS STANDARDS FOR 1"=100' SCALE CLASS 1 MAP ACCURACY



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0 40 80 160
SCALE IN FEET
SCALE: 1" = 40'

CAD FILE: G:_clients\Derry NH\20122184.01A\Drawings\layout Options Drawing 12-10-12.dwg LAYOUT: OPTION 3C PLOTTED: 12/26/2012 12:33 PM BY: ron stmichel

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	REVISIONS	

DATE	DECEMBER 2012
PROJECT NO.	20122184.01-A
DRAWN BY	RSM
CHECKED BY	SEW
FILE NAME	layout options drawing 12-10-12.dwg

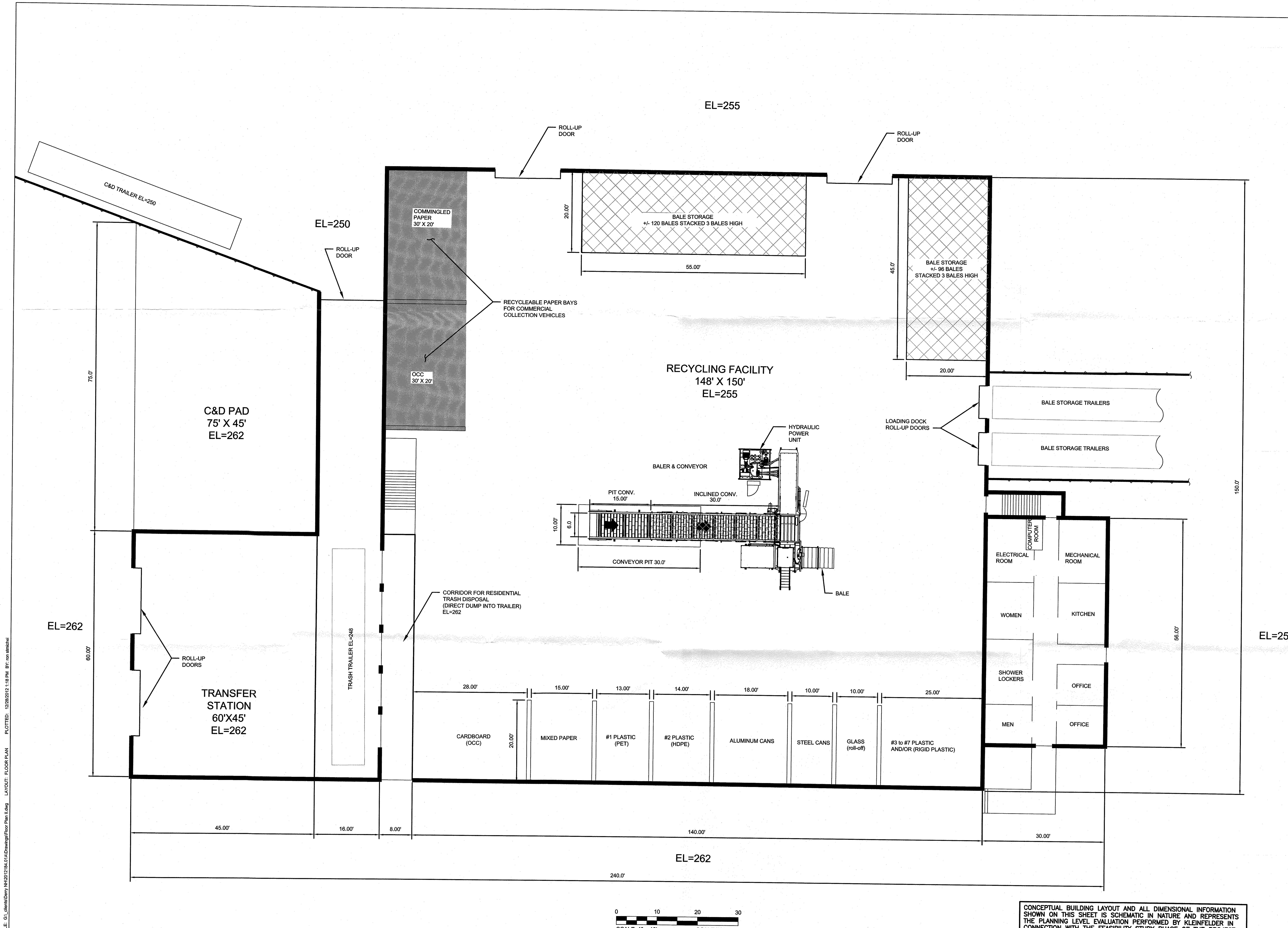
OPTION 3C
LAYOUT - PREFERRED OPTION

TRANSFER STATION FEASIBILITY STUDY
TOWN OF DERRY, NEW HAMPSHIRE
TRANSFER LANE, DERRY, NEW HAMPSHIRE, 03038

SHEET 1 of 1
3C

Appendix H

Concept Layout 3C Drawing (full size)



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CONCEPTUAL BUILDING LAYOUT AND ALL DIMENSIONAL INFORMATION SHOWN ON THIS SHEET IS SCHEMATIC IN NATURE AND REPRESENTS THE PLANNING LEVEL EVALUATION PERFORMED BY KLEINFELDER IN CONNECTION WITH THE FEASIBILITY STUDY PHASE OF THE PROJECT. ALL INFORMATION SHOWN IS APPROXIMATE AND WILL BE SUBJECT TO MODIFICATION AND REFINEMENT IF THIS OPTION IS SELECTED BY THE

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DATE	DECEMBER 2012
PROJECT NO.	2012184.01-A
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FILE NAME	Floor Plan II.dwg

SCHEMATIC FLOOR PLAN
OPTION 3C

TRANSFER STATION FEASIBILITY STUDY
TOWN OF DERRY, NEW HAMPSHIRE
TRANSFER LANE, DERRY, NEW HAMPSHIRE, 03038

SHEET 1 of 1

FLOOR PLAN

Appendix I

Floor Plan Drawing (full size)

NOTES:
1. MAP/OVERLAY IS CORRELATED TO THE NEW HAMPSHIRE STATE PLANE COORDINATE SYSTEM, 1983 NORTH AMERICAN DATUM AND NAVD 1988 (FEET)
2. MAP COMPILED TO MEET ASPRS STANDARDS FOR 1"=100' SCALE CLASS 1 MAP ACCURACY

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	REVISIONS	

DATE	DECEMBER 2012
PROJECT NO.	20121841.01-A
DRAWN BY	RSM
CHECKED BY	SEW
FILE NAME	layout options drawing 12-10-12.dwg

EXISTING CONDITION PLAN

TRANSFER STATION FEASIBILITY STUDY
TOWN OF DERRY, NEW HAMPSHIRE
TRANSFER LANE, DERRY, NEW HAMPSHIRE, 03038

SHEET 1 of 1

EXISTING