

GPS FOR LANDFILL COMPACTION

NEW MEXICO SWANA

ANNUAL MEETING

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PRESENTATION SUMMARY

- What are we Trying to Accomplish Using GPS?
- Initial GPS Evaluation
- What We Decided
- CAT/Trimble Equipment
- Equipment Cost Summary
- Implementation (The Good and the Bad)
- CAT Assistance/Consultation
- VisionLink
- Tracking Operations
- Next Phases

WHAT ARE WE TRYING TO ACCOMPLISH USING GPS?

- Cell Development/Excavation?
- Landfill Buildout?
- Increase Life?
- Monitor Compaction?







WHAT ARE WE TRYING TO ACCOMPLISH?

In-house Survey/Data Collection?





INITIAL GPS EVALUATION

- Potential Equipment
 - CAT 836K Compactor (2015)
 - Komatsu Dozer (2014)
 - CAT 623G Scraper Ready for Second Life
 - CAT D8 Dozer (1997) Next to be Replaced
- Caterpillar (CAT)/Trimble joined forces
 - CAT Trimble Control Technology
- Had been implemented at a couple other landfills
 in New Mexico
- Can it be added to non-CAT equipment?
- Do we need Base Station, Rover, Data Collector?

WHAT WE DECIDED

- Outfit the compactor first to assist in increasing compaction
- Get base station in place (higher accuracy)
- Purchase rover/data collector to assist in road construction, drainage evaluations, etc.
- To retrofit the Komatsu dozer would require antennas on the blade.
- Adding to the scraper during re-build for excavation of future cells/borrow material
- Annual connectivity of equipment
 - Data monitoring (VisionLink)

CAT/TRIMBLE EQUIPMENT (836K COMPACTOR)



CAT/TRIMBLE EQUIPMENT (BASE STATION, ROVER AND DATA COLLECTOR)





EQUIPMENT COST SUMMARY

Item	Description	Need	Cost
Trimble System (Compactor)	Display unit, sensors, control box/software, antenna, cellular modem/900MHz radio, training and peripherals.	IOptimize compaction and ensure proper wastelarplacement with instantaneous correctioning andcapability.	
Base Station and Rover	Base station, mounts, pole, hand-held survey data collector, rover, training and peripherals.	Main communication and data collection units between operations and administration.	\$40,825.00
Annual Connectivity Subscription (One-Year)	Cloud access, license and software access/support.	Provides access to data obtained by Trimble system and data collector/rover.	\$2,722.00
Total Cost for System			\$90,746.00

IMPLEMENTATION THE GOOD AND THE BAD

• THE GOOD

- CAT expert set up the unit correctly (July 1, 2017)
- Real time feedback for operators
- Lift elevation constantly monitored
- Slope meter
- Obtain volumes
- Calculate/track compaction pre and post CAT consultation

• THE BAD

- Not set up properly in the beginning
- Operator acceptance
- Left basically dormant for a year or more
- Seems more complicated than it is

CAT ASSISTANCE/CONSULTATION

- GPS Working Correctly on the Compactor
- Operators understanding of systems on compactor
 - GPS
 - Auto Blade Positioner
 - Etc.
- Operational assessment
 - Roll horizontal/45 degrees
 - Thin lifts (2-foot)
 - Team/equipment working together
- Cover Soil Use (10% Reduction Goal)
- Use of VisionLink to monitor compaction and assess operation

VISIONLINK®

- 3D Project Monitoring
 - Coverage
 - Elevation
 - Cut/Fill
 - Pass Counts
 - Volumes
- Machine Health
 - Fault Codes
 - Fluid Analysis
 - Maintenance
 - Inspections

- Fleet Monitoring
 - Utilization
 - Fuel Level
 - Hour Meter

Have mostly used 3D Project Monitoring

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g Type: Primary Implement, Track, Wheel

No Lift Filtering Active

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Mapping Type: Primary Implement, Track, Wheel

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TRACKING OPERATIONS (EXAMPLE)

TWO WEEK EVALUATION

Start Date	End Date	Tonnage	Volume	Tonnage	Tonnage	Total Fill	Density
		Waste	Dirt	Dirt	Total	Volume	
		(tons)	(CY)	(tons)	(tons)	(CY)	(lb/CY)
7/1/2017	7/10/2017	3,705.15	1,771.00	2,036.65	5,741.80	10,317.60	1,113.01
7/11/2017	7/31/2017	10,897.48	6,831.00	7,855.65	18,753.13	23,191.03	1,617.27
8/1/2017	8/15/2017	7,961.71	3,818.00	4,390.70	12,352.41	15,145.70	1,631.14
8/16/2017	8/31/2017	8,206.62	4,140.00	4,761.00	12,967.62	14,678.29	1,766.91
9/1/2017	9/15/2017	7,476.30	5,198.00	5,977.70	13,454.00	13,349.28	2,015.69
9/16/2017	10/2/2017	7,552.85	2,783.00	3,200.45	10,753.30	9,380.38	2,292.72
10/3/2017	10/18/2017	7,480.91	3,818.00	4,390.70	11,871.61	11,357.71	2,090.49
10/19/2017	10/31/2017	5,196.60	2,070.00	2,380.50	7,577.10	8,558.01	1,770.76
11/1/2017	11/15/2017	6,299.97	2,875.00	3,306.25	9,606.22	10,697.80	1,795.92
11/16/2017	11/30/2017	6,126.47	4,393.00	5,051.95	11,178.42	11,731.87	1,905.65

TRACKING OPERATIONS (EXAMPLE)



TRACKING OPERATIONS (RESULTS)

- Able to see more real time how compaction changes based upon operational tweaks
- CAT Consultation helped us increase our compaction
 - 40% 45% on average
 - 60,000 tons/year added to the same footprint
 - Has paid for the system
- Focus on reduced dirt usage as a whole since January 2017
 - Pre CAT Down 3% on Daily Cover
 - Post CAT Down 14% on Daily Cover

NEXT PHASES

- Compare drone flyover data
 - July 1 through Dec 31
- 3D Model Input (both survey and design)
 - Building above grade
 - Excavation of future cells
- Setting up notifications (visual vs. sound) for operators when they get close to a boundary set by the 3D model
- Tracking remaining life real time using data from GPS and VisionLink capabilities.
- Use of Rover and Data Collector

