GPS FOR LANDFILL COMPACTION

SFSWMA
Santa Fe Solid Waste Management Agency
Caja del Rio Landfill

NEW MEXICO SWANA

ANNUAL MEETING

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LANDFILL MANAGER

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.	Optimize compaction and ensure proper waste placement with instantaneous correction capability.	$47,199.00
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

VISIONLINK®


VisionLink
VisionLink 3D Legacy
https://legacy3d.myvisionlink.com/VisionLink.aspx?s=OTU4ZTdjYTc1MGUzNDhkYThiMWYyYTA1ZDVmNDViYmU=
VISIONLINK
Hello Danita! · Profile | Preferences | Logout | Help
Projects
160722-Landfill
Projects > 160722-Landfill > 3 Results
Project
Administration
3D Project Monitoring
11/15/17 12:00 am - 12/06/17 11:59 pm
Coverage
Settings
Map Info
Coverage
Surveyed Surface
160722-Landfill*
Project Data Filters
New Filter
Unsaved Changes
Apply
Date
Set Date Range
Select
Custom
-- or --
From
11/15/17 12:00 am
To
12/06/17 11:59 pm
On Machine Design
Asset
Machine Name
Proofing Run
Compaction
Elevation Type
Alignment
Lift
Area
MAPS
Copyright © 2017 ALK Technologies Inc., Imagery © Digital Globe
Mapping Type: Primary Implement, Track, Wheel
No Lift Filtering Active
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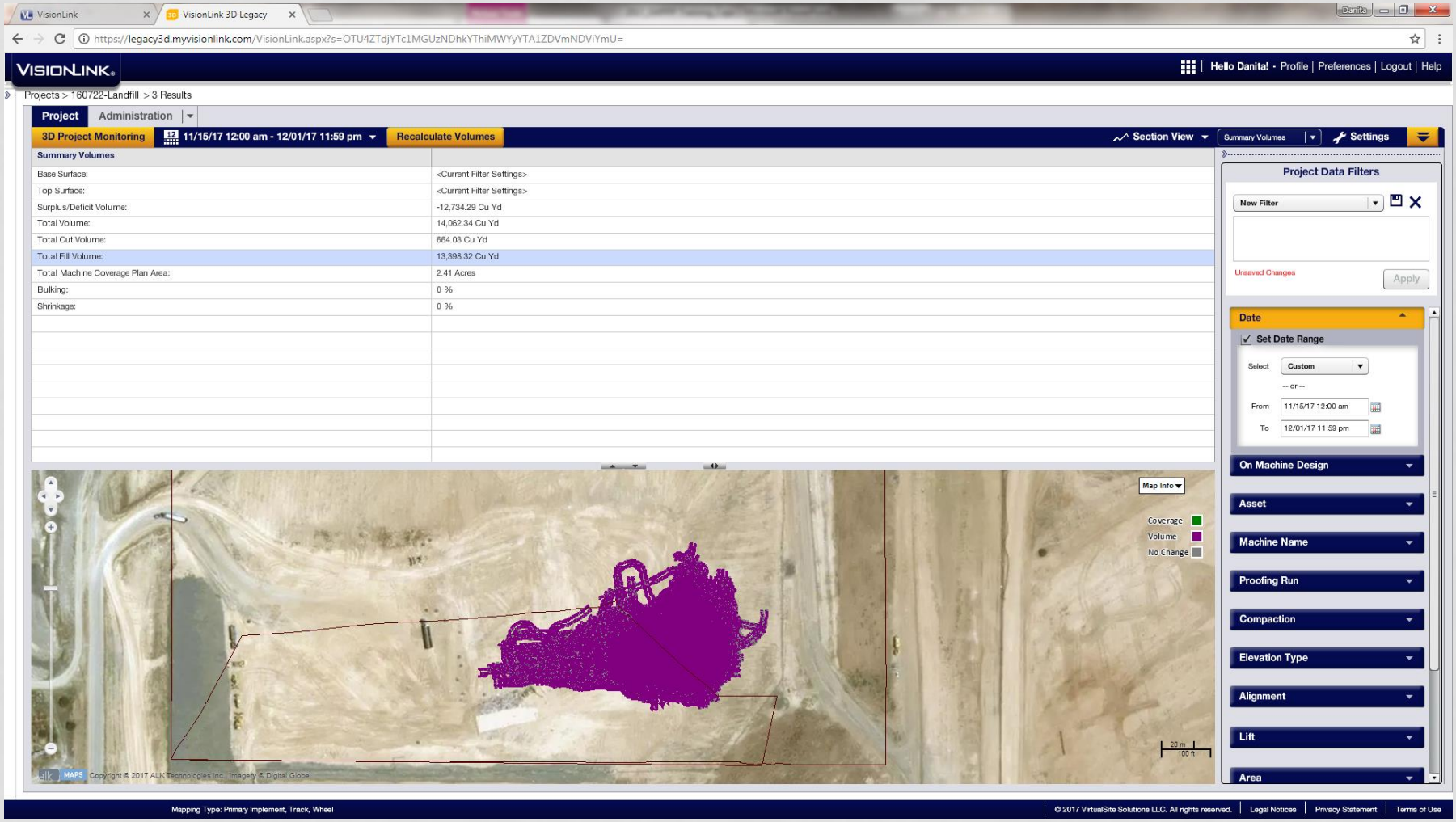
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VISIONLINK
Hello Danita! - Profile | Preferences | Logout | Help
Projects > 160722-Landfill > 3 Results
Project
Administration
3D Project Monitoring
11/15/17 12:00 am - 12/01/17 11:59 pm
Recalculate Volumes
Section View
Summary Volumes
Settings
Summary Volumes
Base Surface: <Current Filter Settings>
Top Surface: <Current Filter Settings>
Surplus/Deficit Volume: -12,734.29 Cu Yd
Total Volume: 14,062.34 Cu Yd
Total Cut Volume: 664.03 Cu Yd
Total Fill Volume: 13,398.32 Cu Yd
Total Machine Coverage Plan Area: 2.41 Acres
Bulking: 0 %
Shrinkage: 0 %
Map Info
Coverage
Volume
No Change
Project Data Filters
New Filter
Unsaved Changes
Apply
Date
Set Date Range
Select
Custom
-- or --
From
11/15/17 12:00 am
To
12/01/17 11:59 pm
On Machine Design
Asset
Machine Name
Proofing Run
Compaction
Elevation Type
Alignment
Lift
Area
Mapping Type: Primary Implement, Track, Wheel
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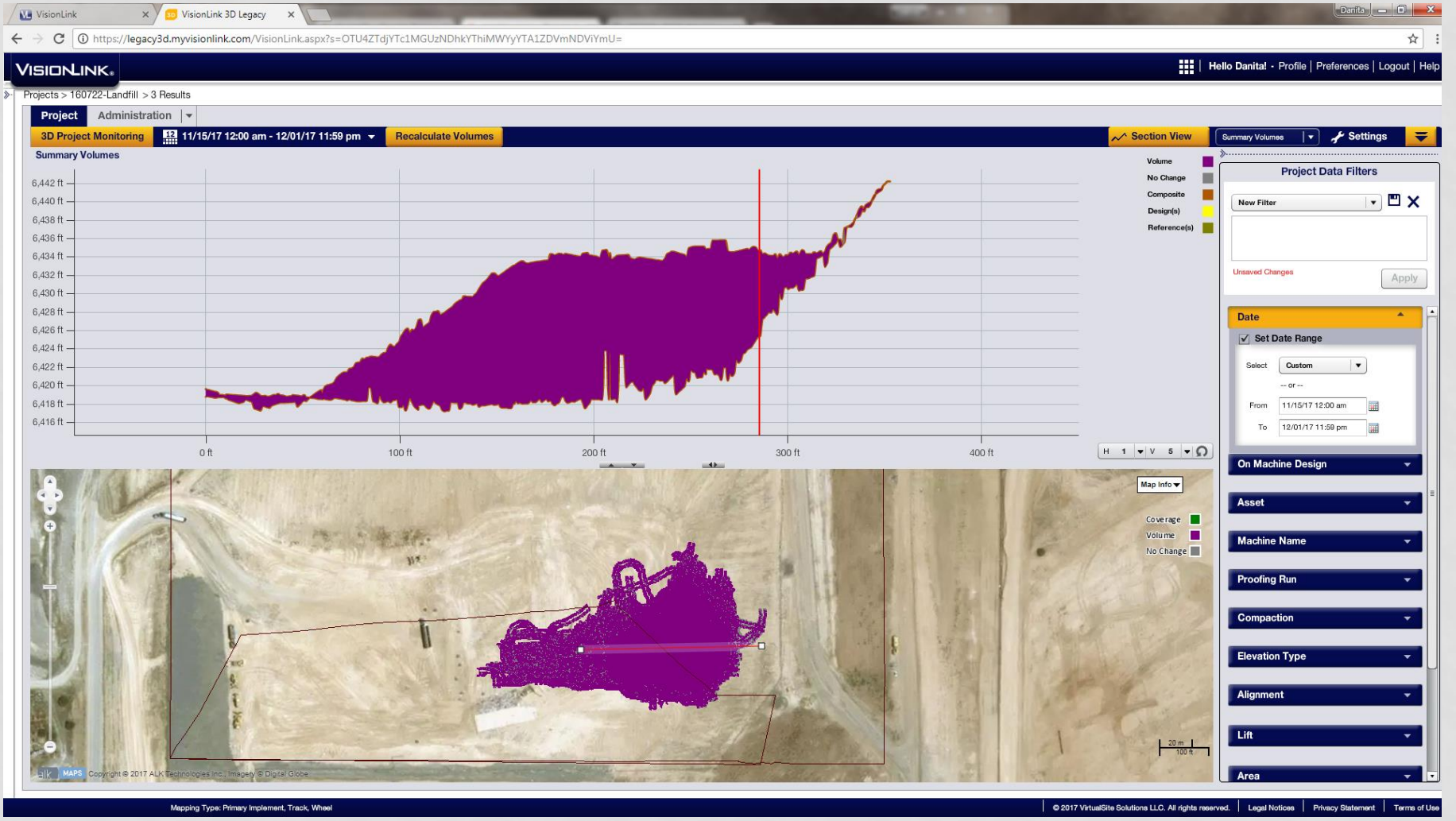
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Project
Administration
3D Project Monitoring
11/15/17 12:00 am - 12/01/17 11:59 pm
Recalculate Volumes
Section View
Summary Volumes
Settings
Summary Volumes
6,442 ft
6,440 ft
6,438 ft
6,436 ft
6,434 ft
6,432 ft
6,430 ft
6,428 ft
6,426 ft
6,424 ft
6,422 ft
6,420 ft
6,418 ft
6,416 ft
0 ft
100 ft
200 ft
300 ft
400 ft
Volume
No Change
Composite
Design(s)
Reference(s)
Project Data Filters
New Filter
Unsaved Changes
Apply
Date
Set Date Range
Select
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TRACKING OPERATIONS (EXAMPLE)

TWO WEEK EVALUATION

Start Date	End Date	Tonnage Waste (tons)	Volume Dirt (CY)	Tonnage Dirt (tons)	Tonnage Total (tons)	Total Fill Volume (CY)	Density (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)

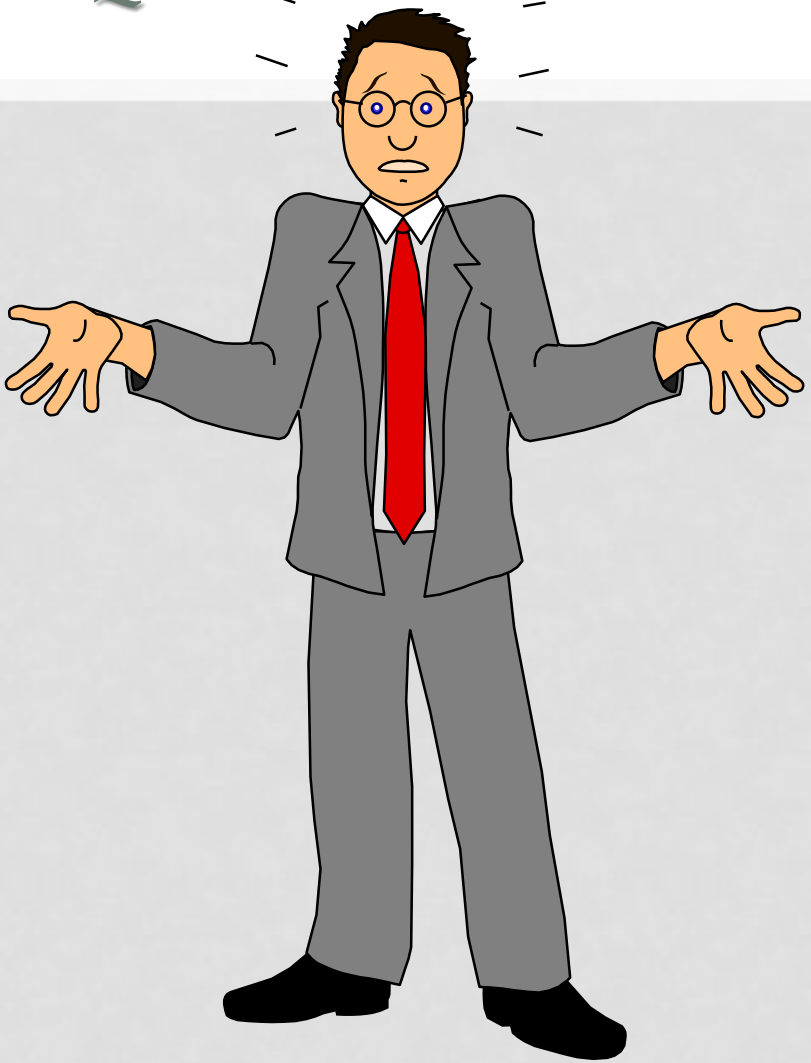
TRACKING OPERATIONS (RESULTS)

- 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

QUESTIONS???



- Thank You!