



STOCKPILE MEASUREMENT PROJECT

Improving processes with technology



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Introduction

What is the app?

- Software as a service
- Video capture and uploading application
- Stockpile volume calculation
- Web based reporting

Our project

- Preliminary measures
- Pilot project
- Rollout training & implementation

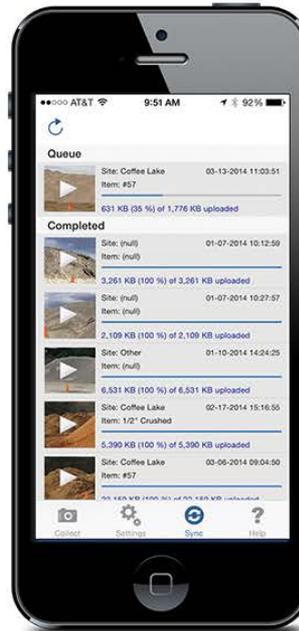
Results

Three basic steps

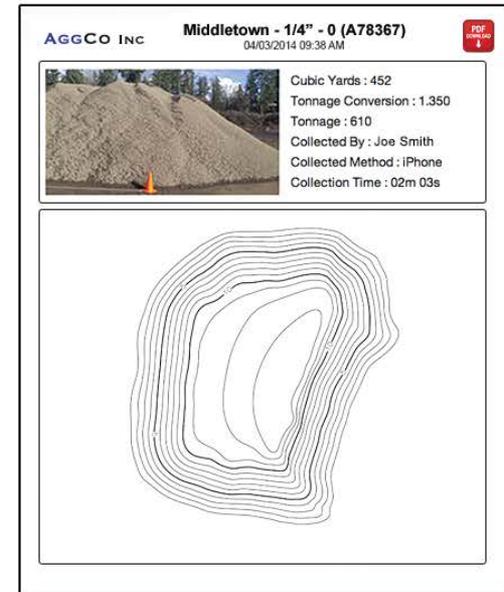
1. Measure



2. Sync

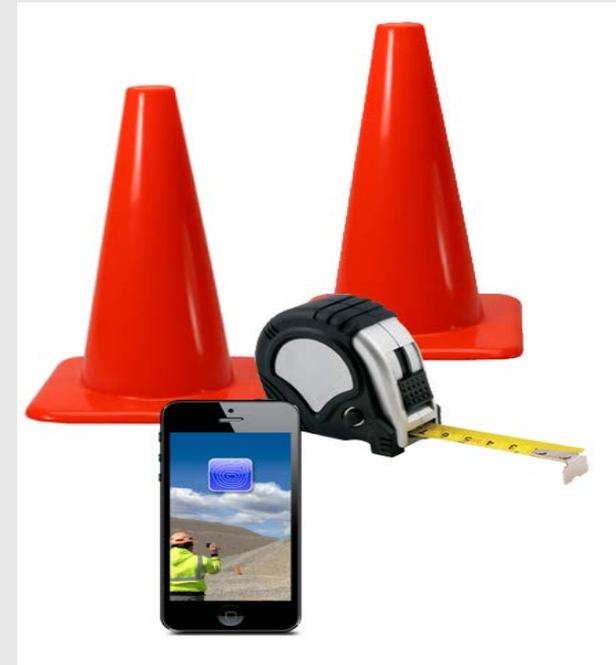


3. View Results



What you need

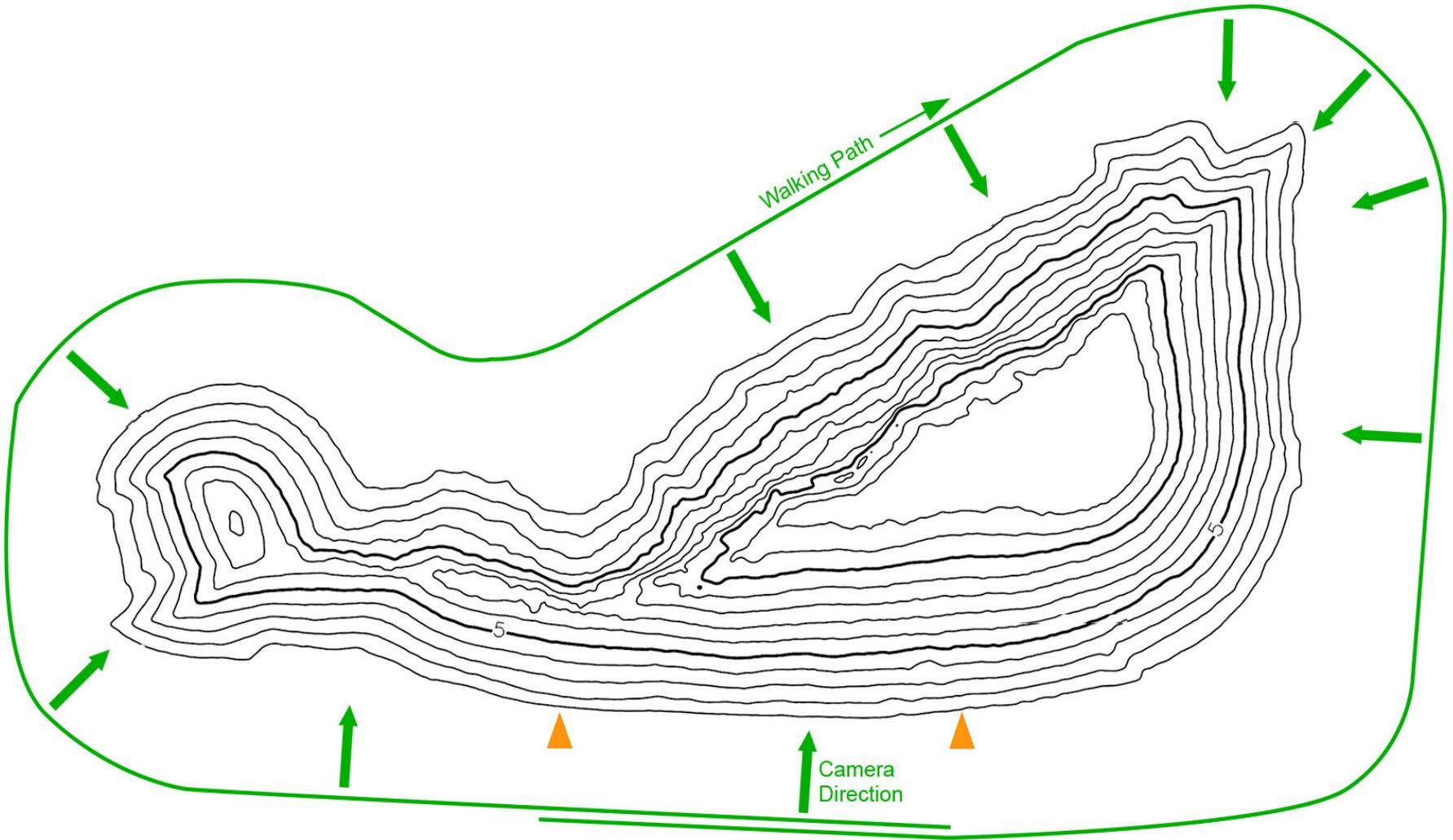
- Your iPhone 5 or higher
- Two orange construction cones approximately 2 feet tall
- A tape measure over 25 feet long.



Place cones 25 feet apart, center to center.



Stockpile video recording

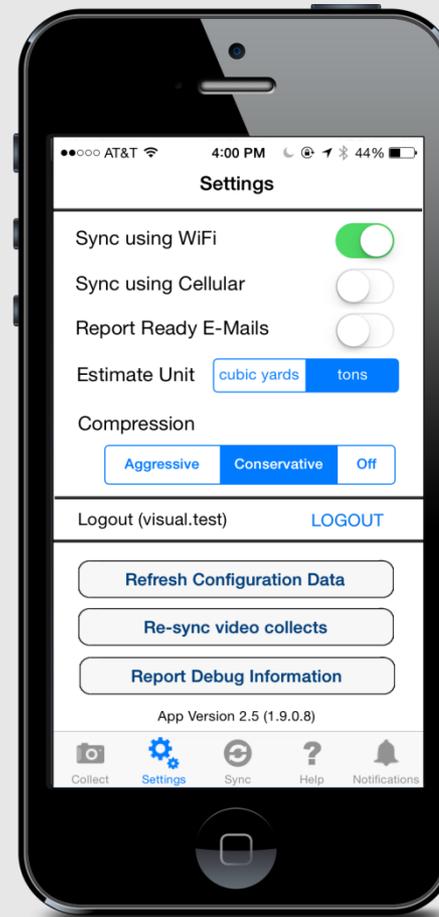


Synchronize your data

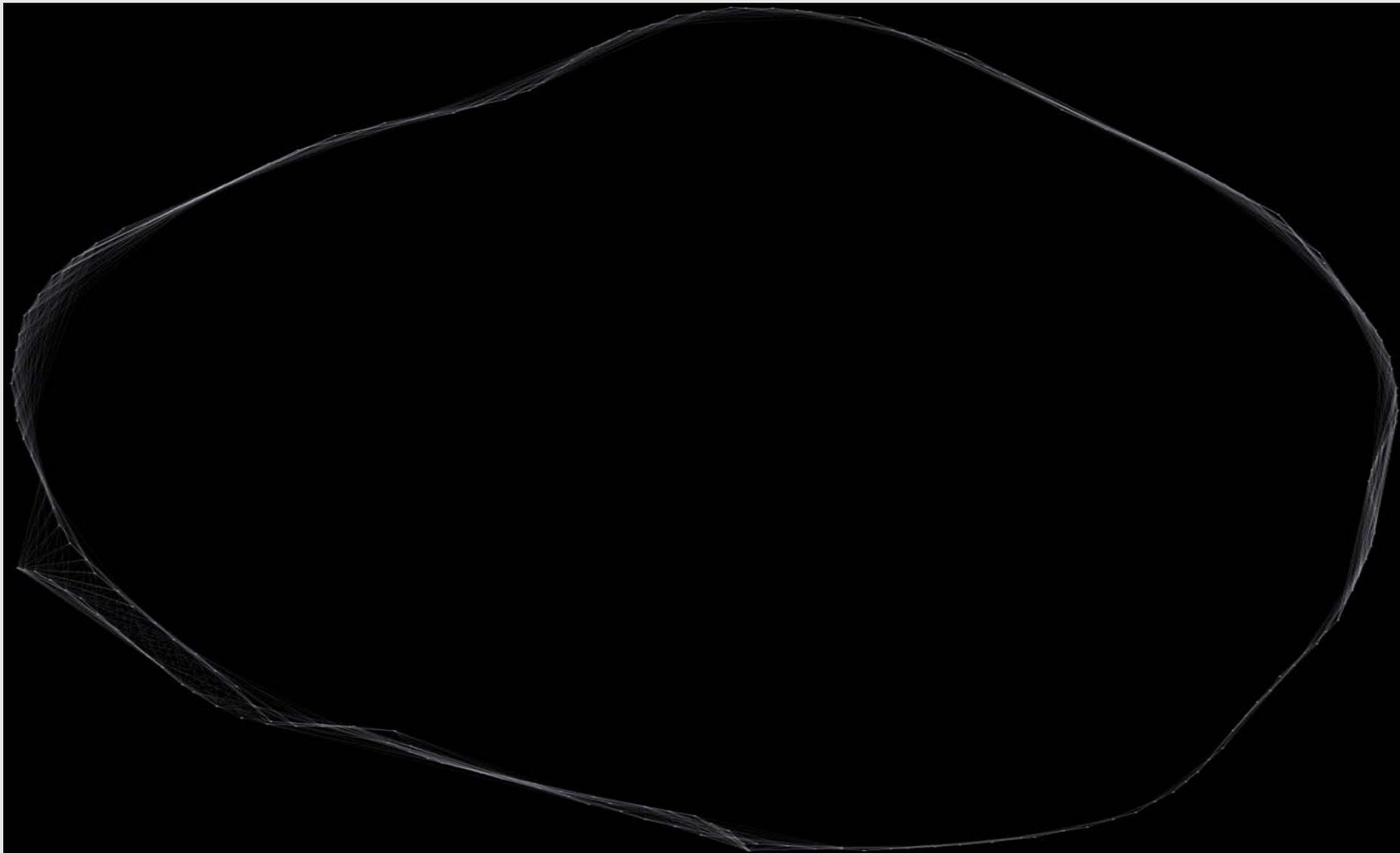
Once recording is finished, you need to sync the data to generate a measurement report.

Three sync options available

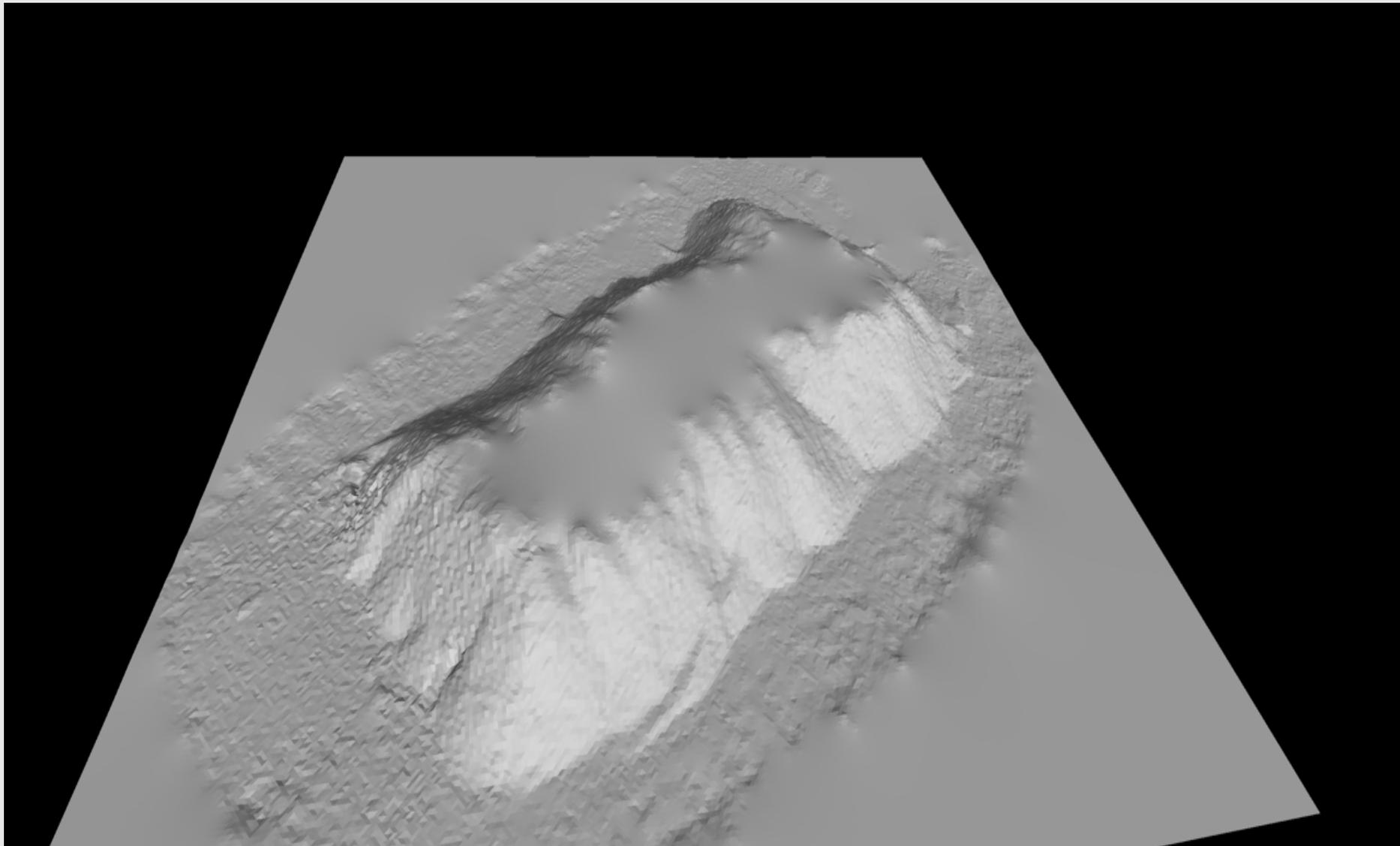
- Wi-Fi network
- Cell network
- Desktop utility



Camera connectivity graph

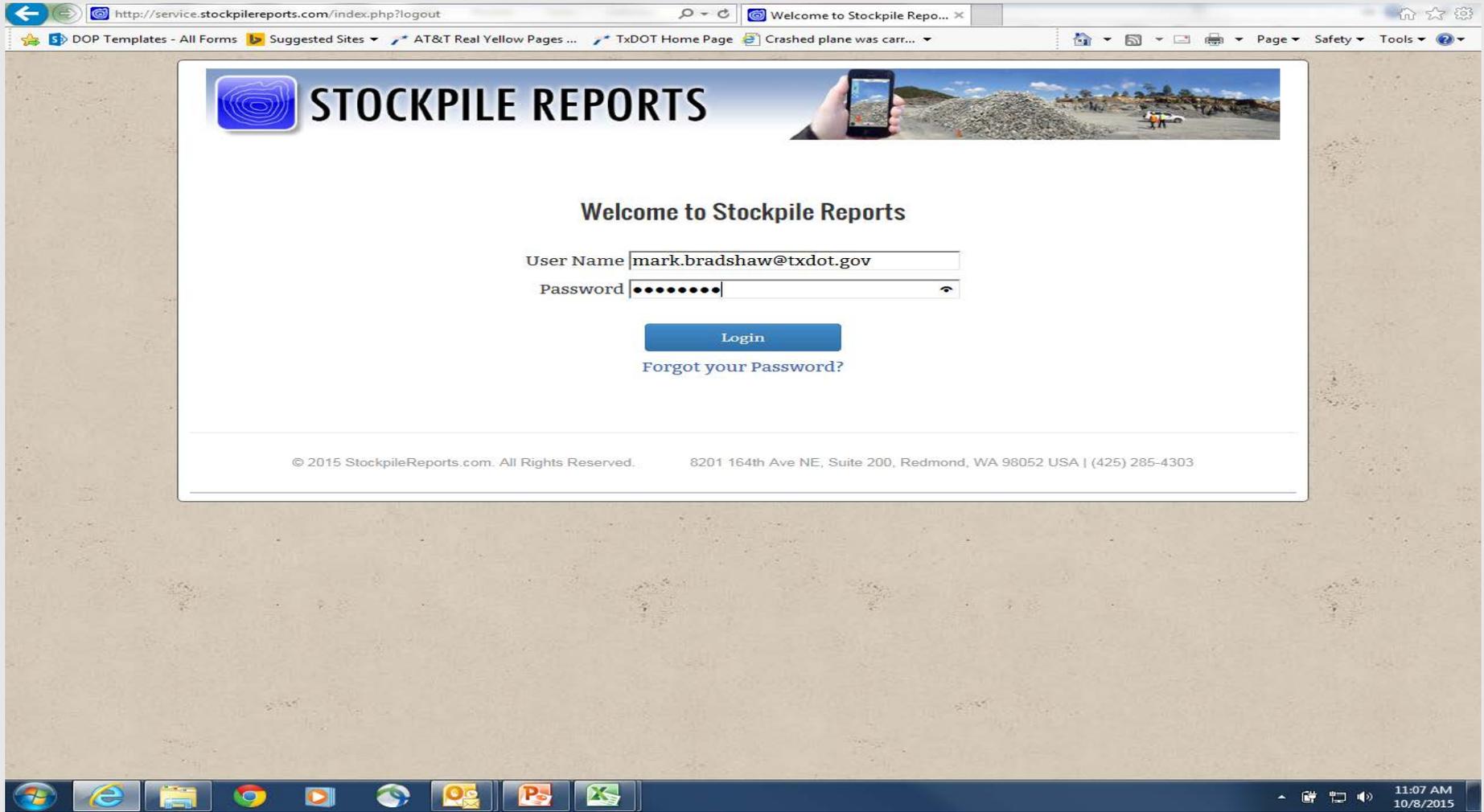


Surface model



View results

Log into your customer account at stockpilereports.com using Novell credentials



The screenshot shows a web browser window with the URL `http://service.stockpilereports.com/index.php?logout`. The page title is "Welcome to Stockpile Reports". The main content area features the "STOCKPILE REPORTS" logo on the left and a banner image on the right showing a hand holding a smartphone displaying a map, with a large pile of gravel in the background. Below the banner, the text "Welcome to Stockpile Reports" is centered. The login form consists of two input fields: "User Name" with the value `mark.bradshaw@txdot.gov` and "Password" with masked characters. A blue "Login" button is positioned below the password field, and a link for "Forgot your Password?" is located directly underneath. At the bottom of the page, the copyright notice reads "© 2015 StockpileReports.com. All Rights Reserved." followed by the address "8201 164th Ave NE, Suite 200, Redmond, WA 98052 USA | (425) 285-4303". The Windows taskbar at the bottom shows the system tray with the time "11:07 AM" and date "10/8/2015".

November 30 login

http://service.stockpilereports.com/index.php

Welcome to Stockpile Repo...

DOP Templates - All Forms | Suggested Sites | AT&T Real Yellow Pages ... | TxDOT Home Page | Stories of those who ...

Home | Queue | Profile | Help | Logout

Hierarchy:
Texas DOT

Site: All
(s):
11 US 79 north at CR 330 (10307-Palestine)
12 US 79 north at FM 2574 south (10307-Palestine)
15 SH 36 IN MOFFAT (09301-Bell Co)
17 FM 2330 west of SH 19 (10307-Palestine)

Dates: Last 7 Days
Month to Date
Quarter to Date
Year to Date
Custom Date range

Map View
List View

Search

iPhone
Estimate
Aerial
Walking Wheel
GPS
Laser
Show Details

Google

Map data ©2015 Google, INEGI Imagery ©2015 TerraMetrics | Terms of Use | Report a map error

9:38 AM
11/30/2015

November 30 list view

[Home](#)
[Queue](#)
[Profile](#)
[Help](#)
[Logout](#)

Hierarchy: Texas DOT

Site (s):

- All
- # 11 US 79 north at CR 330 (10307-Palestine)
- # 12 US 79 north at FM 2574 south (10307-Palestine)
- # 15 SH 36 IN MOFFAT (09301-Bell Co)
- # 17 FM 2330 west of SH 19 (10307-Palestine)

Dates:

- Last 7 Days
- Month to Date
- Quarter to Date
- Year to Date
- Custom Date range

Map View
 List View

[Search](#)
[Export Data to Excel](#)

Site Code	Site Name	Product Code	Product Name	User Name	Notes	Type	Date	Volume	Conversion Ratio	Tonnage	Actions
08308-4 <input type="checkbox"/>	Borden Co	other	Other	Christopher Cooley		iPhone	11/23/2015 9:23 AM	290	1.000	290	
08308-4 <input type="checkbox"/>	Borden Co	other	Other	Christopher Cooley		iPhone	11/23/2015 9:28 AM	297	1.000	297	
08308-4 <input type="checkbox"/>	Borden Co	other	Other	Christopher Cooley		iPhone	11/23/2015 9:33 AM	306	1.000	306	
08308-4 <input type="checkbox"/>	Borden Co	74577531408	ROCK ASPHALT;LIMESTONE, CM/CL;I#330, TYPE 1, GD CC, (	Christopher Cooley		iPhone	11/23/2015 11:25 AM	593	1.400	830	
08308-4 <input type="checkbox"/>	Borden Co	74577531408	ROCK ASPHALT;LIMESTONE, CM/CL;I#330, TYPE 1, GD CC, (	Christopher Cooley		iPhone	11/23/2015 11:29 AM	625	1.400	875	
08308-4 <input type="checkbox"/>	Borden Co	74577531408	ROCK ASPHALT;LIMESTONE, CM/CL;I#330, TYPE 1, GD CC, (	Christopher Cooley		iPhone	11/23/2015 11:33 AM	625	1.400	876	
22317-0 <input type="checkbox"/>	Bracketville	74577532158	ROCK ASPHALT;LIMESTONE, CM/CL;I#330, TYPE 2, GD CS, (	Anthony Aldaco		iPhone	11/24/2015 9:41 AM	616	1.400	863	
22317-0 <input type="checkbox"/>	Bracketville	75052261502	FLEXIBLE BASE;SPEC I 247;TYPE A (CRUSHED STONE), GRAD	Anthony Aldaco		iPhone	11/24/2015 9:47 AM	668	1.400	936	
22317-0 <input type="checkbox"/>	Bracketville	75052261502	FLEXIBLE BASE;SPEC I 247;TYPE A (CRUSHED STONE), GRAD	Anthony Aldaco		iPhone	11/24/2015 9:51 AM	95	1.400	133	
08305-6 <input type="checkbox"/>	Callahan Co	other	Other	Mike Hines		iPhone	11/24/2015 11:00 AM	188	1.000	188	
07302-0	Coke Co	other	Other	Douglas		iPhone	11/23/2015	149	1.000	149	

Borden County measures

http://service.stockpilereports.com/index.php?opt=I&m=0

Welcome to Stockpile Repo...

DOP Templates - All Forms Suggested Sites AT&T Real Yellow Pages ... TxDOT Home Page Stories of those who ...

Home Queue Profile Help Logout

Hierarchy: Texas DOT

Site: All

(s):

- # 11 US 79 north at CR 330 (10307-Palestine)
- # 12 US 79 north at FM 2574 south (10307-Palestine)
- # 15 SH 36 IN MOFFAT (09301-Bell Co)
- # 17 FM 2330 west of SH 19 (10307-Palestine)

Dates: Last 7 Days

- Month to Date
- Quarter to Date
- Year to Date
- Custom Date range

Map View

List View

Search

Map Satellite

iPhone

Estimate

Aerial

Walking Wheel

GPS

Laser

Show Details

Map data ©2015 Google Imagery ©2015 | Terms of Use | Report a map error

10:11 AM
11/30/2015

Borden County top level report

http://service.stockpilereports.com/index.php?opt=I&m=0

Welcome to Stockpile Repo...

Home Queue Profile Help Logout

Hierarchy: Texas DOT

Site(s): All

- # 11 US 79 north at CR 330 (10307-Palestine)
- # 12 US 79 north at FM 2574 south (10307-Palestine)
- # 15 SH 36 IN MOFFAT (09301-Bell Co)
- # 17 FM 2330 west of SH 19 (10307-Palestine)

Dates: Last 7 Days

- Month to Date
- Quarter to Date
- Year to Date
- Custom Date range

Map View List View Search

ROCK ASPHALT;LIMESTONE, CM/CL;#330, TYPE 1, GD CC, (



Date: 11/23/15 11:33 AM
Site Name: Borden Co
Site Code: 08308-4
Item Code: 74577531408
Volume CY: 625
Weight TN: 876
Full Report
Reconstructed Video

iPhone Estimate Aerial Walking Wheel GPS Laser Show Details

Map data ©2015 Google Imagery ©2015 Terms of Use Report a map error

10:25 AM 11/30/2015

Borden County full report

http://service.stockpilereports.com/index.php?m=0&opt=R&id=43104

Welcome to Stockpile Reports

Home Queue Profile Help Logout

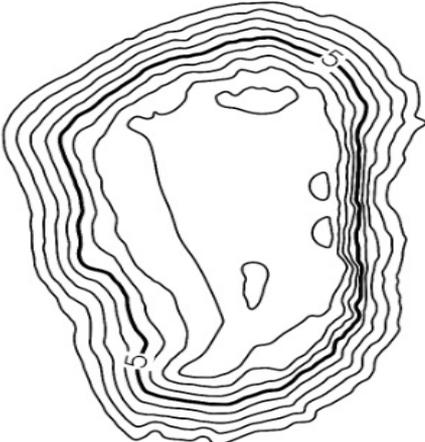


Borden Co (08308-4) - ROCK ASPHALT; LIMESTONE, CM/CL; I#330, TYPE 1, GD CC, (74577531408)

11/23/2015 11:33:06 AM



Cubic Yards : 625
Tonnage Conversion : 1.400
Tonnage : 876
Collected By : Christopher Cooley
Collected Method : iPhone
Collection Time : 03m 27s



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10:31 AM 11/30/2015

Why we pursued the project

Drivers

- Materials Management Project – Reduce cost of warehouse operations, improve work processes and inventory systems
- Audit Finding – Inconsistent measuring of stockpiles
- Preliminary measurements

Preliminary measures

	iPhone 1 Variance from known (ABS)	iPhone 2 Variance from known (ABS)	Employee method variance from known (ABS)	Inventory variance from known (ABS)	Known Qty Counted (CY)
Sand pile shaped	9.47%	9.47%	6.04%	5.26%	95
Sand pile unshaped	9.47%	9.47%	11.50%	5.26%	95
Sand pile counted	9.47%	12.63%		5.26%	95

Stockpile measurement pilot project

Adapt the app to TxDOT operations

Contract in summer of 2014

- Phase I - obtain $\pm 2\%$ accuracy on stockpiles 100 cubic yards or less
- Phase II - pilot test the app in Beaumont & Lubbock districts

Project results

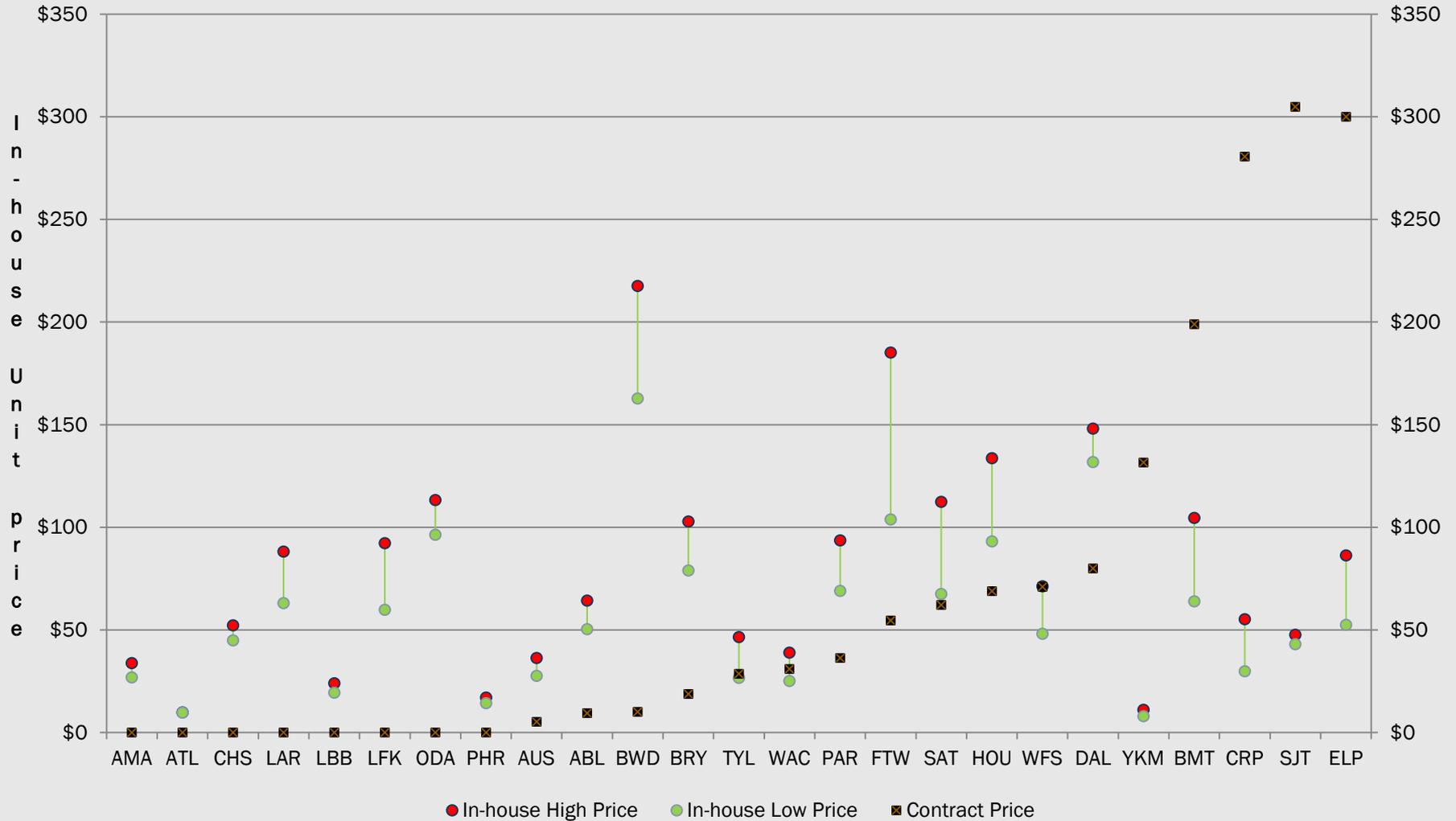
- Improves employee safety - eliminates climbing on stockpiles
- Provides same accuracy as GPS at greatly reduced cost
- Fast and easy to use
- Requires minimal equipment investment
- Provides management visibility of stockpiled inventory
- Provides more accurate performance measurement data

Pilot project test results

	GPS Variance from LiDAR (ABS)	iPhone Variance from LiDAR (ABS)	Total iPhone volume measured (CY)	Employee method variance from iPhone (ABS)	Inventory variance from iPhone (ABS)
Phase I					
Test Results	1.74%	1.46%			
Measurements			2,571	25.64%	21.96%
Phase II					
Measurements			25,558	32.18%	54.10%

How material costs affect cost reporting

FY13 Remove & Replace function(110) in-house & contract cost per CY



Stockpile measurement savings - SPR vs. GPS

		2014	2015	2016	2017	2018
BENEFITS						
	Stockpile Measurement savings	\$0	\$1,068,006	\$2,136,012	\$2,136,012	\$2,136,012
	Annual savings	\$0	\$1,068,006	\$2,136,012	\$2,136,012	\$2,136,012
	Cumulative savings	\$0	\$1,068,006	\$3,204,018	\$5,340,030	\$7,476,042
COSTS						
	Development costs	(\$192,547)	(\$153,664)	\$0	\$0	\$0
	Rollout costs	\$0	(\$299,433)	\$0	\$0	\$0
	Application fees	\$0	(\$100,000)	(\$200,000)	(\$200,000)	(\$200,000)
	Annual costs	(\$192,547)	(\$553,097)	(\$200,000)	(\$200,000)	(\$200,000)
	Cumulative costs	(\$192,547)	(\$745,644)	(\$945,644)	(\$1,145,644)	(\$1,345,644)
NET VALUE						
	Annual net value	(\$192,547)	\$514,909	\$1,936,012	\$1,936,012	\$1,936,012
	Cumulative net value	(\$192,547)	\$322,362	\$2,258,374	\$4,194,386	\$6,130,398
	<i>5 year net value</i>	\$6,130,398				
	<i>Breakeven point</i>	2nd Year				
	<i>5 Year ROI</i>	455.57%				

Functions implemented

Roadway maintenance materials we keep in inventory

- Material receipts – to establish known beginning inventory
- Annual inventory – to establish known ending inventory
- Verify inventory before starting a job
- Check inventory before/after job – ensure correct quantity charged to job

Maintenance project activity

Fully implemented in maintenance operations

Since January 2015

- 383 users
- 3,586 videos totaling 1.9M cubic yards
- 437 estimates totaling 578K cubic yards

Inventory reset

- Video time 3,477 minutes = 3.3 cy/sec
- Avoided error is 301K cubic yards on video measurements

Dallas example 1



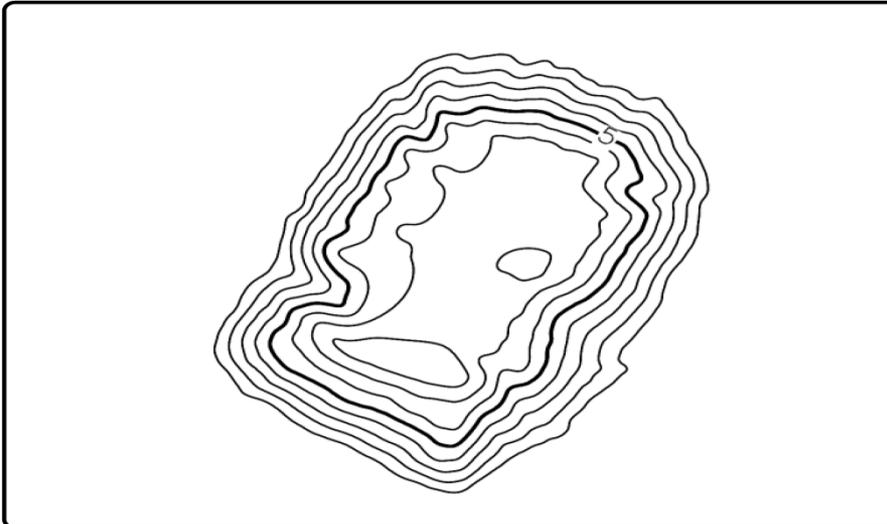
Dalls NE (18308-0) - AGGREGATE;SURFACE;I#302, TYPE L, GRADE 5; (2004 SPEC) (75035215054)

06/09/2015 01:39:40 PM



Cubic Yards : 575
Tonnage Conversion : 1.400
Tonnage : 805
Collected By : Vincent Washington
Collected Method : iPhone
Collection Time : 02m 48s

Notes : 2nd pile is brown gravel rock IH30@US75 under bridge.



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Dallas example 2



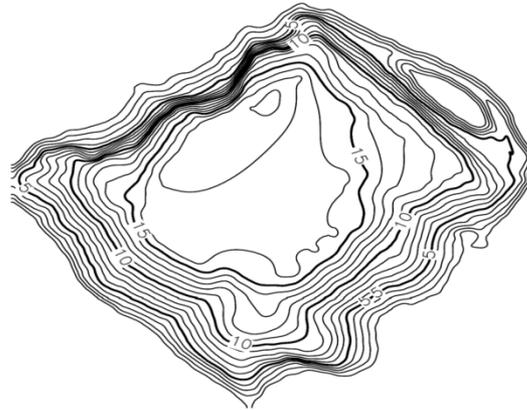
Dalls NE (18308-0) - AGGREGATE;SURFACE;I#302, TYPE L, GRADE 5; (2004 SPEC) (75035215054)

06/09/2015 02:00:31 PM



Cubic Yards : 2,964
Tonnage Conversion : 1,400
Tonnage : 4,149
Collected By : Vincent Washington
Collected Method : iPhone
Collection Time : 03m 41s

Notes : 4th pile is black dirt under bridge IH30@US75



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Dallas test measurement

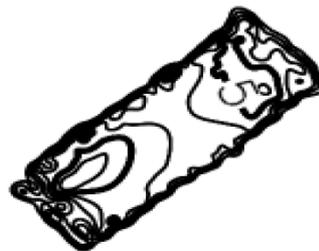


Georgetown (14312) - Other (O01)

01/20/2015 03:02:37 PM



Cubic Yards : 30
Tonnage Conversion : 1.000
Tonnage : 30
Collected By : Tim Wright
Collected Method : iPhone
Collection Time : 00m 54s



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Dallas measurement activity

Home Queue Profile Help Logout

Hierarchy:

->->18-DAL

Site

(s):

- All
- Collin Co (18307-Collin Co)
- Dallas Heavy Equip (18343-Dallas Heavy Equip)
- Dallas NW (18302-Dallas NW)
- Dallas SW (18315-Dallas SW)

Dates:

- Month to Date
- Quarter to Date
- Year to Date
- Custom Date range
- All Available

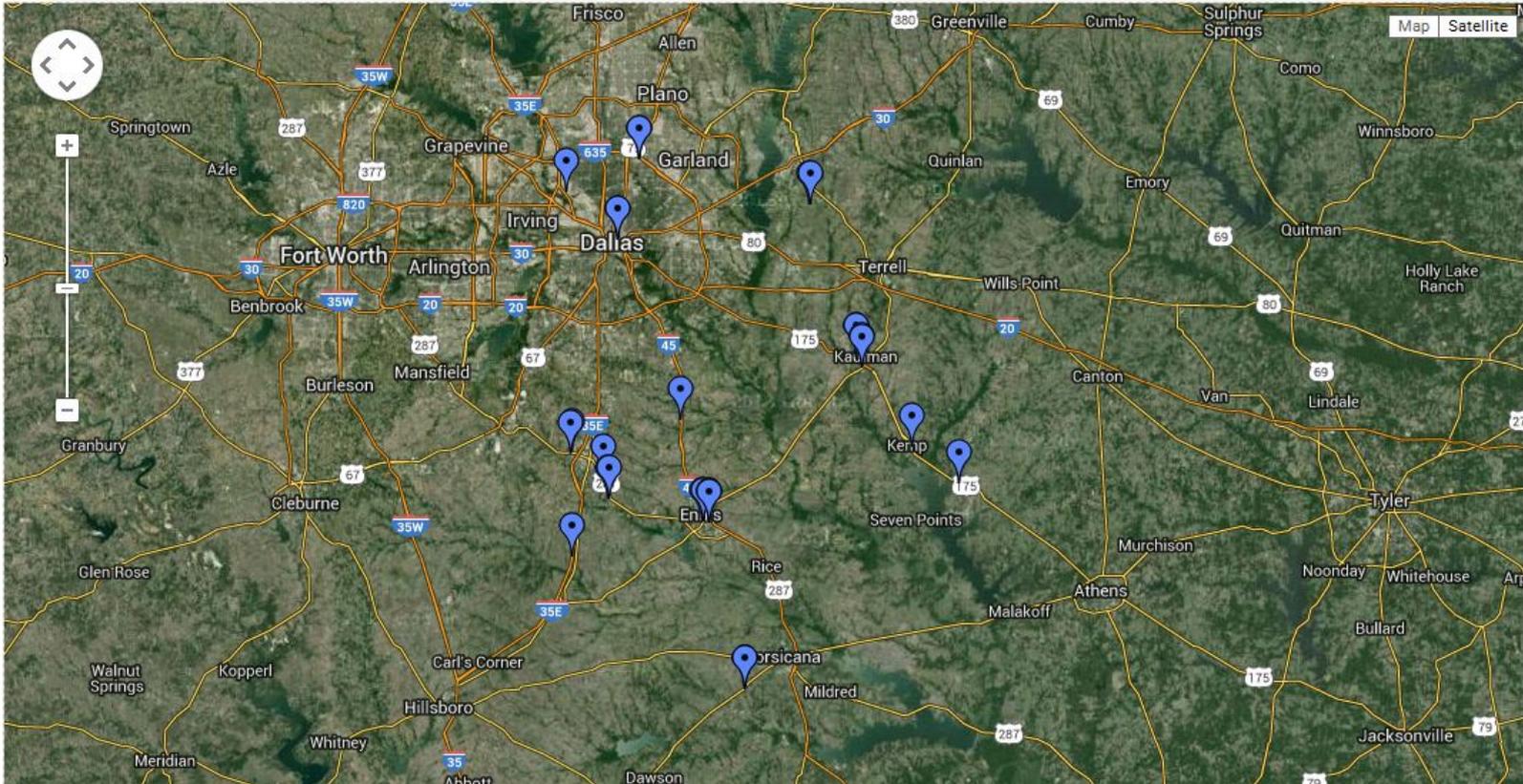
Map

View

List

View

Search



- iPhone
- Estimate
- Aerial
- Walking Wheel
- GPS
- Laser
- Show Details

QUESTIONS?