

6/21/2017 Yreka, CA

An Iterative Approach to Intelligent Traffic Systems Asset Management **Jim Whalen Technology Manager Traffic Operations Nevada Department of Transportation**





➢ Background ➢ Assessment > Should we swing for the fence? Selecting a partner > Journey > Take aways **≻**Future



Background What we do

 Provide, operate, and maintain Intelligent Transportation Systems (ITS) & Public Safety Radio Systems to enhance the operations and maintenance of Nevada roadways.



Background

Diverse equipment

- 118 radio system sites
- 600 intelligent traffic system sites
- 1000 solar warning devices
- 1400 miles of fiber
- Shared user base
 - NDOT
 - Highway patrol
 - Washoe County
 - FAST (Las Vegas)
- Limited budget





Background

- Quick Nevada Facts
- 7th in overall area
- 44th in population density
- Diverse climate
- 5,400 centerline miles
- ITS needs dominated by two major cities

Population per sq. mile <1 110 1025 2550 50100 100250 250500
100250 250500
5001000
10002500
25005000
>0000

Source: U. S. Census Bureau Census 2000 Summary File 1 population by census tract.





Known asset information

- Network representation
- Associated documentation
- Asset attributes (e.g., type, model, configuration)
 Our Belief



Unknown asset information

- Exact asset spatial location
- Maintenance history
- Total cost of ownership
- Associated GIS and topographical information





Missing capabilities

- Work order tracking
 - Historical
 - Prioritization
- Resource allocation
- Attribute updating
- Location mapping
- Associated information in the field
- Manage inventory



Internal dynamics

- Existing software platforms
 - Central systems
 - Orion
- Distributed organization
 - Three districts with different needs

- Matrixed IT organization
- Technology poor maintenance crews





Defined asset management requirements

- Platform agnostic (mobile, desktop, phone)
- Map-based (GIS, location information)
- Easily configurable (meet our unique needs)

- Distributed administration
- Dynamic reporting
- Real-time dashboard
- Offline map
- Hosted environment
- Security architecture



Established asset management metrics

- Maintenance costs
- Maintenance frequency
- Resource efficiency
- Asset life cycle





Should we swing for the fence?

- Budget
- Change management

 Internal politics
 Independent districts
 Asset management politics
- The unknown unknown
- Not sure what we wanted





Selecting a Partner

ITS & Radio

Survey software solutions

	MobileMMS	Commshop 360	Trackit	Econolight
TECHNICAL	Υ	Υ	Y	Y
INVENTORY MANAGEMENT	Υ	Υ	Ν	Y
WORK ORDER MANAGEMENT	Υ	Υ	Y	Y
MAINTENANCE	Y	Y	Y	Y
ACCOUNTING BILLING	У	Y	Y	Y
REPORTING	Y	Y	Y	Y
SECURITY	Y	Y	Y	Y
CONFIGURATION	Y	Y	Ν	Ν

Y = Supports Requirements N = Does Not Support Requirements





Selected MobileMMS

Mobile CRS			Giobal Search		Q		*	1
E A > F Service Requests > ITS Tro	Edit ITS Trouble Ticket/Work Order			٠		*	C	
CO Select User x	Instructions	Linked Device:				00		a - a
ITS Trouble Ticket/Work Order	For emergency help please contact Intelligent Transportation Systems Technology Section	ID:	95					
Gregg Thompson, Carlin Tunnels FLIR Multicast video stream. Configure CSS	at 775.888.7080 Monday through Friday 8:00am to 5:00pm.	Requestor:	Gregg Thompson					
Technician Comments	Мар	Requestor email:	gthompson					
2, Troubleshooting, Closed, 4/19/2016		Requestor phone:	2797]				
12:00:00 AM, 5/10/2016 12:00:00 AM,	+	Problem Location:	Carlin Tunnels FLIR W/B East Side			A.		
		Detailed problem description:	Multicast video stream. Configure CSS and VideoWall for direct IP AXIS camera - Done Configure - V2P to display for AXIS cameras. Gregg is requesting help in the Chameleon server to configure.			der		
	ITS Trouble Ticket/Work Order	Problem Notification Sent To:	Traffic Operations Technolo 🔻			W/B gure	2+	
		Due Date:	10/31/2016 🔳 yesterday toda	У		25	10/10	
	Google Map data 22017 Goople Imagery 62017, DgtalGlobe Terms of Use Report a map error	Due Date (Date Time):	1/9/2017 3:59 PM	N		1 A	96	the state
		Work Comment:	Update 12-20-16 - David with FLIR needs to fine tune the H264 SDK transcoder to display H264 video properly V2R					
	L Gregg Thompson ⊙ Tue 04/19/2016 04:01:09 PM			Cancel	Save			
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Selecting a Partner Why MobileMMS

- Self configuration
- GIS-based
- Diverse customer background

- Real time reporting
- Sophisticated API (SDK)
- Hosted



Determined asset information

- Determined required asset attributes
- Gathered various spreadsheet sources
- Combined existing information
- Corrected spatial location
- Assembled associated documentation
- Collected relevant GIS data

-	Device Name 💌	Naming Convention 💌
	D2-I580RenoYard-RWIS	Okay
	D2-I580SBDamonteRanchWA17.4-DMS	Okay
	D2-180EBGarsonRdWA5.75-DMS	Okay
	D2-Switch5632RenoD2EMcCarranFH-L3	Okay
	D2-180Fernley-DMS	Okay
	D2-180FernleyYard-21Ghz	Okay
	D2-180LovelockYard-5.8Ghz	Okay
	D2-180MogulWA7.0-DMS	Okay
	D2-I80NUGGET1-CCTV	Okay
	D2-180SparksBlvdRemote-RWIS	Okay
	D2-180Toulon-RWIS	Okay
	D2-SR207FoothillDRDO11-DMS	Okay
	D2-SR207Kingsbury-RWIS	Okay
	D2-SR338Sweetwater-RWIS	Okay
	D2-SR341HighlandFlats-RWIS	Okay
	D2-SR341US50-RWIS	Okay
	D2-SR431DiamonPeak-RWIS	Okay
	D2-SR431EBCountryClubDrWA2.60-DMS	Okay
	D2-SR431InclineVillage-RWIS	Okay



Iterative asset representation

- Hierarchy
- Site naming convention
- Map-based representation
- Spatial and mile marker reconciliation

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AND CONNECTED

Developed maintenance work flow

Strike team

- District communication experts
- Network management
- Radio and ITS
- Implementation Details
 - Collected information
 - Users
 - Routing
 - Approval
 - Tracking

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	Cregg Thompson O Thu 01050017 63:20 45 FM				Carcel	Seve	Í.	





Customizing the system

- Distributed administration
- Customized dashboard
- Disconnected capability





Using the system

- Requesters
 - Emergent work order requests
 - Request status
- Users
 - Current work orders
 - Field information
 - Asset updating
 - Inventory management
- Management
 - Preventative maintenance scheduling
 - Dashboard
 - Status and other metrics
- Administrators
 - Form, workflow, notification modification



Expanded use beyond traffic management

- Service request tracking for maintenance districts
 - Replaced legacy request system
 - Includes service on all state assets
- Storm system maintenance
 - Loads field inspections and tracks maintenance

- Private culvert tracking
- Water meter reading
 - Automatic state reporting
- Solar sign yearly inspections
 - Ability to add new signs
- Gate tracking
 - Private gate contact information











The Journey Timeline



Take Aways

Cost

- \$25,000 yearly hosting and licensing
- \$25,000 implementation
 - Loading (reloading) assets
 - Workflow configuration
 - Form development
 - GIS integration
- \$100,000 customization
 - Disconnected App
 - Customized reporting dashboard
 - Segmented back-end administration
 - Map-based asset creation and editing





Take Aways

What we learned

• We would have never gotten it right swinging for the fence



Take Aways

It works

- Task tracking
- Asset updating
- Inventory management
- Work force efficiency
- Product life cycle determination
- Resource planning
- Total cost of ownership determination

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Outsource considerations





Technical presentation

- https://app.mobile-mms.com
- Contact

Sean Dingman (sean.dingman@websoftdev.com)



Demonstration Map-based, mobile platform



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Demonstration Integrated GIS (ArcGIS or Autodesk)







Linked asset information







Form-based asset view and update

Mobile			Global Search	٩	=	٥	1	C•
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ITS Sites								*
d D2.1580180Interchange	Devices			• C	≜ ∞	• 5	/	
previous record next record	CSS/NDEX Name							
	Update Required	No						
Devices 🕜	Cabinet (Historical)	CAB580N06927						
DSDC D2 (580)90Interchange	Device Category	Flow Detector						
DSRC-0. D2-I580180Interchange	Old Device Name	D2-I580I80Interchange-Flow2						
	New Device Name	D2-I580I80Interchange-Flow-0						
Flow Detector, D2-	Site Name	D2-I580I80Interchange						
1580180InterchangCFlow-0, D2-	Device Description							
Elow Delector D2	Device Type	Plug In						
I580I80Interchange-Flow-1, D2-	Location							
	Room							
Calsense, D2-I580I80Interchange-	Notes							
Calsense-0, D2-I580I80Interchange,	Manufacturer	Wavetronics						
CCTV D2.1580180Interchange	Model	170 Controller						
CCTV-1, D2-I580I80Interchange,	Serial Number							
	Child Manufacturer	Digi						
CCTV, D2-1580180Interchange-	Child Model	N2S-170						
CCTV-0, D2-I580I80Interchange,	Column1							
Switches, D2-I580I80Interchange-	Communications							
L2-0, D2-1580180Interchange,	▼ Comm Type							•





Demonstration Authorized editing

Mobile Q ê. Edit Devices Asset > ITS Siles > D2-I580I80Interchange 0 1 X Only Open 1 Manufacturer: Wavetronics **• ITS Sites** 0 6 8 8 9 3 7 6 Devices 170 Controller Model: L D2-1580180Interchange CSS/NDEX Na Serial Number: Update Requ O Devices 3 Cabinet (Histe Child Digi **Device** Categ 9 Manufacturer: DSRC, D2-1580180Interchange-Old Device Na DSRC-0, D2-I580I80Interchange, N2S-170 Child Model: New Device N 0 Flow Detector D2-Site Name Column1: Device Descri Device Type Flow Detector, D2-Communications Location 1580180Interchange-Flow-1, D2-Room Comm Type: Please make a selection Notes Calsense-0, D2-I580I80Interchange. Manufacturer Phone Number: Model 0 CCTV, D2-1580180Interchange-Serial Numbe On/Off Code: CCTV-1, D2-I580I80Interchange, Child Manufa CSSID: D2-Flow-01 Child Model 9 CCTV, D2-1580180Interchange-Column1 1 Sean Dingman Cancel Save O Tue 09/13/2016 06:13:46 AM Communic Switches, D2-I580I80Interchange-0 Comm Type wst





Linked trouble tickets







Historical listing

Mobile			Global Search	Q ≡	۵ ۱ G
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Select User Only Open					
ITS Trouble Ticket/Work Order	ITS Trouble Ticket/W	ork Order		0 6 4 2	💿 🔤 🖊 💼
F Gregg Thompson, Carlin Tunnel East Portal Median, Please update Firmware to the Comtrol	Linked Device	D3-I80CarlinTCab3			
	ID	317			
 Technician Comments O 	Reporting Party (Registered)	Gregg Thompson			
Additional Natifications	Problem Location	Carlin Tunnel East Portal Median			
	Detailed problem description	Please update Firmware to the Comtrol Switch. http://172.30.8.68/index.html			
Attached to the following ITS Sites asset	Due Date (Date Time)	4/19/2017 6:19 AM		N	
D	Work Comment	Arjay 4/19/17. Firmware upgrade to 3.0 successful.		Lag	
	Assigned Tech	Traffic Operations Technology Section			
	Ticket status	Closed			
	Cregg Thompson O Wed 04/19	/2017 06:20:45 AM			
					wsd





Technician field view

Mobile CRS		Global Search	٩	≡ ◊	1	C•	
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Only Open District 3 Communication Techs Gregg T Install Pf Gary Molnar	■ ■ ket/W	ork Order		0 8	4 ∞ 💽	8	â
Mark Pa Gregg Thompson		D3-I80CarlinTCab3					
generate Israel Lopez		317					
Judi Imgard	tered)	Gregg Thompson					
Pilot, Ne Kent Lebarts		Carlin Tunnel East Portal Median					
Elika Wart 208 Papilara CCTV	Detailed problem description	Please update Firmware to the Comtrol Switch. http://172.30.8.68/index.html					
with COHU HD PTZ camera.,	Due Date (Date Time)	4/19/2017 6:19 AM					
	Work Comment	Arjay 4/19/17. Firmware upgrade to 3.0 successful.					
🗲 Gregg Thompson, Golconda East 🛛 💽 🔲 🕨	Assigned Tech	Traffic Operations Technology Section					
side, Install Radwin eLTE	Ticket status	Closed					
 ✓ Osino Check Lights W/B, Order 12" LED Lights. Repair Flashing ✓ Mark Pate, Pequop CCTV, No PTZ. CCD sensor is failing. 	Crogg Thompson O Wed 04/19	/2017 06:20:45 AM					
Wendover Fiber Hut, VLAN IP Change for all devices in							
✓ Gregg Thompson, Lamoille Summit, Install Elko PMP Redline							
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Demonstration **Map-based routing**



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Ad-hoc reporting

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Attached To ~	Linked Device ~	Problem Location ~	Detailed problem descr ~	Due Date (Date Time) ~	Work Comment ~	Assigned Tech ~	Ticket status	Created By	 Created Dat
D3- I80CarlinTCab3WB	D3- I80CarlinTCab3WB	Carlin Tunnels	Install POE Extender for AXIS Camera.	04/19/2017 06:25:18 AM		Gregg Thompson	Closed	Gregg Thompson	04/19/2017 (
D3-I80WellsHub	D3-I80WellsHub	Well FH	Get Blue Star generator online. Check fluids. Order Keys.	02/08/2017 03:28:13 PM	Ordered Keys. Configured Generator to work online and exercise.	Gregg Thompson	Closed	Gregg Thompson	02/08/2017 (
D3-180Pilot	D3-180Pilot	Pilot	Need to redo DC power for CCTV and put onto LVD.	02/08/2017 12.48.23 PM	Installed Samlex 50Amp and Samlex 110 Converter 300Watt. Ran grounding wires and tested power.	Gregg Thompson	Closed	Gregg Thompson	02/08/2017 ·
D3-180ElkoWest	D3-180ElkoWest	Elko West 298	Replace CCTV with COHU HD PTZ camera.	02/06/2017 08:57:55 AM	Replaced COHU Camera. Reconfigured CSS. Found that the Teleste encoder DATA PORT 1 IS BAD.	Gregg Thompson	Closed	Gregg Thompson	02/06/2017 (
D3-180Golconda	D3-I80Golconda	Golconda East side	Install Radwin eLTE Microwave at W/B CSTR and Golconda site	02/06/2017 06:17:04 AM	Installed Redline eLTE and configured switch and Shot	Gregg Thompson	Closed	Gregg Thompson	02/06/2017 (
D3- 180OsinoCheckLigh.	D3- 180OsinoCheckLig	Osino Check Lights W/B	Order 12" LED Lights. Repair Flashing yellow light,	02/01/2017 03:31:59 PM	Changed CAP flasher. Need to move CAP flasher into cabinet and run 2 extra wires	Gregg Thompson	Closed	Gregg Thompson	02/01/2017 (
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Excel view

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2	1716876			D3-I80CarlinTCab3V	VB	D3-180Ca	rlinTCat	o3WB	Carlin Tunnels		¢		Install POE Extender for AXIS Camera.				
3	1634601			D3-I80WellsHub		D3-180W	ellsHub		Well FH				Get Blue Star generator online. Check f	luids. Order Ke	ys.		
4	1634114			D3-I80Pilot		D3-I80Pil	ot		Pilot				Need to redo DC power for CCTV and p	ut onto LVD.			
5	1613096			D3-I80ElkoWest		D3-180EI	koWest		Elko West 298				Replace CCTV with COHU HD PTZ camer	a.			
6	1613065			D3-I80Golconda		D3-180G	olconda		Golconda East side				Install Radwin eLTE Microwave at W/B	CSTR and Golo	onda site.		
7	1609165			D3-I80OsinoCheckLi	ghts	D3-1800s	inoCheo	kLights	Osino Check Lights W	//B			Order 12" LED Lights. Repair Flashing ye	llow light,			
8	1606215			D3-I80PequopSMT		D3-I80Pe	quopSN	1T	Pequop CCTV				No PTZ. CCD sensor is failing. Replace C	OHU camera w	ith COHU H	D. Redo	powe
9	1604727			D3-SR228LamoilleSu	ummit	D3-SR228	BLamoill	eSummit	Lamoille Summit				Install Elko PMP Redline system. Find h	ardware for me	ounting and	pre-cor	n all ra
10	1604720			D3-I80DeethWest		D3-180De	ethWes	t	Deeth East Side RWIS	5			Install 12V Wind Generator on pole.				
11	1604713			D3-SR228LamoilleSu	ummit	D3-SR228	BLamoill	eSummit	Lamoille RWIS				Remove COHU CCTV once new AXIS can	neras are insta	led.		
12	1604702			D3-SR228LamoilleSu	ummit	D3-SR228	BLamoill	eSummit	LAmoille Summit				Install 2 AXIS cameras on the 80' Pole o	n the Summit.	Install 7510	XT swite	ch.
13	1604650			D3-I80EmigrantPass		D3-I80En	nigrantP	ass	Emigrant				Deploy Emigrant VLAN MOP. Switches a	and Field Device	P change		
14	1604640			D3-I80WellsHub		D3-180W	ellsHub		Wells Hub				Replace Radwin Radio East sector. Veril	fy network . Re	-label Flow	detecto	r and
15	1604561			D3-I80GolcondaSM	Г	D3-180Gc	olcondas	MT	Golconda V2P				Update V2P for 511 and NDOT site				
16	1043764								Fry's				[FC0] Displays on Sign with CSS.				
17	797573			D3-I80ElkoWest		D3-180EI	koWest		Elko Mtn.				Need a new -48V ITS switch to tie into t	the site battery	backup pe	r-Gary.	
18	797472			D3-I80OsinoWB		D3-1800s	inoWB		Osino W/B Lights				NHP complaining that they can't insert	the X key into t	he locks to	operate	e the s
19	797465								Carlin Tunnels WB Ea	ast AXIS			No Multicast is being pushed out. Came	era is currently	offline. No	Ping	
20	786832								Elko DMS				Tripp Lite UPs firmware update needed	i.			
21	786783								Elko West CCTV				No Multicast				
22	785214								Carlin Tunn. W/B We	est Side			60hz horizontal lines in video stream.				
23	785210			D3-I80CarlinTCab1		D3-I80Ca	rlinTCat	51	Carlin Tunnels Sever	Room			Need to install Web Relay to provide ne	otifications of	generator r	unning,	Failur
24	782433								Carlin tunnel RWIS E	/B			Remove Motorola Canopy radio.				
25	782432								Carlin Server Room				Remove ZTRON and install Web Relay f	or Generator c	ontrols.		
26	779135								ELY				Hi Dean, This is to confirm that you will	need the follo	wing;In the	Front of	ffice o
27	775033			D3-I80WendoverFH		D3-I80W	endover	FH	Wendover Fiber Hut				Follow up on VOIP phone request.				
28	775032			D3-I80WellsYard		D3-I80W	ellsYard		Wells Shop				check available pots for phone install in	n Wells equipm	ent shop.		
29	773619			D3-ElkoServerRoom		D3-ElkoS	erverRo	om	Elko IMC				GE Infinity D Controller with SNMP/SM	TP capability.			
30	772584			D3-ElkoServerRoom		D3-ElkoS	erverRo	om	ALL ITS FIELD DEVICES	5			Need to change all of the new NTP time	a to the new Sy	mmetric St	rata cloo	ck.
31	771993			D3-I80WellsWest		D3-180W	ellsWest	t	Wells West DMS				No Comm to sign. Power shows faults u	up in sign.			
32	771906			D3-I80CarlinTCab5		D3-180Ca	rlinTCat	5	Carlin Tunnel West S	ide East Bou	ind		Flow Detector Not reporting data.				
33	771713	S Trouble	TicketV	D3-I80WellsYard Vork Order Techni	ician Co	D3-I80W mments	ellsYard Additio	onal Notifica	Wells Equipment Sho ations (+)	opp Yard Fib	er Link	: 4	Requesting VOIP phone installed at loca	ation ITS and P	roduction	witch ca	ibinet ≚

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Calendar-based scheduling

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new user, 5/18/2017 5:00:00 PM, Traffic	30 2000, 4/30/2017, 252 1580	01 Israel Lopez, D2 Detector	02 Arjay Cordero, Winter's	03 Mark Aragon, Lovelock	04 5/1/2017, Sandy Spencer	61,4	/28/2017, C	05 losed		06
F Israel Lopez, Reno and Elko KHA	South 1580 of Evit 684	Istations The following	2001, 5/2/2017, 271 Spooper Summit Spooper	Hub and Yard	5/1/2017, Sandy Spencer	, 62, 9	/1/2017, Clo	sed		
servers, Please provide access to KHA	07	08	09	10	11 2000 EMM2047 202	2014	5/40/0047	12		13
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F Gary Molnar, Test, There, 5/15/2017	14 2021, 5/10/2017, 202	15 2022, 5/15/2017, 202	16 Israel Lopez, Reno and	17 Maite Gandiaga, New	18			19		20
2:47:13 PM, Traffic Operations	Facilities ME comos of the	Escilition: Dono Mate Vard 2023, 5/15/2017, 202 Escilitor: Dono Mate Vard	2025, 5/16/2017, 250 ML Dana SD 421 mile cart 7	usor Tost Add now usor 132, 5/17/2017, DPS- NILID Dichard Ruman Had						
✓ Mark Aragon, Duck Hill , Configure a new OS6860· P24 switch to replace the	21	22	23	24	25			26		27
Gary Molnar, Hot Springs ITS Fiber Hut,										
Configure the iDRAC connections for	28	29	30	31	01			02		03
✓ Gary Molnar, Carson City, Setup user accounts for the technicians at IRD, for										
✓ Mark Aragon, Lovelock Hub and Yard, Decommission Cambium PTP 5.8 GHz	04	05	06	07	01	E.		09		10

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314 records .

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User administration

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Logs

Organizations

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	Brien O'Brien		 Manage Users 							E
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	C227 Carson		🖾 C227Carson@dot state nv us			[immegiidered]	(madicanti)		Z Cyst	





Form administration

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Group administration

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Demonstration Workflow scripting



Self-styled reporting



City of Stockton WDID Inspection Report

Map: 5S39C378834

Project Name: Nocal	Logistics			Inspection Date:	05/05/201
Subcontractor Name:	KPRS Construction				
Forman:	Nicholas Schofields		Name:	Marc Belluomini	
Project Address:	4601 Newcastle Rd,	N	Phone #:	949-431-6403	
	Stockton, CA 95215	lag"	Email:	mbelluomini@ctrinves	stors.com
Project Phone:	(714) 476-7142				
Email Address:	nschofield@kprsinc.com				
Start Date:	04/17/2017		Receiving Waters:	Little Johns Creek	
Final Stabilization Date:	10/01/2018				

BMP ID	BMP Item	Photo	Deficiency Note			
NV	No Violations	DSCN9114_14499	None to be reported.			
NV	No Violations	DSCN9115_14500	None to be reported.			

Note: All Stormwater Best Management Practice (BMPs) listed above are products of California Stormwater Quality Association (CASQA) and all corrections must be per specifications. The discharger shall ensure that SWPPPs are written, amended and certified by a Qualified SWPPP Developer (QSD).

Type of	Inspection	Inpector Information			
Inspection Type: ØRoutine - Compliance Inspection Reinspection Post Inpsection	Enforcement Action: Verbal Warning Notice of Violation Ontice to Clean Correction Order Cease and Desist Order	Ricco Ramirez 2500 Navy Dr. Stockton, CA 95206-1191 Office: 209-937-8282 Cell: 209-993-1449 Fax: 209-937-8137 E-mail: ricco.ramirez@stocktongov.com			
Weather: Sunny	 Violation Warning Notice Stop Work Order 	Representative Signature:			



Future

Additional Development & Software Dashboard







Additional Development & Software Mobile App







Future

Additional Development & Software

- Barcode Reader
- Enterprise Asset Management



