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## **TRWC Board of Directors Meeting – Conference Call**

February 21, 2019 - 1:00 p.m.

Video Conference: <https://global.gotomeeting.com/join/342586733>

Audio Bridge: 1-872-240-3212, Access Code 342-586-733

### *Public Attendance Access Only:*

Queen Creek Municipal Services Building

Saguaro Room

22358 S Ellsworth Rd

Queen Creek, AZ 85142

Members of the public may address the Board on any item. Please complete a “Request to Speak Card”, located at the entry of the room and promptly turn it in to the Executive Director or designee prior to the beginning of the meeting. There is a time limit of three minutes for comments.

### **Agenda**

1) Call to Order and Opening Comments

- a. Materials and sign-in sheet (public attendance access only)
- b. Speaker cards (public attendance access only)
- c. Audio and video recording
- d. Board representative roll-call
- e. Announcement of other teleconference participants
- f. Teleconference protocol and Super-Majority procedures (Bill Anger)

2) Public Comment

Members of the public may address the Board on items not on the printed agenda. Please complete a “Request to Speak Card”, located at the entry of the room and promptly turn it in to the Executive Director or designee prior to the beginning of the meeting. There is a time limit of three minutes for comments.

3) Discussion and Action on Board Meeting Minutes

September 6, 2018 Board Meeting Minutes

4) Discussion and Possible Action on FY19/20 Proposed Budget – Jared Hansen, Dale Shaw

- Requires Super-Majority Approval

5) Discussion and Possible Action on Network Administrator Updates

- a. Finance Update – Jared Hansen
- b. Network Updates and Performance Overview – Randy Thompson

6) Comments from the Board

An opportunity will be provided for Board members to present a brief summary of current events. The Board is not allowed to propose, discuss, deliberate or take action at the meeting on any matter in the summary, unless the specific matter is properly noticed for legal action.

7) Next TRWC Board Meetings:

All meetings are currently scheduled from 9:00 a.m. to 11:00 a.m. at PMGA.

2019 Schedule

Date	Upcoming Agenda Items
05/09/19	
09/12/19	- Chairman & Vice-Chairman Elections - FY20/21 Preliminary Budget Review
12/12/19	- FY20/21 Budget Adoption

8) Adjournment



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## **TRWC Board of Director's Meeting Minutes**

September 6, 2018 - 9:00 a.m.

Phoenix-Mesa Gateway Airport (PMGA)

Administration Building, Board Room

5835 S. Sossaman Road

Mesa, AZ 85212

Video Conference: <https://global.gotomeeting.com/join/668758453>

Audio Bridge: 1-571-317-3122, Access Code 668-758-453

Members of the public may address the Board on any item. Please complete a "Request to Speak Card", located at the entry of the room and promptly turn it in to the Executive Director or designee prior to the beginning of the meeting. There is a time limit of three minutes for comments.

### **Agenda**

#### 1) Call to Order and Opening Comments

- a. [Materials](#) and sign-in sheet
- b. Speaker cards
- c. Audio and video recording
- d. TRWC 10-year Anniversary

Chairman Kross called the meeting to order with a quorum of four and welcomed the attendees, provided instruction on the process for public comment and reminded the participants the meeting is audio recorded.

Chairman Kross thanked the Board Members for their time and talents and commended the supporting advisory committee members supporting this cooperative for the past 10-years. A tremendous staff as well that makes these meetings happen and everything in between that is critical to the success of this organization.

Thank you to Cheryl Noll for the organization and distribution of the 10-year anniversary shirts. If you didn't get a shirt or a patch please see her.

John Pombier added that he concurs with Chairman Kross's comments regarding the support of the staff, they do an amazing job making these meetings very easy for us to do. No group does anything without good leadership and as long as he has been on the Board, our chair has been John Kross. His leadership, guidance and direction has made this a very easy process for the Board, making collaboration a key element for what we do.

Mike Farber stated he chose Chairman Kross as a mentor by watching how he handles things and he has never been more prepped for a meeting than he is on this Board. The entire staff is great.

Staff joined Chairman Kross for a commemorative picture for the website in recognition of the 10-year anniversary of TRWC.

#### 2) Public Comment

Members of the public may address the Board on items not on the printed agenda. Please complete a "Request to Speak Card", located at the entry of the room and promptly turn it in to the Executive Director or designee prior to the beginning of the meeting. There is a time limit of three minutes for

comments.

No public comment requests were received.

3) Discussion and Action on Board Meeting Minutes

March 15, 2018 Board Meeting Minutes

John Pombier motioned to approve the 3/15/18 TRWC Board Meeting Minutes and Mike Farber seconded. All Board members who were in favor signaled by saying aye; there was no opposition, the motion passed unanimously.

4) Discussion and Possible Action on FY 19/20 Preliminary Budget - Dale Shaw & Jared Hansen

Dale Shaw stated that in December there is a Board Meeting and at that time we will seek action on this proposed budget. Jared Hansen presented an overview of the FY 19/20 Proposed Budget as provided in the meeting materials.

Dale Shaw stated staff is available to answer any questions the Board may have before the next meeting in December.

5) Discussion and Action on New IGA and Governance Adoption - Dale Shaw & Bill Anger

Dale Shaw reviewed the New IGA Governance Adoption memo provided in the meeting materials.

Bill Anger reviewed the PowerPoint presentation viewed at the meeting discussing the TRWC IGA and Governance History including the background between TRWC and RWC and the New Governance Agreement Summary.

Upon TRWC Board approval, each TRWC member agency will then carry the new governance material forward for their respective governing body approval and official execution by the suggested December 1, 2018 effective date. This will allow for the expected consideration of the member admission of Salt River Pima Maricopa Indian Community (SRPMIC), which is planned for the December 13, 2018 TRWC Board Meeting. This material was given to all the memberships' legal teams for review. Staff is available to review the agreement with Board Members before the December 13, 2018 meeting.

Mike Farber motioned to approve the Second Amendment to the Amended and Restated Intergovernmental Agreement to Plan, Design, Construct, Operate, Maintain and Finance the TOPAZ Regional Wireless Cooperative Network, including any non-substantive changes. Jay Ducote seconded. All Board members who were in favor signaled by saying aye; there was no opposition, the motion passed unanimously.

6) Discussion and Possible Action on SRPMIC Membership - Dale Shaw & Bill Anger

Dale Shaw stated at the next Board Meeting the Board could entertain an action to add Salt River Community as a member of the TRWC. They are in the process of finalizing an agreement with the City of Mesa to receive dispatch services from the City of Mesa and in conjunction with that, their membership is required. They also are looking to work with the TRWC in the areas of hazard zone communications as well. They are aware they would be subject to the new governance agreement as adopted and anticipate after this meeting they will be moving through that process internally. They would need to adopt it in full to exercise that option.

7) FirstNet Update – Amos Chalmers – AT&T/FirstNet

Amos Chalmers gave an update on FirstNet. Adoption across the United States has increased, and they are at approximately 165,000 folks in 2,600 agencies across the US. In Arizona they have 1,311 folks on FirstNet and those numbers will jump in the near future. The build out is starting to manifest. Those towers that they started to build in August last year will come on line this winter. However, Arizona negotiated 40 additional towers in order to opt-in, of those 40, eight are built now and four more will be built before the end of the year and double that by the end of next year.

More significant is the addition of band 14, the spectrum that goes coast to coast, border to border and nobody else is on it. It will be put on the new sites and will go back to the hundreds of sites in AZ and they will add capacity for public safety. Over 650 are done so far providing a big capacity and coverage increase.

Small Cells, (5G) these are close to the roadway, very small and super high speed, up to 600 -

Hundreds are rolling out in major cities in AZ. That is the predicate for 5G, this is the hardware piece. The state also negotiated to have a disaster recovery asset truck with a giant satellite dish, available 24/7, located in the East Valley (Mesa). Another one is going up in Flagstaff. It has several miles of coverage, dependent on where it is located.

John Pombier asked if there was an outage, how long the outage would be expected. Amos stated the network was built for public safety. They are required to be up 99.99% of the time by the Federal Government. If a tower goes down, you are often not even aware because it is fed by 4-5 other tower locations. However, it will take time to get the employee to the rig, the rig to the location and the truck set up.

Amos introduced Dave Falkner who works for the Department of Commerce as a Sr. Public Safety Advisor for FirstNet. Mike Poth, CEO for FirstNet announced his resignation and Ed Horowitz was appointed as Chairman of the Board.

8) Discussion and Possible Action on Committee and Working Group Updates

a. CSAA Coordinating Council – John Pombier & Dale Crogan

John Pombier stated the CSAA met on July 31, to start the discussion on how this coordinating council would work. Set focus areas for the group including how to save money on contracts for the group, awareness; better share the usability of the networks throughout the region; joint meeting with TRWC and RWC to coordinate regional strategic planning, streamline policies for both groups to mirror each other and roaming issues.

b. Executive Committee Update – Bob Badgett (Co-chair)

Bob Badgett thanked everyone for working together on the new governance agreement. There were many meetings with many involved. John Locklin with the City of Mesa provided much needed historical information.

The last few years have been fire centric. There are some police needs that will be addressed in the upcoming years, please be sure that you are well represented at our meetings with your police personnel.

Bill Peters is no longer the co-chair and he has nominated Darin Douglas for this position. Chief Badgett will meet with Darin to discuss how to proceed.

c. User Group Update – Dale Crogan

Dale Crogan stated their goal for this fall is to bring law enforcement in to find their needs for the system. John Pombier asked that they meet with Maricopa County Sheriff's office and get an update for the coordination of these systems.

9) Discussion and Possible Action on Network Administrator Updates

a. Finance Update – Jared Hansen

Jared Hansen presented a financial update as provided in the meeting materials.

b. Network Updates and Performance Overview – Randy Thompson

Randy Thompson gave a summary review of the Capital Projects and Operations Summary Staff Report as provided in the meeting materials.

10) Comments from the Board

An opportunity will be provided for Board members to present a brief summary of current events. The Board is not allowed to propose, discuss, deliberate or take action at the meeting on any matter in the summary, unless the specific matter is properly noticed for legal action.

11) Next TRWC Board Meetings:

All meetings are currently scheduled from 9:00 a.m. to 11:00 a.m. at PMGA.

Date	Upcoming Agenda Items
12/13/18	<ul style="list-style-type: none"> <li>- FY19/20 Budget Adoption</li> <li>- SRPMIC Membership Approval</li> </ul>

2019 Schedule

Date	Upcoming Agenda Items
03/14/19	
05/09/19	
09/12/19	<ul style="list-style-type: none"> <li>- Chairman &amp; Vice-Chairman Elections</li> <li>- FY20/21 Preliminary Budget Review</li> </ul>
12/12/19	<ul style="list-style-type: none"> <li>- FY20/21 Budget Adoption</li> </ul>

12) Adjournment



**Date:** February 21, 2019  
**To:** Topaz Regional Wireless Cooperative (TRWC) Board of Directors  
**From:** Dale Shaw, TRWC Executive Director  
Bob Badgett, TRWC Executive Committee Co-chairman  
Darin Douglass, TRWC Executive Committee Co-chairman  
**Subject:** Fiscal Year 2019/2020 Budget

### **Recommendation**

The TRWC Executive Director and Executive Committee recommend the approval of the Proposed TRWC Budget (attached) in the amount of \$4,036,292 for Fiscal Year 2019/2020.

### **Background & Discussion**

The attached Proposed Budget for Fiscal Year 2019/2020 has been under review and endorsed by the TRWC Executive Committee. When compared to the current 2018/2019 Fiscal Year Budget, the proposed Operating & Maintenance expenses will increase by \$95,019 (primarily due to Motorola services, utilities, and training cost increases) and Capital will decrease by \$200,239 for planned improvements - with a net overall Budget decrease of \$105,220.

### **Fiscal Impact**

The Proposed Budget represents the total planned contribution by all member agencies for the ongoing operation, maintenance, and improvement of the TRWC radio network. Each member agency will be invoiced as actual expenditures occur on a monthly basis using the cost allocation methodology outlined in the Proposed Budget.

**TRWC Operating & Maintenance Budget  
Summary of Labor and Non-labor**

<b>FY 18/19 ENDORSED BUDGET CORRECTED</b>	<b>FY 19/20 PROPOSED BUDGET</b>	<b>CHANGE FY18/19 to FY19/20</b>
		1.90%
\$ 390,840	\$ 398,266	\$ 7,426
<b>\$ 390,840</b>	<b>\$ 398,266</b>	<b>\$ 7,426</b>

**ESCALATION FACTOR**

Salaries and Wages  
**Total Labor**

**ESCALATION FACTOR**

**GENERAL & ADMINISTRATIVE - OTHER SERVICES**

			1.90%
Temp Services	\$ 6,000	\$ 6,114	\$ 114
Prof Services - TRWC Executive Director	88,500	90,182	1,681
Prof Services - Legal	37,000	37,703	703
Prof Services - Consulting & Other	15,000	15,285	285
Ins. Premiums - Agencies	8,500	8,662	162
Utilities	60,000	70,000	10,000
Telephone	3,400	3,465	65
Repairs & Maint	31,000	31,589	589
Equipment Usage (Vehicles)	20,000	20,380	380
Shaw Butte & Florence Gardens	25,300	25,781	481
Training	-	10,000	10,000
All Other Services	-	-	-
<b>TOTAL OTHER SERVICES</b>	<b>\$ 294,700</b>	<b>\$ 319,159</b>	<b>\$24,459</b>

**GENERAL & ADMINISTRATIVE - COMMODITIES**

Non Cap Assets	\$ 25,000	25,475	\$ 475
Contract - Motorola (Preventative & Security Monitoring)	957,200	1,012,200	55,000
Software Maint-Mainsaver, Juniper	22,500	22,928	427
Materials & Repair Parts	20,460	20,849	389
All Other Commodities	-	-	-
<b>TOTAL COMMODITIES</b>	<b>\$ 1,025,160</b>	<b>\$ 1,081,451</b>	<b>\$56,291</b>

**OTHER BUDGET ITEMS**

<b>PROPOSED CONTINGENCY - 3%</b>	\$ 51,321	\$ 53,966	\$ 2,645
<b>VHF OPERATIONS (special assessment)</b>	120,138	123,813	3,675
<b>VHF Equipment Staff Time (special assessment)</b>	27,500	28,023	522
<b>TOTAL OTHER BUDGET ITEMS</b>	<b>\$ 198,959</b>	<b>\$ 205,802</b>	<b>\$ 6,843</b>

**Total Operating & Maintenance**

<b>\$ 1,909,659</b>	<b>\$ 2,004,678</b>	<b>\$95,019</b>
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**O&M - AIRTIME PERCENTAGE (1)**

Mesa	71.33%	68.54%	-2.79%
Gilbert	16.48%	17.79%	1.31%
Apache Junction	8.20%	9.00%	0.80%
Ft McDowell	1.88%	2.11%	0.23%
Superstition Fire & Medical	0.75%	1.06%	0.31%
Queen Creek	0.46%	0.41%	-0.05%
Rio Verde	0.03%	0.03%	0.00%
Southwest Ambulance	0.71%	0.87%	0.16%
American Medical Response	0.16%	0.19%	0.03%
<b>Total</b>	<b>100.00%</b>	<b>100.00%</b>	<b>0.00%</b>

**VHF SPECIAL ASSESSMENT (2,3)**

Mesa Fire & Medical	66.85%	68.68%	1.83%
Gilbert Fire	18.81%	17.16%	-1.65%
Superstition Fire & Medical	8.11%	10.01%	1.90%
Queen Creek Fire	5.73%	3.22%	-2.51%
Rio Verde Fire	0.50%	0.93%	0.43%
<b>Total</b>	<b>100.00%</b>	<b>100.00%</b>	<b>0.00%</b>

**ANNUAL ESTIMATED REVENUE: OPERATING & MAINTENANCE**

Mesa	1,355,546	1,374,219	18,673
Gilbert	318,152	355,676	37,524
Apache Junction	144,486	166,756	22,270
Ft McDowell	33,126	39,095	5,969
Superstition Fire & Medical	25,189	34,839	9,650
Queen Creek	16,565	12,486	(4,079)
Rio Verde	1,267	1,968	701
Southwest Ambulance	12,510	16,120	3,609
American Medical Response	2,819	3,520	701
<b>Total</b>	<b>\$ 1,909,659</b>	<b>\$ 2,004,678</b>	<b>\$95,019</b>

(1) Normal partner assessments are allocated based on July, 2018 6-month rolling average airtime and will change based on actual monthly data.

(2) For FY 18/19 Endorsed Budget, agency cost distribution for the Fire Hazard Zone Communication (VHF) Special Assessment is based on 12 months average Airtime as of March 31, 2015.

(3) For FY 19/20 Proposed Budget, agency cost distribution for the Fire Hazard Zone Communication (VHF) Special Assessment is based on Call Volume July 1, 2017 - June 30, 2018.



**TRWC Capital Budget Plan**

	PROJECT ID	ENDORSED	PROPOSED	FORECASTED							TOTAL	
		FY 18/19	FY19/20	FY 20/21	FY 21/22	FY 22/23	FY 23/24	FY 24/25	FY 25/26	FY 26/27	9 Years	
TOPAZ Voice Radio Network Upgrade	CN0022	\$ 433,828	\$ 433,828	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 867,656
Southeast Queen Creek Expansion Site	CP0091	-	-	574,063	988,024	-	-	-	-	-	-	1,562,087
Wireless Backhaul (Microwave) Network Upgrade	CP0093	-	-	-	-	-	-	-	-	-	-	-
System-of-Systems Networking	CP0438	619,500	-	-	-	-	-	-	-	-	-	619,500
Southeast Apache Junction Expansion Site	CP0754	-	-	-	590,276	1,013,847	-	-	-	-	-	1,604,123
Internet Protocol Network Routers & Switches Expansion	CP0755	464,625	-	-	-	-	-	-	-	-	-	464,625
Northeast Mesa Expansion Site	CP0779	-	-	-	-	605,703	1,040,515	-	-	-	-	1,646,218
Interface for non-Motorola Dispatch Console	CP0812	-	-	-	-	-	-	-	-	-	330,179	330,179
Automated Billing & Upgrade Management Tools	CP0813	-	-	-	-	-	-	-	-	325,919	334,438	660,357
System-of-Systems Networking Expansion	CP0905	-	396,480	247,800	247,800	247,800	-	-	-	-	-	1,139,880
Upgrade Shaw Butte and Florence Gardens to P25 Phase II (TDMA)	CP0906	-	287,406	287,406	-	-	-	-	-	-	-	574,812
Florence Gardens ISR Site Lifecycle upgrade	LF0224	354,000	-	-	-	-	-	-	-	-	-	354,000
Radio Sites Emergency Power Upgrade	LF0226	106,200	106,200	106,200	106,200	106,200	-	-	-	-	-	531,000
Communications Building UPS Battery Replacement	LF0228	17,700	-	-	-	-	17,700	-	-	-	-	35,400
Internet Protocol Network Routers & Switches Upgrade	LF0248	-	-	-	-	-	-	-	-	-	-	-
Radio & Core Sites Battery Backup Lifecycle Upgrade	LF0266	-	-	-	-	-	-	94,400	94,400	94,400	-	283,200
Radio & Core Sites DC Power Plant Lifecycle Upgrade	LF0267	-	-	-	-	-	-	-	-	-	377,600	377,600
Antenna & Transmission Lines Lifecycle Upgrade	LF0282	236,000	236,000	-	-	-	-	-	-	-	-	472,000
TOPAZ Voice Radio Network Lifecycle Upgrade		-	-	-	-	-	-	-	-	-	-	-
Consulting Services for VHF & 7/800 MHz Coverage Expansion		-	200,000	-	-	-	-	-	-	-	-	200,000
<b>Sub-total</b>		<b>2,231,853</b>	<b>1,659,914</b>	<b>1,215,469</b>	<b>1,932,300</b>	<b>1,973,550</b>	<b>1,058,215</b>	<b>94,400</b>	<b>420,319</b>	<b>1,136,617</b>	<b>11,722,637</b>	
Fire Hazard Zone System Coverge Improvement and Expansion	CP0907	-	371,700	371,700	371,700	371,700	371,700	371,700	371,700	371,700	371,700	2,973,600
Fire Hazard Zone System Lifecycle Upgrade		-	-	-	-	-	-	-	-	-	-	-
SRPMIC Fire Hazard Zone Coverage Expansion		-	-	-	-	-	-	-	-	-	-	-
FMYN Fire Hazard Zone Coverage Expansion		-	-	-	-	-	-	-	-	-	-	-
<b>Sub-total VHF Special Assessment Projects</b>		<b>-</b>	<b>371,700</b>	<b>371,700</b>	<b>371,700</b>	<b>371,700</b>	<b>371,700</b>	<b>371,700</b>	<b>371,700</b>	<b>371,700</b>	<b>371,700</b>	<b>2,973,600</b>
<b>Total Capital &amp; Fire Special Assessment Projects</b>		<b>\$ 2,231,853</b>	<b>\$ 2,031,614</b>	<b>\$ 1,587,169</b>	<b>\$ 2,304,000</b>	<b>\$ 2,345,250</b>	<b>\$ 1,429,915</b>	<b>\$ 466,100</b>	<b>\$ 792,019</b>	<b>\$ 1,508,317</b>	<b>\$ 14,696,237</b>	
<b>Capital Assessment to Members</b>												
Mesa	69.28%	1,605,952	1,149,988	842,077	1,338,697	1,367,275	733,131	65,401	291,199	787,449	8,181,169	
Gilbert	17.98%	371,038	298,453	218,541	347,428	354,844	190,267	16,973	75,573	204,364	2,077,481	
Apache Junction	9.09%	184,618	150,886	110,486	175,646	179,396	96,192	8,581	38,207	103,318	1,047,330	
Ft McDowell	2.13%	42,327	35,356	25,889	41,158	42,037	22,540	2,011	8,953	24,210	244,481	
Superstition Fire & Medical	1.07%	16,886	17,761	13,006	20,676	21,117	11,323	1,010	4,497	12,162	118,438	
Queen Creek	0.42%	10,357	6,972	5,105	8,116	8,289	4,445	396	1,765	4,774	50,219	
Rio Verde	0.03%	675	498	365	580	592	317	28	126	341	3,522	
<b>Sub-total</b>	<b>100.00%</b>	<b>2,231,853</b>	<b>1,659,914</b>	<b>1,215,469</b>	<b>1,932,301</b>	<b>1,973,550</b>	<b>1,058,215</b>	<b>94,400</b>	<b>420,320</b>	<b>1,136,618</b>	<b>11,722,640</b>	
<b>VHF Special Assessment</b>												
Mesa Fire & Medical	68.68%	-	255,283	255,284	255,284	255,284	255,284	255,284	255,284	255,284	2,042,271	
Gilbert Fire	17.16%	-	63,784	63,784	63,784	63,784	63,784	63,784	63,784	63,784	510,272	
Superstition Fire & Medical	10.01%	-	37,207	37,207	37,207	37,207	37,207	37,207	37,207	37,207	297,656	
Queen Creek Fire	3.22%	-	11,969	11,969	11,969	11,969	11,969	11,969	11,969	11,969	95,752	
Rio Verde Fire	0.93%	-	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	27,656	
<b>Sub-total</b>	<b>100.00%</b>	<b>-</b>	<b>371,700</b>	<b>371,701</b>	<b>371,701</b>	<b>371,701</b>	<b>371,701</b>	<b>371,701</b>	<b>371,701</b>	<b>371,701</b>	<b>2,973,607</b>	
<b>Total Capital + Fire Special Assessment</b>												
Mesa		1,605,952	1,405,271	1,097,361	1,593,981	1,622,559	988,415	320,685	546,483	1,042,733	10,223,440	
Gilbert		371,038	362,237	282,325	411,212	418,628	254,051	80,757	139,357	268,148	2,587,753	
Apache Junction		184,618	150,886	110,486	175,646	179,396	96,192	8,581	38,207	103,318	1,047,330	
Ft McDowell		42,327	35,356	25,889	41,158	42,037	22,540	2,011	8,953	24,210	244,481	
Superstition Fire & Medical		16,886	54,968	50,213	57,883	58,324	48,530	38,217	41,704	49,369	416,094	
Queen Creek		10,357	18,941	17,074	20,085	20,258	16,414	12,365	13,734	16,743	145,971	
Rio Verde		675	3,955	3,822	4,037	4,049	3,774	3,485	3,583	3,798	31,178	
<b>Total</b>		<b>2,231,853</b>	<b>2,031,614</b>	<b>1,587,170</b>	<b>2,304,002</b>	<b>2,345,251</b>	<b>1,429,916</b>	<b>466,101</b>	<b>792,021</b>	<b>1,508,319</b>	<b>14,696,247</b>	

**TRWC Operating & Maintenance Budget  
Summary of Labor and Non-labor**

	FY 18/19	FY 19/20 PROPOSED BUDGET	FORECAST				
	ENDORSED BUDGET CORRECTED		FY 20/21	FY 21/22	FY 22/23	FY 23/24	FY 24/25
<b>ESCALATION FACTOR</b>		1.90%	1.90%	2.30%	3.00%	3.00%	3.00%
Salaries and Wages	\$ 390,840	\$ 398,266	\$ 405,833	\$ 415,167	\$ 427,622	\$ 440,451	\$ 453,664
<b>Total Labor</b>	\$ 390,840	\$ 398,266	\$ 405,833	\$ 415,167	\$ 427,622	\$ 440,451	\$ 453,664
<b>ESCALATION FACTOR</b>		1.90%	1.90%	1.90%	1.90%	1.90%	1.90%
<b>GENERAL &amp; ADMINISTRATIVE - OTHER SERVICES</b>							
Temp Services	\$ 6,000	\$ 6,114	\$ 6,230	\$ 6,349	\$ 6,469	\$ 6,592	\$ 6,717
Prof Services - TRWC Executive Director	88,500	90,182	91,895	93,641	95,420	97,233	99,081
Prof Services - Legal	37,000	37,703	38,419	39,149	39,893	40,651	41,424
Prof Services - Consulting & Other	15,000	15,285	15,575	15,871	16,173	16,480	16,793
Ins. Premiums - Agencies	8,500	8,662	8,826	8,994	9,165	9,339	9,516
Utilities	60,000	70,000	71,330	72,685	74,066	75,474	76,908
Telephone	3,400	3,465	3,530	3,598	3,666	3,736	3,806
Repairs & Maint	31,000	31,589	32,189	32,801	33,424	34,059	34,706
Equipment Usage (Vehicles)	20,000	20,380	20,767	21,162	21,564	21,974	22,391
Shaw Butte & Florence Gardens	25,300	25,781	26,271	26,770	27,278	27,797	28,325
Training	-	10,000	10,190	10,384	10,581	10,782	10,987
All Other Services	-	-	-	-	-	-	-
<b>TOTAL OTHER SERVICES</b>	\$ 294,700	\$ 319,159	\$ 315,033	\$ 321,019	\$ 327,118	\$ 333,334	\$ 339,667
<b>GENERAL &amp; ADMINISTRATIVE - COMMODITIES</b>							
Non Cap Assets	\$ 25,000	25,475	\$ 25,959	\$ 26,452	\$ 26,955	\$ 27,467	\$ 27,989
Contract - Motorola (Preventative & Security Monitoring)	957,200	1,012,200	1,136,531	1,156,761	1,177,351	1,189,125	1,201,016
Software Maint-Mainsaver,Juniper	22,500	22,928	23,363	23,807	24,259	24,720	25,190
Materials & Repair Parts	20,460	20,849	21,245	21,649	22,060	22,479	22,906
All Other Commodities	-	-	-	-	-	-	-
<b>TOTAL COMMODITIES</b>	\$ 1,025,160	\$ 1,081,451	\$ 1,207,098	\$ 1,228,669	\$ 1,250,625	\$ 1,263,791	\$ 1,277,101
<b>OTHER BUDGET ITEMS</b>							
<b>PROPOSED CONTINGENCY - 3%</b>	\$ 51,321	\$ 53,966	\$ 57,839	\$ 58,946	\$ 60,161	\$ 61,127	\$ 62,113
<b>VHF OPERATIONS (special assessment)</b>	120,138	123,813	127,567	131,404	135,326	139,386	143,567
<b>VHF Equipment Staff Time (special assessment)</b>	27,500	28,023	28,555	29,097	29,650	30,214	30,788
<b>TOTAL OTHER BUDGET ITEMS</b>	\$ 198,959	\$ 205,802	\$ 213,961	\$ 219,447	\$ 225,137	\$ 230,727	\$ 236,468
<b>Total Operating &amp; Maintenance</b>	\$ 1,909,659	\$ 2,004,678	\$ 2,141,925	\$ 2,184,302	\$ 2,230,503	\$ 2,268,302	\$ 2,306,900
<b>O&amp;M - AIRTIME PERCENTAGE (1)</b>							
Mesa	71.33%	68.54%	68.54%	68.54%	68.54%	68.54%	68.54%
Gilbert	16.48%	17.79%	17.79%	17.79%	17.79%	17.79%	17.79%
Apache Junction	8.20%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%
Ft McDowell	1.88%	2.11%	2.11%	2.11%	2.11%	2.11%	2.11%
Superstition Fire & Medical	0.75%	1.06%	1.06%	1.06%	1.06%	1.06%	1.06%
Queen Creek	0.46%	0.41%	0.41%	0.41%	0.41%	0.41%	0.41%
Rio Verde	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%
Southwest Ambulance	0.71%	0.87%	0.87%	0.87%	0.87%	0.87%	0.87%
American Medical Response	0.16%	0.19%	0.19%	0.19%	0.19%	0.19%	0.19%
<b>Total</b>	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
<b>VHF SPECIAL ASSESSMENT (2)</b>							
Mesa Fire & Medical	66.85%	68.68%	68.68%	68.68%	68.68%	68.68%	68.68%
Gilbert Fire	18.81%	17.16%	17.16%	17.16%	17.16%	17.16%	17.16%
Superstition Fire & Medical	8.11%	10.01%	10.01%	10.01%	10.01%	10.01%	10.01%
Queen Creek Fire	5.73%	3.22%	3.22%	3.22%	3.22%	3.22%	3.22%
Rio Verde Fire	0.50%	0.93%	0.93%	0.93%	0.93%	0.93%	0.93%
<b>Total</b>	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
<b>ANNUAL ESTIMATED REVENUE: OPERATING &amp; MAINTENANCE</b>							
Mesa	\$ 1,355,546	\$ 1,374,219	\$ 1,468,294	\$ 1,497,345	\$ 1,529,018	\$ 1,554,932	\$ 1,581,393
Gilbert	318,152	355,676	380,065	387,576	395,767	402,462	409,299
Apache Junction	144,486	166,756	178,722	182,142	185,897	188,883	191,929
Ft McDowell	33,126	39,095	41,900	42,702	43,583	44,283	44,997
Superstition Fire & Medical	25,189	34,839	36,677	37,518	38,409	39,223	40,058
Queen Creek	16,565	12,486	13,169	13,466	13,781	14,066	14,358
Rio Verde	1,267	1,968	2,048	2,100	2,154	2,207	2,261
Southwest Ambulance	12,510	16,120	17,276	17,607	17,970	18,259	18,553
American Medical Response	2,819	3,520	3,773	3,845	3,925	3,988	4,052
<b>TOTAL</b>	\$ 1,909,659	\$ 2,004,678	\$ 2,141,925	\$ 2,184,302	\$ 2,230,503	\$ 2,268,302	\$ 2,306,900

(1) Normal partner assessments are allocated based on the July 2018 6-month rolling average airtime and will change based on actual monthly data.

(2) For the FY18/19 Endorsed Budget, agency cost distribution for the Fire Hazard Zone Communication (VHF) Special Assessment is based on 12 months average Airtime as of March 31, 2015.

(3) For the FY19/20 Proposed Budget, agency cost distribution for the Fire Hazard Zone Communication (VHF) Special Assessment is based on Call Volume from July 1, 2017 - June 30, 2018.



## Capital Plan for FY19/20 to FY26/27

This plan provides a narrative of the projects forecast for the TOPAZ Regional Wireless Cooperative for the fiscal years of 2019/2020 through 2026/2027. Projects beyond fiscal year 2026/2027 are included for planning and visibility.

### Projects Funded for FY18/19

**TOPAZ Voice Radio Network Lifecycle Upgrade** **Project No. CN0022** **\$7,169,138**

**Timeframe: Project Complete – ongoing lease payments only**

This project provided a lifecycle upgrade to the TOPAZ 800 MHz voice radio network infrastructure, re-banded the radio frequencies utilized by the TRWC to comply with Federal Communications Commission rules, and added the backup capability for the Master Site (Dynamic Site Resiliency, DSR) and the geo-redundant Prime Site for the simulcast cell. This project is complete but appears on the TRWC Capital Plan because it was funded through a lease-purchase arrangement. The remaining lease payments (\$433,828 each) are due in July 2018 and July 2019.

**Wireless Backhaul (Microwave) Network Lifecycle Upgrade** **Project No. CP0093** **\$306,350**

**Timeframe: Project Complete except for punchlist items and final payment**

The wireless backhaul or point-to-point microwave radio network connects the radio sites used by the TRWC into a network. The radio signals received from the radio sites are transported to a central location for processing and then transported back to each radio site for transmission to field units. The former equipment in this network was obsolete and on best-effort support by the manufacturer and utilized technology that was obsolete and inefficient in transporting the data to and from the radio sites. The new wireless backhaul equipment will transport the signals with technology that matches the other network components, improving efficiency. The total project cost was \$612,700, with the cost shared equally between the TRWC members (including the City of Mesa) and the City of Mesa (Mesa pays about 87.5% of the total project cost). [This purchase was approved for the TRWC Administrative Manager by the Mesa City Council at their May 8, 2017, meeting.](#) The completion of the punchlist items and final payment are forecast for September and October 2018, respectively.

**System-of-Systems Networking** **Project No. CP0438** **\$619,500**

**Timeframe: July 1, 2018 to June 30, 2019**

System-of-systems networking is a method for radio networks such as the TRWC to connect with other similar radio networks to allow handheld and vehicle-mounted radios to “roam” from system to system and utilize the resources in the other system to communicate with users in both the home and visited systems. Possible applications of this type of networking would be for the TRWC to network with the (Phoenix) Regional Wireless Cooperative, Maricopa or Pinal Counties, or the Arizona Department of Public Safety, for example. This would allow TRWC users to roam into those systems and talk back to units in the TRWC service area and the other system’s service area, and units from the other system to roam into the TRWC service area to utilize resources on the TRWC network to talk back to their system as well as users in radio coverage of the TRWC network. In addition, the system-of-systems networking will enable direct connection to push-to-talk services offered by cellular carriers such as Verizon Wireless and the First Responder Network Authority (FirstNet) through AT&T. The connection to the cellular network(s) will enable nationwide roaming capabilities. Not all system talkgroups (channels) would have this capability. The current technology for system-of-systems networking (Motorola Solutions Inter Sub-Site Interface (ISSI) 8000) allows users to move from one system to the other automatically, without user action. [This](#)



## Capital Plan for FY19/20 to FY26/27

[purchase was approved for the TRWC Administrative Manager by the Mesa City Council at their June 18, 2018, meeting.](#)

In addition to the initial purchase of the software and licensing already approved, there will be ongoing licensing costs as we connect to other Public Safety voice networks. These costs are forecast in future years. These costs are listed under CP0905 System-of-Systems Networking Expansion.

**Internet Protocol Routers & Switches Expansion**                      **Project No. CP0755**        **\$464,525**  
**Timeframe: October 1, 2018 to June 30, 2019**

Internet Protocol (IP) network routers and switches direct the communications between the TOPAZ radio sites and the TOPAZ infrastructure. They also redirect those communications if there is a failure in the network that connects the TOPAZ radio sites and infrastructure together. When the TOPAZ Lifecycle Upgrade was implemented, there were some sites that did not have routers to direct/redirect the radio traffic. In those cases, other network components were configured to provide some of the direction/redirection of the radio traffic, but this is not the best way to implement these capabilities, and it has resulted in some unexpected network behavior and unscheduled impairments to the TOPAZ network. To mitigate these unscheduled impairments to the TOPAZ network, the proper equipment will be installed at all TOPAZ sites to provide full network direction/redirection capabilities for the TOPAZ radio sites.

**Florence Gardens TOPAZ ISR Site Lifecycle Upgrade**                      **Project No. LF0224**        **\$354,000**  
**Timeframe: July 1, 2018 to December 31, 2018**

The Florence Gardens Intelligent Site Repeater (ISR) provides TOPAZ wide-area service to the area around Florence for the City of Mesa Gas Utility Magma Gas Service Area, and the Apache Junction Police Department for communications when transporting prisoners to the Pinal County Jail. The Florence Gardens ISR was put in service in October 2016, with equipment that was removed from the Thompson Peak site that is over 15 years old. This equipment is obsolete and will require upgrading to maintain compatibility with the TOPAZ network infrastructure software. [This purchase was approved for the TRWC Administrative Manager by the Mesa City Council at their June 18, 2018, meeting.](#)

**Radio Sites Emergency Power Lifecycle Upgrade**                      **Project No. LF0226**        **\$531,000**  
**Timeframe: two sites annually, July 1, 2018 to June 30, 2023**

Each TOPAZ radio site is equipped with an emergency generator to supply electrical power in the event of a commercial alternating current (AC) power failure. Except for a few sites, the generators are at least 15 years old, and several are much older. Because these generators sit outdoors in our desert environment, they need to be replaced periodically to ensure they start and run when there is loss of power. The plan is to replace the emergency generators at two radio sites each fiscal year, beginning in FY18/19, and finishing in FY24/25. This item is budgeted at \$106,200 per year for each of the 5 fiscal years of the replacement plan.

**Communications Building UPS Battery Lifecycle Replacement**                      **Project No. LF0228**        **\$35,400**  
**Timeframe: April 1, 2019 to June 30, 2019**

The City of Mesa Communications Building includes an Uninterruptible Power Supply (UPS) that keeps critical equipment operational during a power failure while the building emergency generators are starting. This UPS relies on batteries to store the energy required to keep the critical electronic systems



## Capital Plan for FY19/20 to FY26/27

functioning without interruption. These batteries require replacement every four years, with the cost shared equally between the TRWC members (including the City of Mesa) and the City of Mesa (Mesa pays about 87.5% of the total project cost).

### **Internet Protocol Network Routers & Switches Lifecycle Upgrade Project No. LF0248 \$415,000**

**Timeframe: April 1, 2018 to December 31, 2018**

Internet Protocol (IP) network routers and switches direct the communications between the radio sites and the TOPAZ infrastructure. They also redirect those communications if there is a failure in the network that connects the TOPAZ radio sites and infrastructure together. This equipment is currently eight years old and is on best-effort support status with the manufacturer. To ensure continued reliable operation of this network, this equipment requires upgrading. The TRWC pays one-half of the \$830,000 total cost of this upgrade. [The acceleration of this lifecycle upgrade project was approved by the TRWC Board of Directors at their September 14, 2017, meeting. This purchase was approved for the TRWC Administrative Manager by the Mesa City Council at their October 2, 2017, meeting.](#)

### **TOPAZ Antenna & Transmission Lines Lifecycle Upgrade Project No. LF0282 \$472,000**

**Timeframe: July 1, 2018 to June 30, 2020**

The antennas and transmission lines that carry radio signals between the TOPAZ radio infrastructure and the antennas at each site are over 15 years old and need to be replaced due to their age. This will ensure the TOPAZ network will continue to provide reliable radio coverage for the users of the TRWC. This project is planned for FY18/19 and FY19/20 to spread the cost over two fiscal years.

## **Unfunded Lifecycle Upgrade Projects**

### **Communications Building UPS Battery Lifecycle Replacement Project No. LF0228 \$35,400**

**Timeframe: July 1, 2023 to June 30, 2024, depending on the availability of funds**

The City of Mesa Communications Building includes an Uninterruptible Power Supply (UPS) that keeps critical equipment operational during a power failure while the building emergency generators are starting. This UPS relies on batteries to store the energy required to keep the critical electronic systems functioning without interruption. These batteries require replacement every four years, at a cost of about \$30,000, of which the TRWC pays one-half.

### **Radio & Core Sites Battery Backup Next Lifecycle Upgrade Project No. LF0266 \$283,200**

**Timeframe: July 1, 2024 to June 30, 2028, depending on the availability of funds**

The batteries that back up the TOPAZ voice radio network and other equipment at the radio sites, the core site at City of Mesa Communications Building, and the TOPAZ backup core site at Mesa Fire Station 219 are just completing their upgrade cycle, but it is prudent to plan for the next upgrade. These batteries have a service life of ten years. Normally, these batteries only power the equipment at a site for less than a minute while the emergency generator starts and picks up the load to power the site equipment. However, these batteries are sized to power the site for a minimum of 4 hours in the event the emergency generator does not start, so there is time to take a portable generator to the site to provide emergency power.



## Capital Plan for FY19/20 to FY26/27

**Radio & Core Sites DC Power Plant Lifecycle Upgrade**                      **Project No. LF0267**                      **\$377,600**

**Timeframe: July 1, 2026 to June 30, 2027, depending on the availability of funds**

The equipment at the radio sites is powered by a Direct Current (DC) power plant that allows backup of the site equipment with battery banks as described above. This arrangement also isolates the equipment from disturbances on the incoming Alternating Current (AC) power lines, which keeps the equipment operating during reductions or disruptions (outages) in the AC power supply. This equipment has a typical service life of 15 years. The equipment was last replaced in August 2011.

**TOPAZ Voice Radio Network Next Lifecycle Upgrade**                      **Project No. NEW**                      **\$7,500,000**

**Timeframe: July 1, 2030 to June 30, 2031, depending on the availability of funds**

The TOPAZ voice radio network infrastructure was upgraded in August-September 2015, with new equipment at the nine simulcast cell radio sites, and the addition of the backup Master Site (DSR) and geo-redundant Prime Site. The typical service life for this equipment is 15 years, so it is prudent to plan for the next lifecycle upgrade.

**Fire Hazard Zone (VHF) Lifecycle Upgrade**                      **Project No. NEW**                      **\$2,500,000**

**Timeframe: July 1, 2031 to June 20, 2032, depending on the availability of funds**

The Fire Hazard Zone (VHF) Communications System provides radio infrastructure to communicate with firefighters when working in areas deemed hazard or hot zones. The communications in the hazard or hot zones will be on the Very High Frequency (VHF) radio band (150-174 MHz). Firefighters and on-scene command personnel will communicate direct from radio-to-radio without any infrastructure. The infrastructure implemented by this project will enable the tele-communicators and command personnel in the fire alarm room (dispatch) to monitor the fire ground communications and communicate with on-scene personnel. This infrastructure will also receive and allow response to transmissions initiated when the “emergency” button on the handheld or vehicle-mounted radio is activated. This system provides operational consistency with the fire departments dispatched by the Phoenix Fire Department. While this equipment is not planned to be in service until the middle of calendar year 2017, it is prudent to plan for the upgrade of the equipment in the future. The typical service life for this equipment is fifteen years.

### **Unfunded Capital Improvement Projects**

**Southeast Queen Creek TOPAZ Expansion Site**                      **Project No. CP0091**                      **\$1,562,087**

**Timeframe: July 1, 2019 to June 30, 2021, depending on the availability of funds**

As population growth in the far southeast valley continues, demand for Public Safety services will grow as well. This will require an additional TOPAZ radio site in the southeast area of Queen Creek to ensure reliable in-building TOPAZ radio coverage (both 800 MHz and VHF). This will require the development of a radio site, including a radio tower, equipment shelter, emergency generator, radio and network equipment, and services, including land. Note: we will look at colocation at an existing radio site or on an existing radio tower, or sharing existing facilities or systems if possible, to avoid duplication (overbuilding) and constructing facilities if they are not necessary. The need for this site will be validated by a consultant study prior to commencement of the project.



## Capital Plan for FY19/20 to FY26/27

**Southeast Apache Junction TOPAZ Expansion Site**                      **Project No. CP0754**        **\$1,604,123**

**Timeframe: July 1, 2020 to June 30, 2022, depending on the availability of funds**

As population growth in the far east valley continues, demand for Public Safety services will grow as well. This will require an additional TOPAZ radio site in the southeast area of Apache Junction (southeast of Fire Station 264) to ensure reliable in-building TOPAZ radio coverage (both 800 MHz and VHF). This will require the development of a radio site, including a radio tower, equipment shelter, emergency generator, radio and network equipment, and services, including land. Note: we will look at colocation at an existing radio site or on an existing radio tower, or sharing existing facilities or systems if possible, to avoid duplication (overbuilding) and constructing facilities if they are not necessary. The need for this site will be validated by a consultant study prior to commencement of the project.

**Northeast Mesa TOPAZ Expansion Site**                      **Project No. CP0779**        **\$1,646,218**

**Timeframe: July 1, 2020 to June 30, 2022, depending on the availability of funds**

As population growth in the east valley continues, demand for Public Safety services will grow as well. This will require an additional TOPAZ radio site in the far northeast area of Mesa to ensure reliable in-building TOPAZ radio coverage (both 800 MHz and VHF). This will require the development of a radio site, including a radio tower, equipment shelter, emergency generator, radio and network equipment, and services, including land. Note: we will look at colocation at an existing radio site or on an existing radio tower, or sharing existing facilities or systems if possible, to avoid duplication (overbuilding) and constructing facilities if they are not necessary. The need for this site will be validated by a consultant study prior to commencement of the project.

**Interface for Non-Motorola Dispatch Consoles**                      **Project No. CP0812**        **\$330,179**

**Timeframe: July 1, 2026 to June 30, 2027, depending on the availability of funds**

The TRWC network currently supports only Motorola Solutions Inc (“Motorola”) dispatch consoles. This limits the selection of dispatch consoles available for use by the TRWC dispatch centers (Apache Junction Police, Gilbert Police, Mesa Fire & Medical Regional, Mesa Police, and Mesa Utilities Control Center & backup site). In order to provide flexibility for the TRWC member dispatch centers in the selection of non-Motorola dispatch consoles, a Console Sub-System Interface (CSSI) is required. Note: the \$250,000 cost includes a limited number of licenses for connection of non-Motorola dispatch consoles to the TRWC P25 800 MHz radio network. Non-Motorola dispatch consoles beyond this number of licenses will incur a per dispatch console license fee.

**Automated Billing & Upgrade Network Management Tools**                      **Project No. CP0813**        **\$660,357**

**Timeframe: July 1, 2025 to June 30, 2027, depending on the availability of funds**

This project will purchase and implement automated airtime billing and accounting hardware and software and upgrade the network management tools for the TOPAZ network. At the present time, the airtime billing data is obtained by a labor-intensive process that does not provide airtime data for each individual radio utilizing TOPAZ airtime. Automating this process will reduce costs to the TRWC members and allow for more granular airtime data if desired. This upgrade will also include the network management tools that are utilized in monitoring and analyzing day-to-day operations of the network and in troubleshooting network impairments and outages.





## Capital Plan for FY19/20 to FY26/27

### **TDMA Channel Conversion for Shaw Butte & Florence Gardens Project No. CP0906 \$574,812**

**Timeframe: July 1, 2019 to June 30, 2021, depending on the availability of funds**

Two of the three TOPAZ wide-area sites, Shaw Butte and Florence Gardens, have 6 physical radio channels, which limits their voice channels to 5 simultaneous transmissions. The third TOPAZ wide-area site, Thompson Peak, has 11 physical radio channels, which allows a maximum of 10 simultaneous voice transmissions. There have been occasions when users have received busies due to a lack of voice channel capacity on Shaw Butte or Florence Gardens. To remedy this situation, 5 of the 6 physical voice channels at Shaw Butte and Florence Gardens will be upgraded to Time Division Multiple Access (TDMA, also known as P25 Phase II; currently the sites all use Frequency Division Multiple Access (FDMA), also known as P25 Phase I) to enable two simultaneous voice transmissions on each physical radio channel. This will enable 10 simultaneous voice transmissions on all three wide-area sites.

### **Fire Hazard Zone Communications (VHF) Coverage Improvement and Channel Expansion**

**Project No. CP0907**

**\$2,973,600**

**Timeframe: July 1, 2019 to June 30, 2027, depending on the availability of funds**

This project adds VHF coverage for the existing TRWC fire partner coverage area in Mesa, Gilbert, Apache Junction, and Queen Creek. This coverage expansion will be in response to user identification of areas that deficient in coverage, or if channel capacity is deemed insufficient by the users.

### **SRPMIC Fire Hazard Zone Communications (VHF) Coverage Expansion Project No. NEW \$0**

**Timeframe: July 1, 2019 to June 30, 2020, depending on the availability of funds**

This project adds VHF coverage for the Salt River Pima-Maricopa Indian Community (SRPMIC) assuming SRPMIC joins the TRWC. SRPMIC would bear the cost (approximately \$770,000) of this project as part of joining the TRWC and extending VHF coverage into their Community. Two new transmit-receive sites would be added to the existing TRWC VHF network.

### **FMYN Fire Hazard Zone Communications (VHF) Coverage Expansion Project No. NEW \$0**

**Timeframe: July 1, 2019 to June 30, 2020, depending on the availability of funds**

This project adds VHF coverage for the Fort McDowell Yavapai Nation (FMYN). FMYN has a \$130,000 grant to fund the VHF coverage expansion. One new transmit-receive site would be added to the existing TRWC VHF network.

## **Projects Completed in Prior Fiscal Years**

### **Fire Hazard Zone Communications System (VHF)**

**Project No. CP0305**

**\$1,181,168**

**Timeframe: Completed December 1, 2017**

This project provides radio infrastructure to communicate with firefighters when working in areas deemed hazard or hot zones. The communications in the hazard or hot zones will be on the Very High Frequency (VHF) radio band (150-174 MHz). Firefighters and on-scene command personnel will communicate direct from radio-to-radio without any infrastructure. The infrastructure implemented by this project will enable the tele-communicators and command personnel in the fire alarm room (dispatch) to monitor the fire ground communications and communicate with on-scene personnel. This infrastructure will also receive and allow response to transmissions initiated when the “emergency” button on the handheld or vehicle-mounted radio is activated. This system will provide operational consistency with the fire departments dispatched by the Phoenix Fire Department.





## Capital Plan for FY19/20 to FY26/27

### Appendix – Project Details

#### **Wireless Backhaul (Microwave) Network Lifecycle Upgrade**      **Project No. CP0093**

	Path	In Service	Notes
Communications Building	Mesa Community College	✓	
Communications Building	Fire Station 219	✓	
Communications Building	Twin Knolls	✓	
Central Radio Site	Falcon Field Airport	✓	
Falcon Field Airport	South Water Plant (Greenfield)	✓	New path. Replaced Mesa Community College to South Water Plant path.
Falcon Field Airport	East Mesa Service Center	✓	
East Mesa Service Center	Twin Knolls	✓	
Twin Knolls	Fire Station 205	✓	
Twin Knolls	Fire Station 219	✓	
Twin Knolls	Apache Junction Police Department	✓	
Twin Knolls	Fire Station 262	✓	
Fire Station 262	Apache Junction Police Department	✓	
Fire Station 219	TRW	✓	
TRW	Mesa Community College	✓	
TRW	South Water Plant (Greenfield)	✓	
Thompson Peak	Fire Station 441 (Rio Verde)	No	New path. Cox Communications cable link inadequate for VHF network.

#### **Internet Protocol Network Routers & Switches Lifecycle Upgrade**      **Project No. LF0248**

#### **Internet Protocol Routers & Switches Expansion**      **Project No. CP0755**

Location	MX104 Router	Number of EX3400 Switches	Notes
Twin Knolls (TKN-01)	✓	Pending Installation	Switch scheduled for installation July 10, 2018
Communications Building (COM-01)	✓	?	Installed ??
Thompson Peak (THO-01)	✓	1	Installed May 30, 2018
Range Rider (RAN-01)	✓	1	Installed May 30, 2018
Shaw Butte (SHA-01)	✓	Pending Installation	Installed May 30, 2018
Mesa Community College (MCC-01)	✓	1	Installed July 11, 2018
TRW (TRW-01)	✓	1	Installed August 15, 2018
South (Greenfield) Water Plant (SWP-01)	Pending Installation	Pending Installation	Scheduled for installation October 17, 2018
Fire Station 219 (FS219-01)	Pending Installation	Pending Installation	Scheduled for installation October 3, 2018
Communications Building (COM-02)	Pending Installation	Pending Installation	Scheduled for installation October 10, 2018
Central Radio Site (CRS-01)	Pending Installation	Pending Installation	Scheduled for installation September 12, 2018
Falcon Field Airport (FAL-01)	Pending Installation	Pending Installation	Scheduled for installation September 19, 2018
East Mesa Service Center (EMC-01)	Pending Installation	Pending Installation	Scheduled for installation September 26, 2018
Fire Station 205 (FS205-01)	Pending Procurement	Pending Installation	Procurement sched. for City Council 10/1/18
Fire Station 262 (FS262-01)	Pending Procurement	Pending Procurement	Procurement sched. for City Council 10/1/18
Fire Station 264 (FS264-01)	Pending Procurement	Pending Procurement	Procurement sched. for City Council 10/1/18
Florence Gardens	No router - no room	Pending Installation (2 switches)	Schedule for installation TBD
Spare	Available (DC)	Available (DC)	
Spare	Pending Procurement	Available (AC)	Procurement sched. for City Council 9/24/18



## Capital Plan for FY19/20 to FY26/27

***Fire Hazard Zone Communications System (VHF)***

***Project No. CP0305***

Location	Site Capability		CH1	CH2	CH3	CH4	CH5
			156.2400 MHz	151.1675 MHz	154.8000 MHz	154.2800 MHz	155.6175 MHz
Central Radio Site	Transmit	Receive	X	X	X	X	X
Mesa Community College		Receive	X	X	X	X	X
Fire Station 205		Receive	X	X	X		X
Twin Knolls	Transmit	Receive	X	X	X		X
Range Rider	Transmit	Receive	X	X	X		X
TRW	Transmit	Receive	X	X	X	X	X
Fire Station 262	Transmit	Receive	X	X	X		X
Fire Station 264		Receive	X	X	X		X
South (Greenfield) Water Plant	Transmit	Receive	X	X	X		X
Fire Station 219		Receive	X	X	X	X	X
Shaw Butte	Transmit	Receive	X				
Fire Station 441 (Rio Verde)	Transmit	Receive	X	X			
Talking Stick Resort	Transmit	Receive	Note 1	Note 1	Note 1		Note 1
Shea Blvd & Beeline Highway	Transmit	Receive	Note 1	Note 1	Note 1		Note 1
FMYN Site	Transmit	Receive	Note 2	Note 2	Note 2		Note 2
<p>Note 1: If VHF coverage is expanded for Salt River Pima-Maricopa Indian Community (SRPMIC), it would include 2 additional transmit-receive sites (Talking Stick Resort and Shea Blvd &amp; Beeline Highway).</p> <p>Note 2: Fort McDowell Yavapai Nation (FMYN) would include an additional site with 2-4 existing channels.</p>							

**TOPAZ BUDGET TO ACTUAL COMPARISON**  
**Operations & Maintenance Costs**  
**Fiscal Year 2018 / 2019**

	COM	TOG	TQC	SFM	RVFD	CAJ	FTM	SWA	AMR	TOTAL	% of Annual BUDGET	ANNUAL BUDGET/ Remaining Budget
<b>1. Budgeted Airtime Units</b>	<b>71.33%</b>	<b>16.48%</b>	<b>0.46%</b>	<b>0.75%</b>	<b>0.03%</b>	<b>8.20%</b>	<b>1.88%</b>	<b>0.71%</b>	<b>0.16%</b>	<b>100.00%</b>		
2. Airtime Units Billed												
July	70.35%	17.53%	0.30%	0.61%	0.02%	8.74%	1.58%	0.72%	0.15%	100.00%		
August	68.29%	17.69%	0.42%	1.01%	0.03%	9.29%	2.20%	0.89%	0.18%	100.00%		
September	67.83%	17.97%	0.45%	0.91%	0.03%	9.55%	2.18%	0.90%	0.18%	100.00%		
October	67.99%	17.89%	0.51%	0.83%	0.03%	9.50%	2.17%	0.90%	0.18%	100.00%		
November	68.24%	17.67%	0.54%	0.79%	0.03%	9.45%	2.17%	0.93%	0.18%	100.00%		
December	68.56%	17.52%	0.54%	0.63%	0.03%	9.36%	2.23%	0.94%	0.19%	100.00%		
January	68.80%	17.44%	0.55%	0.64%	0.02%	9.25%	2.18%	0.93%	0.19%	100.00%		
<b>3. Budgeted Monthly O&amp;M</b>	<b>\$ 113,513</b>	<b>\$ 26,226</b>	<b>\$ 732</b>	<b>\$ 1,194</b>	<b>\$ 48</b>	<b>\$ 13,049</b>	<b>\$ 2,992</b>	<b>\$ 1,130</b>	<b>\$ 255</b>	<b>\$ 159,139</b>		<b>\$ 1,909,658</b>
4. Monthly O&M Costs												
July	28,011	6,980	119	243	8	3,480	629	287	60	39,817		
August	40,459	10,480	249	598	18	5,504	1,303	527	107	59,245		
September	44,786	11,865	297	601	20	6,305	1,439	594	119	66,026		
October	29,543	7,774	222	361	13	4,128	943	391	78	43,453		
November	38,970	10,090	308	451	17	5,396	1,239	531	103	57,105		
December	34,960	8,934	275	321	15	4,773	1,137	479	97	50,991		
January	310,548	78,721	2,483	2,889	90	41,753	9,840	4,198	858	451,380		
<b>Total YTD Costs</b>	<b>\$ 527,277</b>	<b>\$ 134,844</b>	<b>\$ 3,953</b>	<b>\$ 5,464</b>	<b>\$ 181</b>	<b>\$ 71,339</b>	<b>\$ 16,530</b>	<b>\$ 7,007</b>	<b>\$ 1,422</b>	<b>\$ 768,017</b>	<b>40.22%</b>	<b>\$ 1,141,641</b>

**TOPAZ BUDGET TO ACTUAL COMPARISON**

**Projects Costs**

**Fiscal Year 2018 / 2019**

	<b>COM</b>	<b>TOG</b>	<b>TQC</b>	<b>SFM</b>	<b>RVFD</b>	<b>CAJ</b>	<b>FTM</b>	<b>TOTAL</b>
<b>1. Budgeted Airtime Units</b>	<b>71.96%</b>	<b>16.62%</b>	<b>0.46%</b>	<b>0.76%</b>	<b>0.03%</b>	<b>8.27%</b>	<b>1.90%</b>	<b>100.00%</b>
<b>2. Airtime Units Billed:</b>								
July	70.97%	17.68%	0.30%	0.62%	0.02%	8.82%	1.59%	100.00%
August	69.03%	17.88%	0.43%	1.02%	0.03%	9.39%	2.22%	100.00%
September	68.55%	18.17%	0.46%	0.92%	0.03%	9.66%	2.21%	100.00%
October	68.72%	18.09%	0.52%	0.84%	0.03%	9.61%	2.19%	100.00%
November	69.00%	17.87%	0.55%	0.80%	0.03%	9.56%	2.19%	100.00%
December	69.35%	17.72%	0.55%	0.63%	0.03%	9.47%	2.25%	100.00%
January	69.59%	17.64%	0.55%	0.65%	0.02%	9.35%	2.20%	100.00%

	<b>COM</b>	<b>TOG</b>	<b>TQC</b>	<b>SFM</b>	<b>RVFD</b>	<b>CAJ</b>	<b>FTM</b>	<b>TOTAL</b>
<b>3. Budgeted Project Costs</b>	<b>\$ 1,606,041</b>	<b>\$ 370,934</b>	<b>\$ 10,267</b>	<b>\$ 16,962</b>	<b>\$ 670</b>	<b>\$ 184,574</b>	<b>\$ 42,405</b>	<b>\$ 2,231,853</b>

	<b>COM</b>	<b>TOG</b>	<b>TQC</b>	<b>SFM</b>	<b>RVFD</b>	<b>CAJ</b>	<b>FTM</b>	<b>TOTAL</b>
<b>4. Actual Costs Incurred</b>								
July	\$ 314,124	\$ 78,255	\$ 1,328	\$ 2,744	\$ 89	\$ 39,039	\$ 7,038	\$ 442,617
August	1,639	424	10	24	1	223	53	2,374
September	4,289	1,137	29	58	2	605	138	6,258
October	42,445	11,174	321	519	19	5,936	1,353	61,767
November	377,090	97,661	3,006	4,372	164	52,246	11,969	546,508
December	114,629	29,290	909	1,041	50	15,653	3,719	165,291
January	5,802	1,470	46	54	2	779	183	8,336

<b>Total Costs</b>	<b>\$ 860,018</b>	<b>\$ 219,411</b>	<b>\$ 5,649</b>	<b>\$ 8,812</b>	<b>\$ 327</b>	<b>\$ 114,481</b>	<b>\$ 24,453</b>	<b>\$ 1,233,151</b>
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**TOPAZ**  
**Detail of Operating and Maintenance**  
**Fiscal Year 2018 / 2019**

Year to Date Through January 31, 2019

Description	Budget	Updated Forecast	YTD Forecast*	YTD Actual	\$ Var	% Var
					From YTD Forecast	Incr/(Decr)
Personnel Services	\$ 418,340	\$ 336,223	\$ 193,975	\$ 193,975	\$ -	0%
Insurance Premiums	8,500	8,500	4,958	-	(4,958)	-100%
Legal Services	37,000	37,000	21,583	13,782	(7,801)	-36%
Temp Services	6,000	6,000	3,500	346	(3,154)	-90%
Leases and Rents - Land	25,300	25,300	14,758	15,649	891	6%
Professional Services - Consulting	88,500	88,500	51,625	72,856	21,231	41%
Professional Services - Other	15,000	15,000	8,750	1,054	(7,696)	-88%
Utilities	60,000	60,000	35,000	30,941	(4,059)	-12%
Telephone	3,400	3,400	1,983	1,170	(813)	-41%
Repairs & Maintenance	31,000	31,000	18,083	100	(17,983)	-99%
Equipment Usage (Vehicles)	20,000	20,000	11,667	7,929	(3,738)	-32%
All Other Services	-	-	-	881	881	0%
Sub-total Services	294,700	294,700	171,907	144,708	(27,199)	-16%
Contract - Motorola SUAll	597,400	597,400	348,483	261,957	(86,526)	-25%
Contract - Motorola Security	359,800	359,800	209,883	154,538	(55,345)	-26%
Materials & Parts	20,460	20,460	11,935	12,839	904	8%
Non Cap Assets	25,000	25,000	14,583	-	(14,583)	-100%
Software Maintenance- Juniper	22,500	22,500	13,125	-	(13,125)	-100%
All Other Commodities	-	-	-	-	-	0%
Sub-total Commodities	1,025,160	1,025,160	598,009	429,334	(168,675)	-28%
Subtotal O&M	1,738,200	1,656,083	963,891	768,017	(195,874)	-20%
Contingency - 5% of total O&M	51,321	51,321	29,937	-	(29,937)	-100%
VHF Operations	120,138	120,138	70,081	-	(70,081)	-100%
Total	<u>\$ 1,909,659</u>	<u>\$ 1,827,542</u>	<u>\$ 1,063,909</u>	<u>\$ 768,017</u>	<u>\$ (295,892)</u>	<u>-28%</u>

\*YTD Forecast represents 7 months of operational costs plus any contractual expenses already incurred (i.e. one time payments such as Insurance Premiums, Land Rental and Motorola Contract).

**TOPAZ**  
**Detail of Capital Projects**  
**Fiscal Year 2018 / 2019**

**Year to Date Through January 31, 2019**

<b>Project</b>	<b>Project ID</b>	<b>Budgeted</b>	<b>YTD Forecast*</b>	<b>YTD Actual</b>	<b>\$ Var From YTD Forecast Incr/(Decr)</b>	<b>% Var</b>
TOPAZ Voice Radio Network Upgrade	CN0022	\$ 433,828	\$ 433,828	\$ 433,828	\$ -	0.00%
Wireless Backhaul Microwaves	CP0093	-	-	65,967	65,967	0.00%
System-of-Systems Networking	CP0438	619,500	361,375	357,439	(3,936)	-1.09%
Internet Protocol Network Router	CP0755	464,625	271,031	154,407	(116,624)	-43.03%
Florence Gardens ISR Site Lifecycle upgrade	LF0224	354,000	206,500	196,491	(10,009)	-4.85%
Radio Sites Emergency Power Upgrade	LF0226	106,200	61,950	-	(61,950)	-100.00%
Communications Building UPS Battery Replacement	LF0228	17,700	10,325	195	(10,130)	-98.11%
Internet Protocol Network Routers & Switches Upgrade	LF0248	-	-	8,222	8,222	0.00%
Antenna & Transmission Lines Lifecycle Upgrade	LF0282	236,000	137,667	16,602	(121,065)	-87.94%
<b>Total Capital Projects</b>		<b>\$ 2,231,853</b>	<b>\$ 1,482,676</b>	<b>\$ 1,233,151</b>	<b>\$ (249,525)</b>	<b>-16.83%</b>
<b>Capital Assessment to Members</b>						
Mesa	71.96%	1,605,952	936,805	860,018	(76,787)	-8.20%
Gilbert	16.62%	371,038	216,439	219,411	2,972	1.37%
Apache Junction	8.27%	184,618	107,694	114,481	6,787	6.30%
Ft McDowell	1.90%	42,327	24,691	24,453	(238)	-0.96%
Superstition Fire & Medical	0.76%	16,886	9,850	8,812	(1,038)	-10.54%
Queen Creek	0.46%	10,357	6,042	5,649	(393)	-6.50%
Rio Verde	0.03%	675	394	327	(67)	-17.01%
<b>Total Assessment to Members</b>	<b>100.00%</b>	<b>\$ 2,231,853</b>	<b>\$ 1,301,915</b>	<b>\$ 1,233,151</b>	<b>\$ (68,764)</b>	<b>-5.28%</b>

\*YTD Forecast represents 7 months of project costs plus any contractual expenses already incurred (i.e. one time payments).



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PO Box 1466  
Mesa, Arizona 85211-1466

**Date:** February 21, 2019

**To:** TOPAZ Regional Wireless Cooperative (TRWC) Board of Directors

**Through:** Dale Shaw, TRWC Executive Director

**From:** Randy Thompson

**Subject:** Administrator Update

### **Capital Projects**

- 1) **Point-to-Point Microwave Radio Wireless Backhaul Lifecycle upgrade.** This lifecycle upgrade will replace the point-to-point microwave radios that connect the radio towers in the TOPAZ network together to transport data to and from the network core. This project is budgeted in the TRWC capital budget. The project milestones with status and dates are shown in the Appendix. The punchlist was complete and the final payment for the original scope was made on October 9, 2018. A Change Order was executed to add a microwave path from Thompson Peak to Rio Verde Fire Station 441 to support the TRWC Fire Hazard Zone (VHF) network.
- 2) **Lifecycle Upgrade for Microwave Radio Network Routers.** The network routers in the point-to-point microwave radio network control the flow of data in and out of the TOPAZ radio sites to ensure the data finds the fastest route to its destination and does not encounter congestion or other impairments that would delay delivery of data. In a radio system such as TOPAZ, minimizing these delays is critical to delivering clear voice radio communications. These network routers also automatically reroute data around disruptions in the point-to-point microwave radio network to ensure clear voice radio calls. These routers support both the 7/800 MHz and VHF radio networks. Twelve of thirteen sites have been successfully installed and put in service. The project milestones with status and dates are shown in the Appendix.
- 3) **Fiscal Year 2019 Capital Projects (approved in Fiscal Year 2018-2019 TRWC Capital Budget)**
  - a. **System-of-Systems Networking.** This project will implement the ability to network the TRWC to other Project 25 radio networks (for example, the Arizona Department of Public Safety; Pinal County), the First Responder Network Authority (FirstNet built by AT&T), and/or Verizon Wireless to enable “roaming” between systems to expand radio coverage without building additional radio sites. The hardware and software for this project have been received and installed. We will require a connection to another system to continue implementation of this capability on the TOPAZ network.

The connection required for system-of-systems networking with FirstNet (AT&T) is on order, but AT&T has been unable to provide an installation schedule. We are also in discussions with Verizon to make a similar connection to Verizon’s network. Once the connection to FirstNet (AT&T) or Verizon is made, internal testing will begin prior to

## TRWC Administrator Update, February 21, 2019

putting this service into production use by law enforcement and fire & medical users of the TRWC.

- b. Florence Gardens Site Lifecycle Upgrade.** The upgraded radio equipment for the Florence Gardens site was installed and put into service on November 27, 2018. In addition to upgraded base station equipment, the channel capacity of the site was increased from 4 to 6 radio channels. This project is complete.
- c. Radio Sites Emergency Power Upgrade.** This is a five-year plan to replace the emergency generators at the TOPAZ radio sites. This is a planned lifecycle upgrade. We have difficulty getting parts for the older generators, so we want to replace rather than wait for failure. A Request for Bid package is being prepared.
- d. Antenna & Transmission Lines Lifecycle Upgrade.** The antennas and the transmission lines that connect the antennas to the base stations at the TOPAZ radio sites are over 15 years old, so we need to replace them before they fail. This a two-year plan. This project is on hold pending the outcome of the TOPAZ Network Engineering Study described below.
- e. Internet Protocol Network Routers & Switches Expansion.** Several TOPAZ sites use network switches instead of routers; this project is a reliability improvement, as the architecture of using switches at those TOPAZ sites has not provided the expected level of network reliability. The project milestones with status and dates are shown in the Appendix.
- f. Communications Building UPS Battery Replacement.** The cost of the replacement batteries for the Communications Building Uninterruptible Power Supply are split between the TRWC and City of Mesa. This is a once every four years expense and is scheduled for the 2<sup>nd</sup> calendar quarter of 2019.
- g. TOPAZ Network Engineering Study.** This is a new project for Fiscal Year 2018-2019 and will be funded by reallocating existing TRWC Operations & Maintenance budget. This engineering study will evaluate the current TOPAZ network (both 7/800 MHz and the Fire Hazard Zone Communications System (VHF)) to determine the following:
  - i. Are current site locations optimal for the current radio coverage area criteria
  - ii. Are the current antennas appropriate to meet the system radio coverage objectives (this is related to item “d” above).
  - iii. An ordered list of areas requiring new sites to provide or improve radio coverage in the future (this is related to the TRWC Capital Budget Plan)

A Request for Proposals has been published to solicit consultant proposals for this work.



**TRWC Administrator Update, February 21, 2019**

**Operations Summary**

**Unscheduled Impairments** – Please see the unscheduled impairments graph on page 6. Since the last Administrator update on September 6, 2018, the unimpaired system availability has been as follows:

<b>Period</b>	<b>Unimpaired System Availability</b>	<b>Comments</b>
August, 2018	100%	8/12/2018: Florence Gardens out of service 8 seconds due to a network transport problem.
September, 2018	100%	
October, 2018	99.999%	10/15/2018: Florence Gardens site out of service 37 seconds due to network transport problems (fiber optic cable work).
November, 2018	100%	
December, 2018	99.397	12/25/2018: Twin Knolls out of service 4:23:58 due to equipment failure. 12/31/2018: Thompson Peak site out of service 5:13 due to network transport problems.
January, 2019	100%	
Calendar Year 2018	99.888%	Goal 99.999%
Fiscal Year 2019	99.811%	Goal 99.999%
Calendar Year 2019	100%	Goal 99.999%

**Airtime and Radio Counts** – the following charts are included:

- 1) Six month rolling average airtime usage by member for fiscal year 2019 through January.
- 2) Average number of radios enabled by member for fiscal year 2019 through January.
- 3) Six month rolling average airtime usage by service type for fiscal year 2019 through January.
- 4) Average number of radios enabled by service type for fiscal year 2019 through January.

**Peak Channel Usage** – the following charts are included:

- 1) Peak channel usage for each site for August through January, 2019 is shown on the graphs at the end of this report. The following table is a summary of the number of days with an all channels in use event:

<b>Period</b>	<b>Simulcast Cell</b>	<b>Florence Gardens</b>	<b>Shaw Butte</b>	<b>Thompson Peak</b>
August, 2018	2	1	0	0
September, 2018	1	2	0	0
October, 2018	5	0	0	0
November, 2018	6	3	0	0
December, 2018	6	0	0	0
January, 2019	0	0	0	0

- a. Although all channels were in use on several occasions as shown above, no system busies have been reported by users.

## TRWC Administrator Update, February 21, 2019

- b. During the visit by the President of the United States on October 19, 2018, all channels on the simulcast cell were in use, but there were no busies.
- c. Note the Florence Gardens site was frequently experiencing all channels in use. As described in item 3.b above, Florence Gardens was upgraded from four to six radio channels during the lifecycle upgrade.

### **Other Operational Events:**

- 1) The City of Mesa Communications Building simulated power outage test frequency has been changed to monthly following the air conditioning controls problem discovered in July, 2018. The City of Mesa has modified the air conditioning controls to ensure the air conditioning will restart when the generators are powering the building and when the power switches back to normal utility power. The last test was completed successfully on February 13, 2019.
- 2) The quarterly software patching of the TRWC 7/800 MHz network performed by Motorola Solutions under the services contract on January 23, 2019 resulted in problems with several support functions for the TRWC network. Fortunately, these problems did not result in interruptions to call processing. We have been working with Motorola to resolve the faults in the support systems, determine the root cause of these faults, and implement changes to prevent these problems in the future.

### **Upcoming Events:**

The upgrade of the TOPAZ 7/800 MHz network from the current 7.16 system release to the 7.18 system release is planned for September 30 – October 10, 2019.

### **Other News:**

- 1) **Motorola Solutions Services.** The services provided by Motorola for the TRWC were expanded August 1, 2017. In addition to enhanced security monitoring and upgrade services, Motorola was providing services to monitor system alarms and dispatch Motorola personnel to resolve problems and restore service. Unfortunately, the service to dispatch Motorola's personnel fell short of our expectations, resulting in system impairments that took longer to resolved than they should have. Although extensive discussions were held with Motorola about these problems, it was decided that the alarm monitoring and dispatching of personnel to resolve problems and restore service would once again be a responsibility of the City of Mesa, as it was prior to August 1, 2017. Effective December 1, 2018, the City of Mesa is responsible for these functions. The increase in costs to the TRWC for City of Mesa personnel to respond to these events will be offset by a reduction in the services contract with Motorola. The expectation is there will be no effect on the TRWC budget as a result of this change.

TRWC Administrator Update, February 21, 2019

**Appendix**

***Point-to-Point Microwave Radio Wireless Backhaul Lifecycle Upgrade Schedule***

<b>Milestone</b>	<b>Status</b>	<b>Date</b>
Contract awarded to Aviat Networks	Complete	
Equipment received	Complete	August 14, 2017
Path equipment installation, testing, and commissioning (1 path/week)	Complete	
Initial Project Completion	Complete	October 9, 2018
Change Order to Add a Microwave Path from Thompson Peak to Rio Verde Fire Station 441	Installation Complete; Commissioning Link	Expect Completion by May 2, 2019

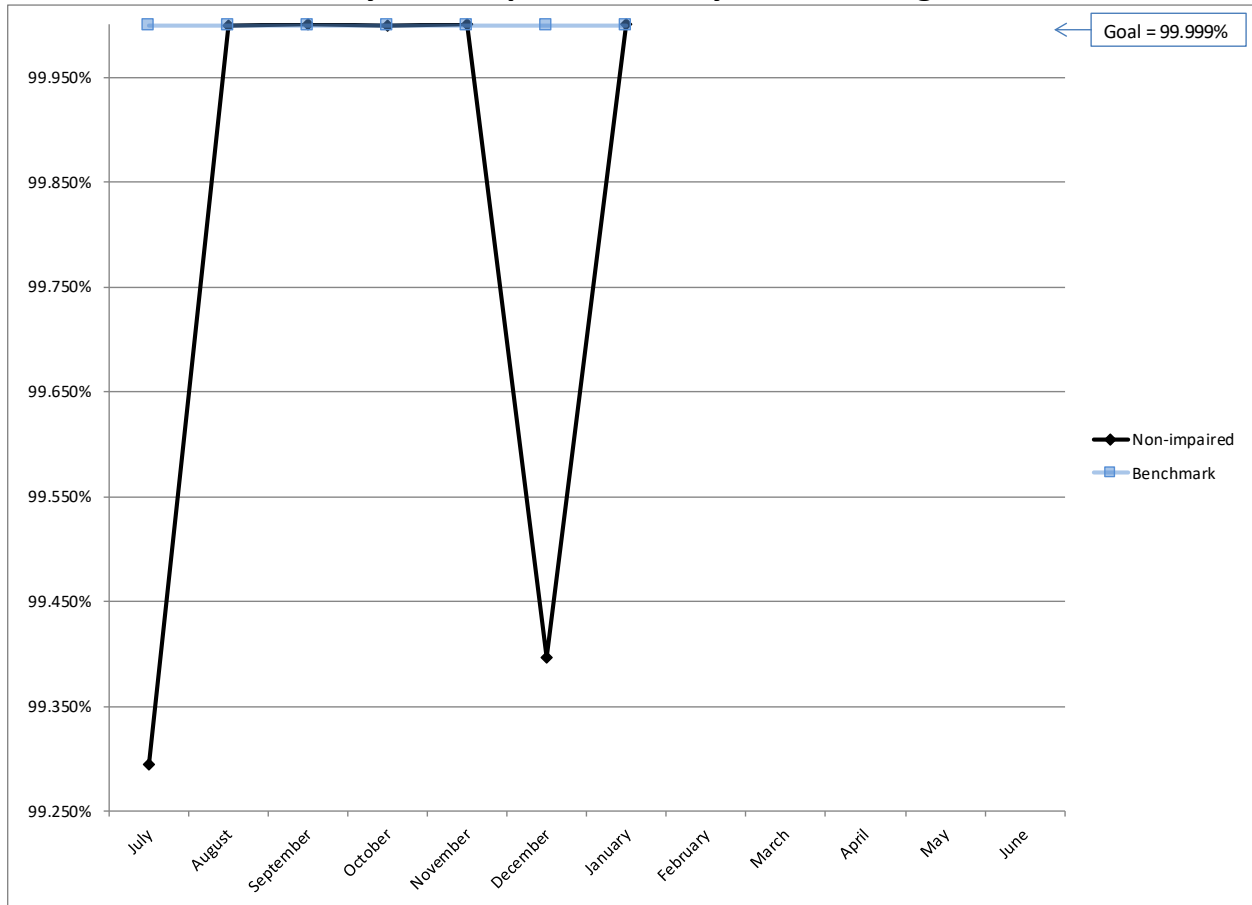
***Lifecycle Upgrade for Microwave Radio Network Routers***

<b>Milestone</b>	<b>Status</b>	<b>Date</b>
Contract awarded to Enterprise Network Solutions	Complete	October 2, 2017
Equipment ordered	Complete	
Equipment received	Complete	
Equipment staging & testing	Ongoing	
Equipment installed & operational	In Progress	Started May 30, 2018, 12 of 13 sites complete. Last site schedule for completion on March 27, 2019.
Project Completion	Planned	May 2, 2019

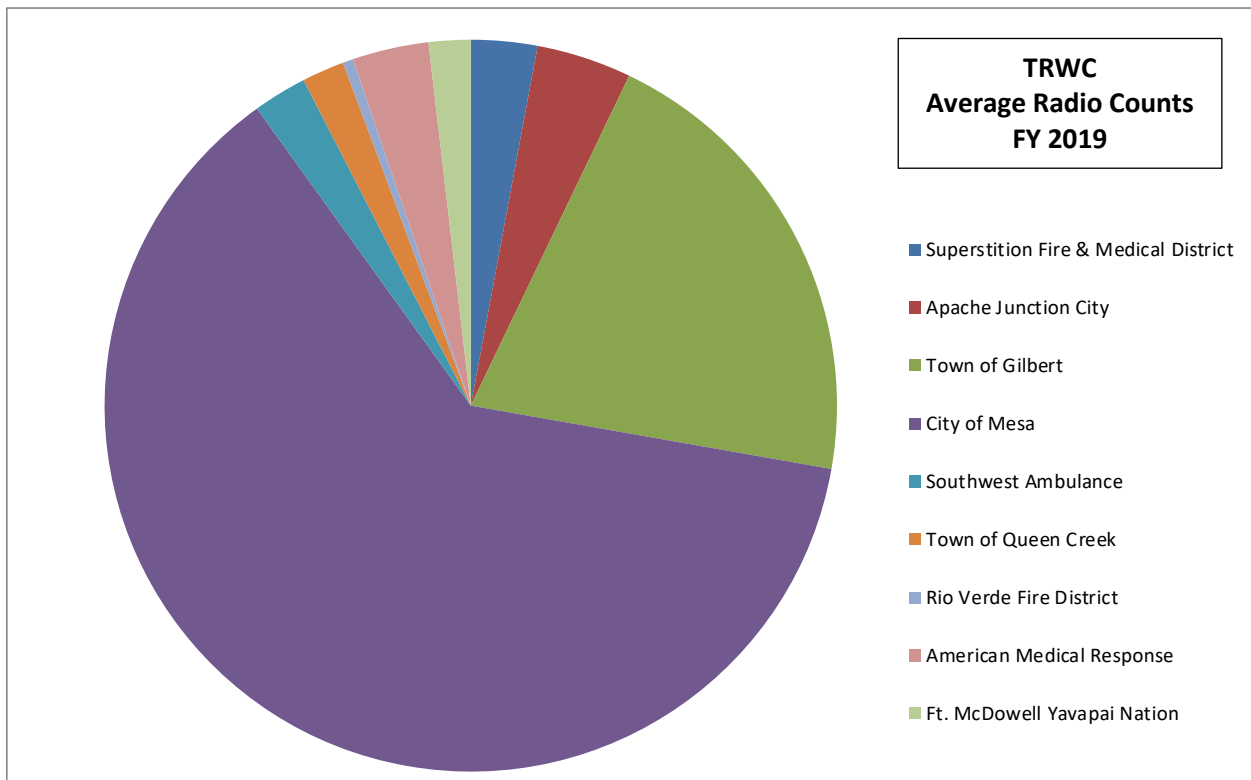
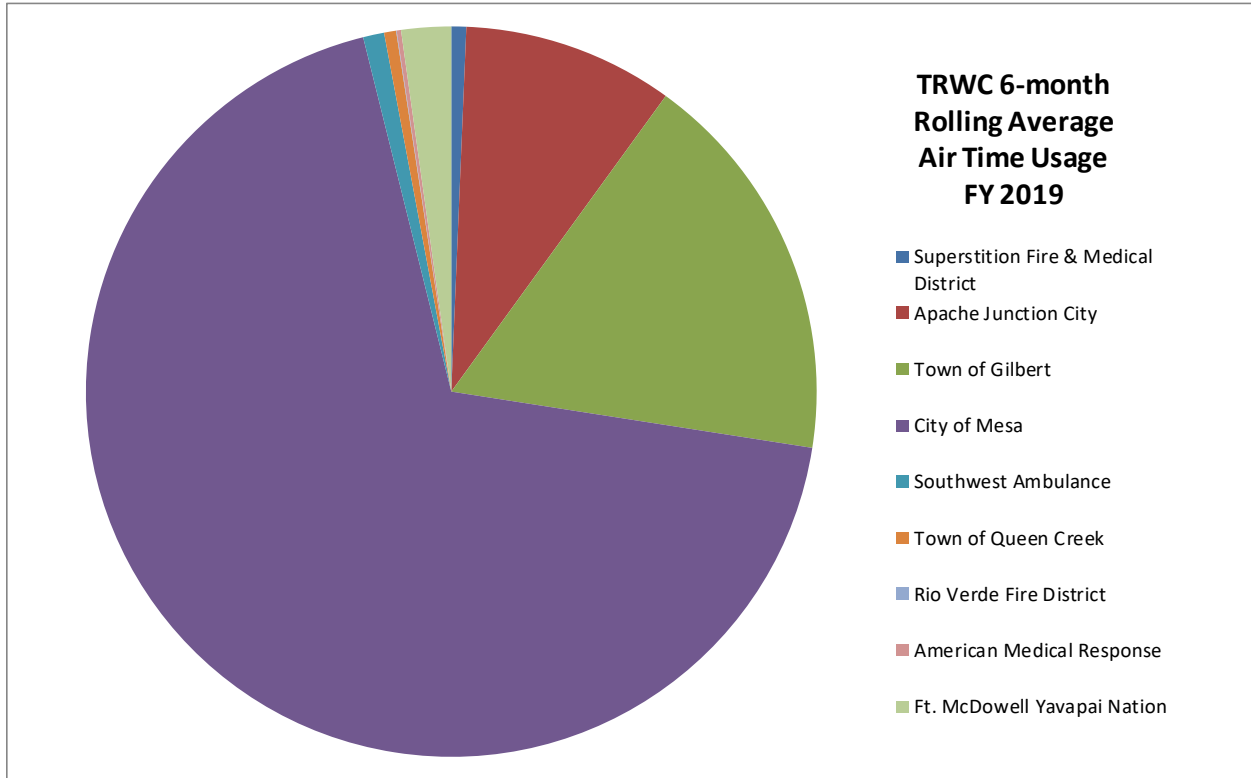
***Internet Protocol Network Routers & Switches Expansion***

<b>Milestone</b>	<b>Status</b>	<b>Date</b>
Equipment ordered	Complete	
Equipment received	Complete	
Equipment staging & testing	Ongoing	
Equipment installed & operational	Planned	Start planned for March 20, 2019; 4 sites total; completion is TBD.
Project Completion	Planned	June 30, 2019

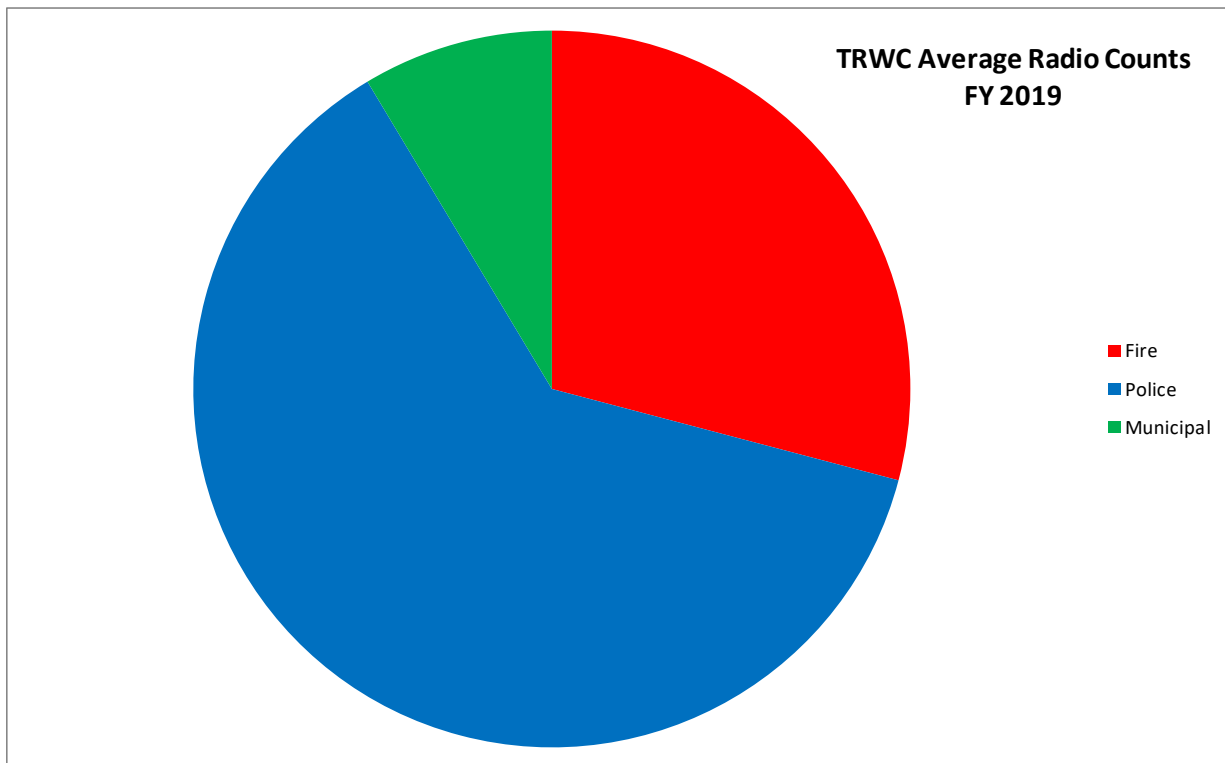
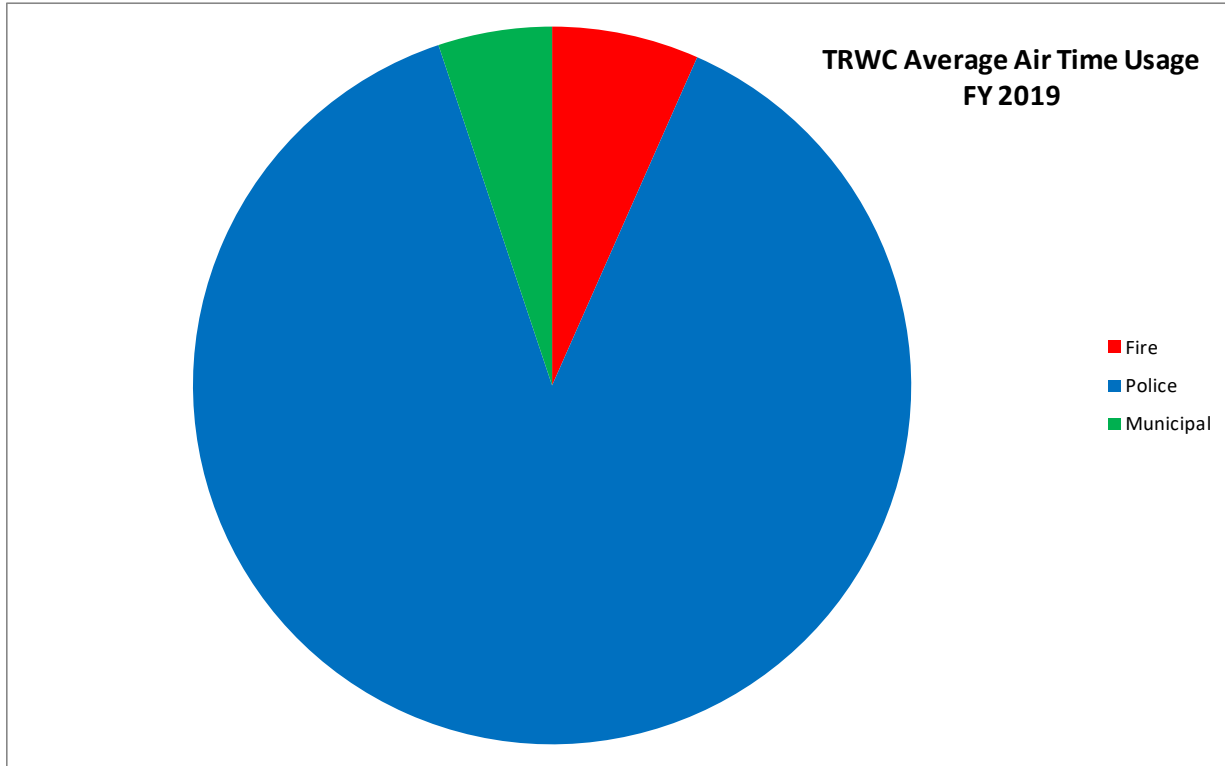
### Unscheduled System Impairment, July, 2018 through June, 2019



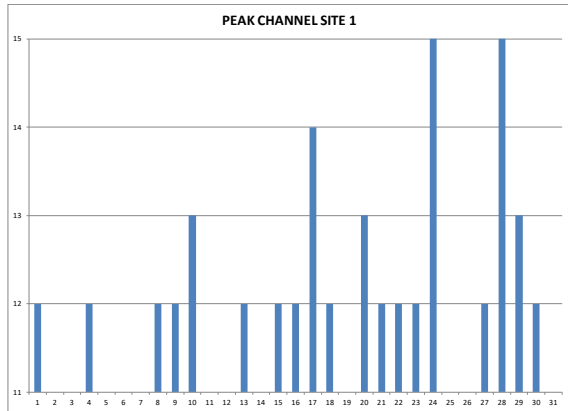
TRWC Administrator Update, February 21, 2019



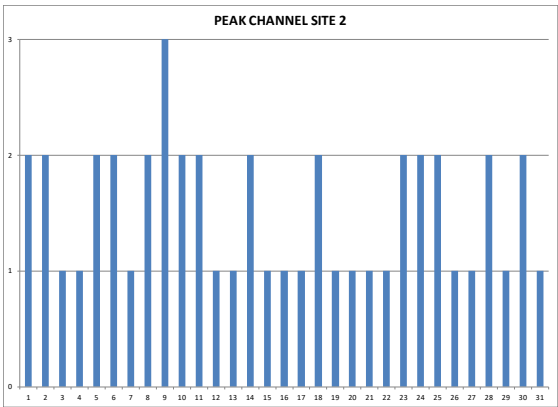
TRWC Administrator Update, February 21, 2019



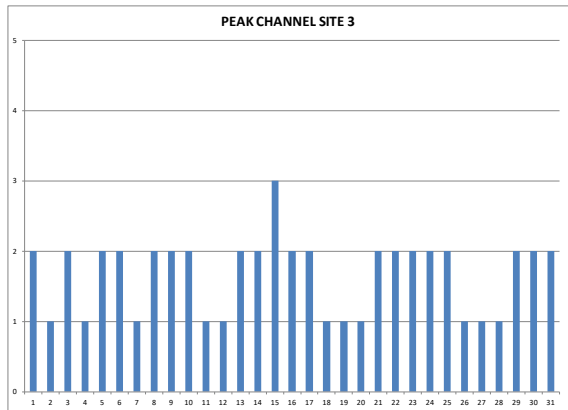
TOPAZ Peak Channel Usage, August, 2018



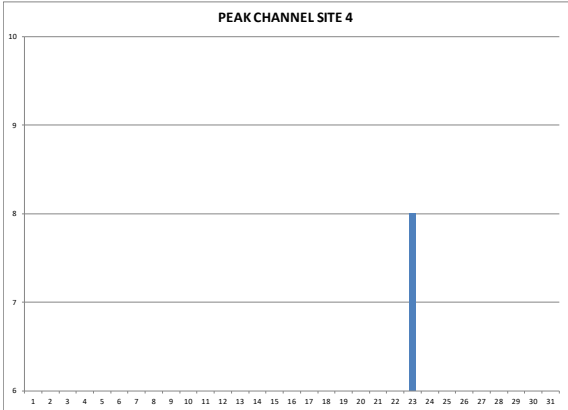
Simulcast Cell



Florence Gardens

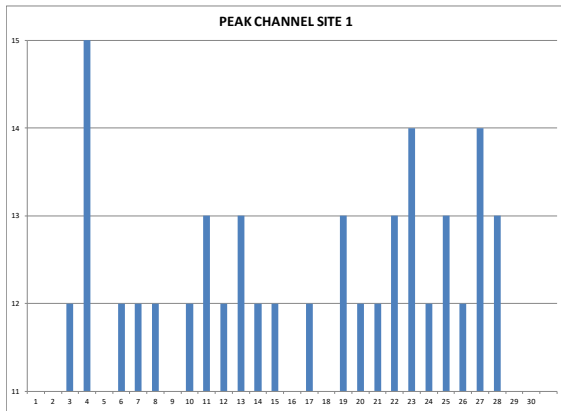


Shaw Butte

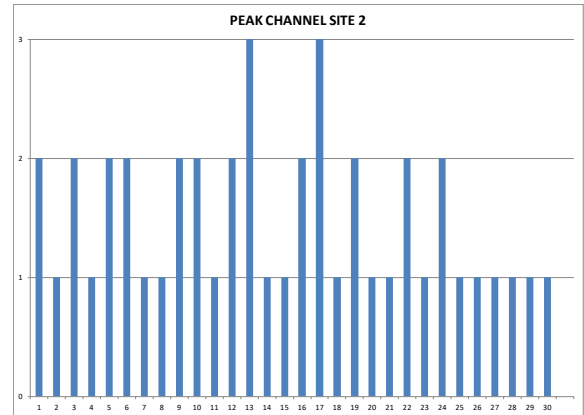


Thompson Peak

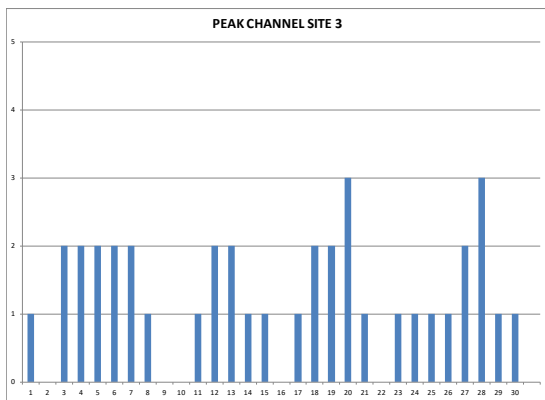
TOPAZ Peak Channel Usage, September, 2018



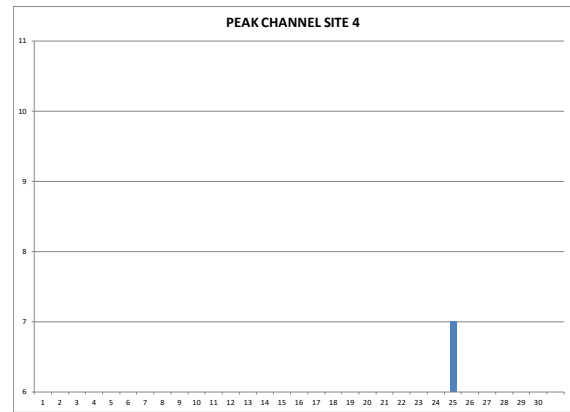
Simulcast Cell



Florence Gardens



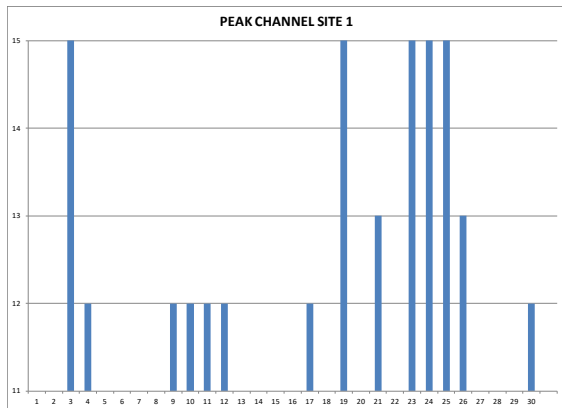
Shaw Butte



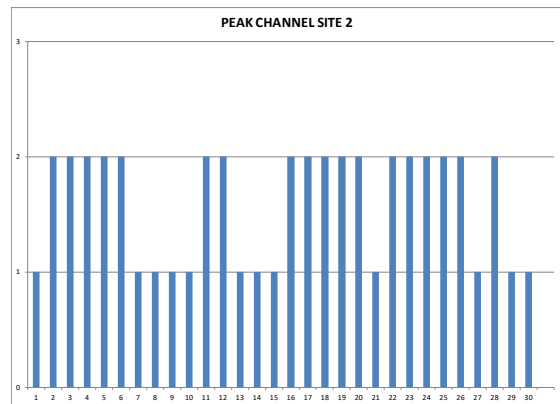
Thompson Peak



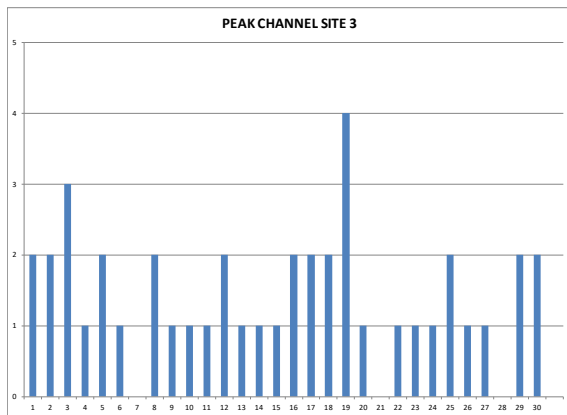
TOPAZ Peak Channel Usage, October, 2018



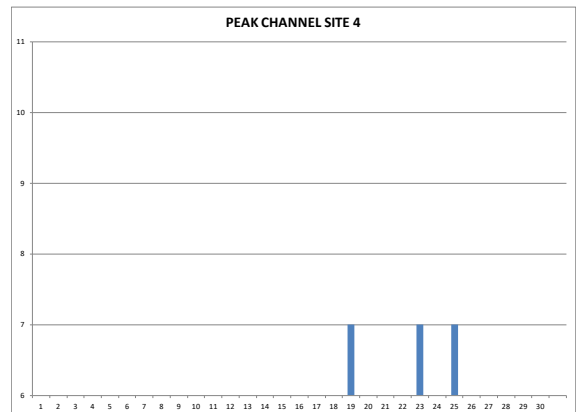
Simulcast Cell



Florence Gardens

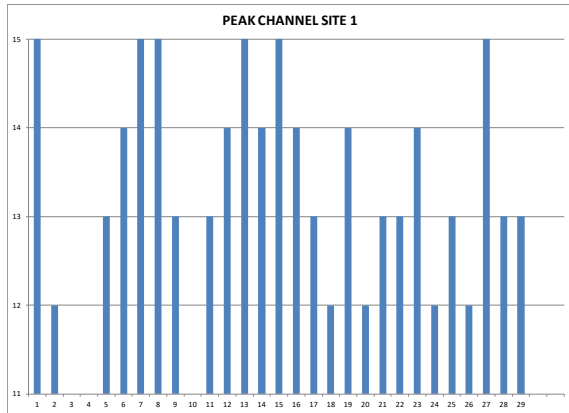


Shaw Butte

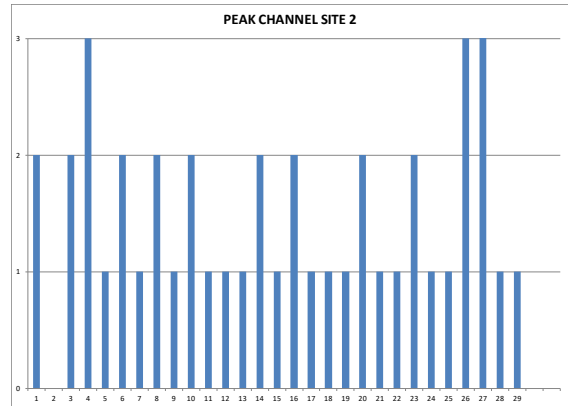


Thompson Peak

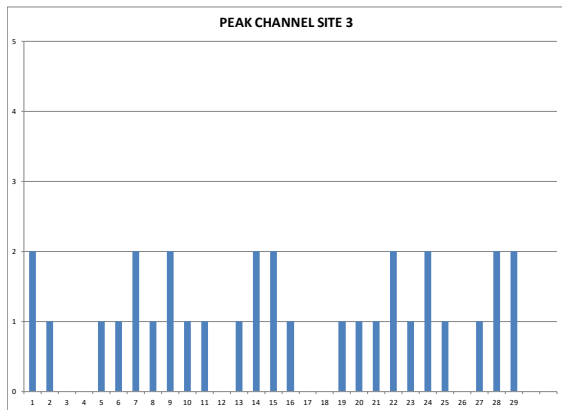
TOPAZ Peak Channel Usage, November, 2018



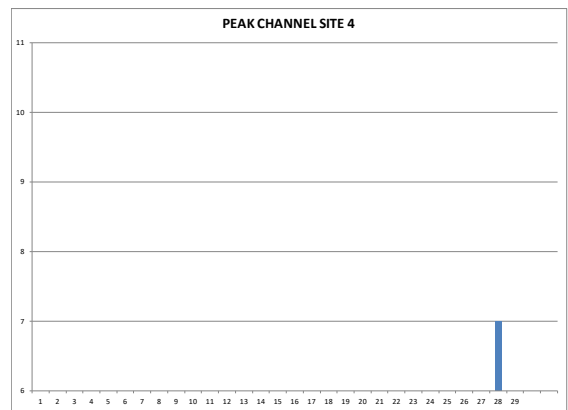
Simulcast Cell



Florence Gardens

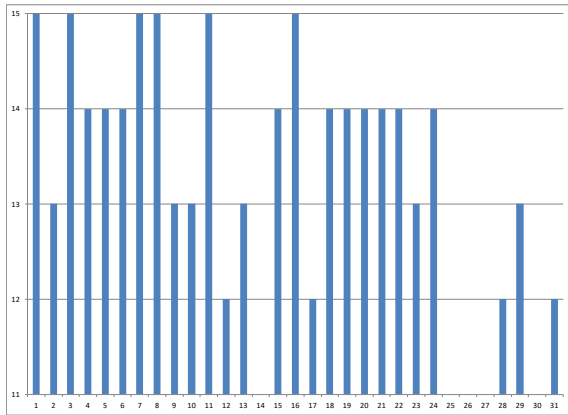


Shaw Butte

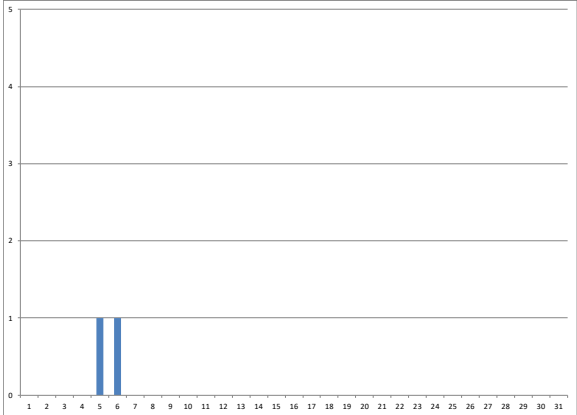


Thompson Peak

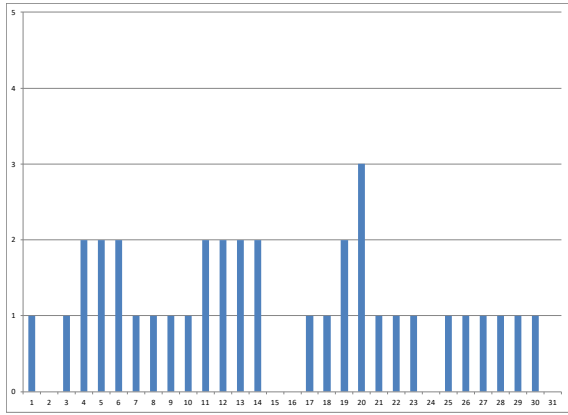
TOPAZ Peak Channel Usage, December, 2018



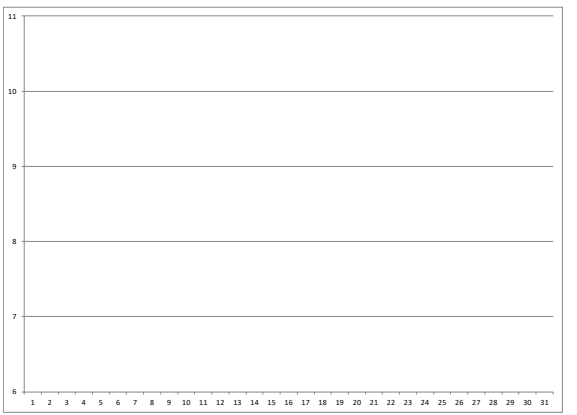
Simulcast Cell



Florence Gardens

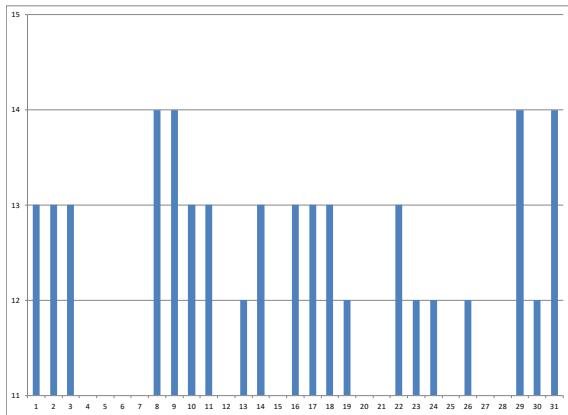


Shaw Butte

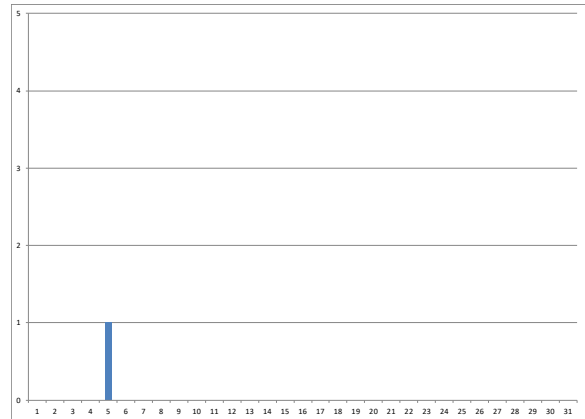


Thompson Peak

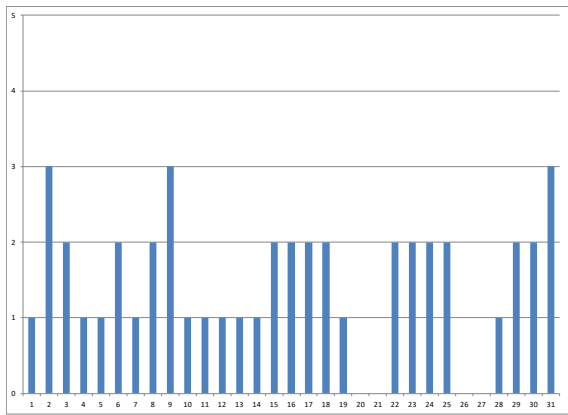
TOPAZ Peak Channel Usage, January, 2019



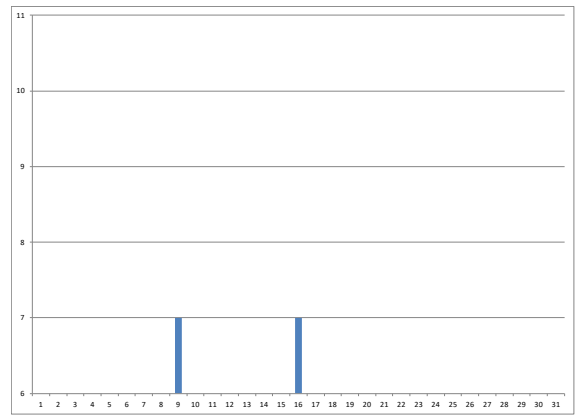
Simulcast Cell



Florence Gardens



Shaw Butte



Thompson Peak