ZTF Observatory Schedule Review

February 22, 2017

Goals:

1) Review the proposed ZTF-P48 changeover schedule;
   - Confirm proposed timing meets the expected project plan goals;
   - Confirm timing of activities that require campus & summit coordination;
   - Adjust phasing and duration of activities;

2) Identify items that pose a potential risk to the proposed schedule;

Milestones

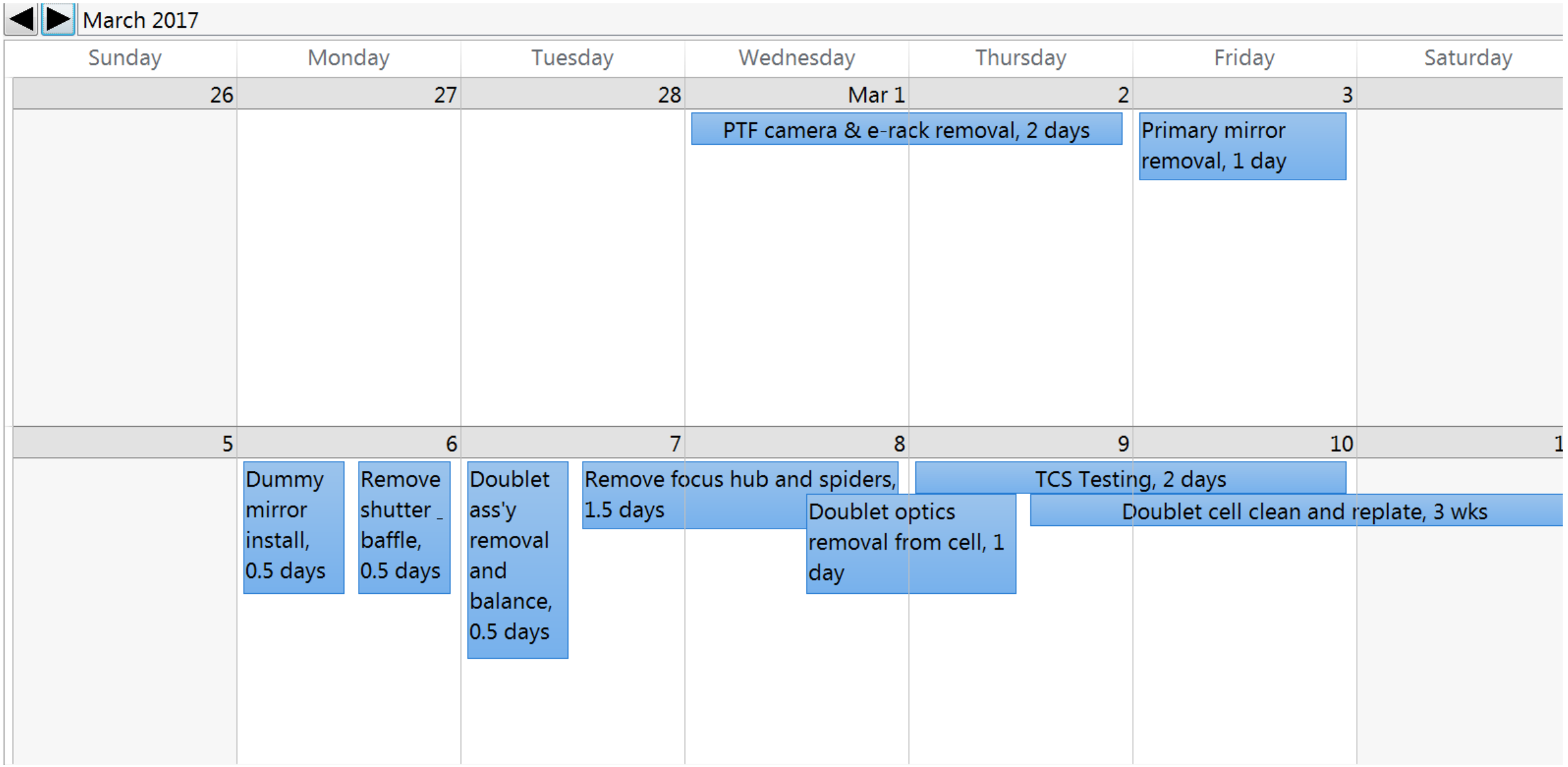
- End of iPTF science operations : February 28, 2017
- ZTF changeover begins at P48: March 1, 2017
- Camera Alignment Testing (early): May 2 – 11, 2017
- Camera Alignment Testing (baseline): May 23 – June 6, 2017
- Trim plate est. at Palomar (soonest): July 17, 2017
- ZTF 1st Light: August 1, 2017
- ZTF Science Verification Tests begins: September 13, 2017

Commissioning Schedule drivers

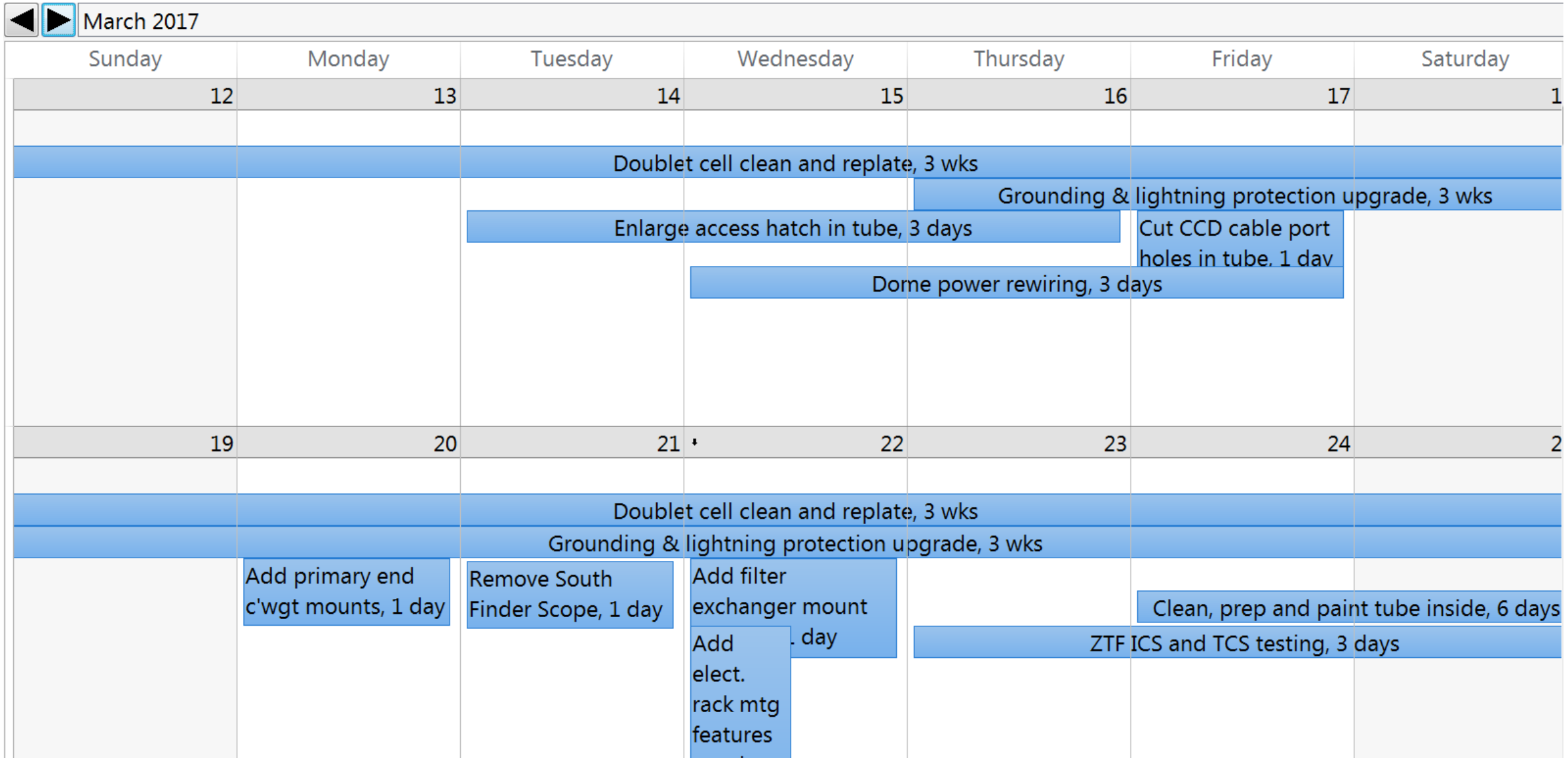
- **Before ZTF camera alignment tests:**
  - Telescope structural changes;
    - Access hatch enlargement & Cable ports;
    - Mounting for Filter Exchanger, Instr. Support, E-Rack,
  - TCS testing;
  - Cable/hose mgt and air treatment system;
  - Telescope interior cleaning & painting;
  - Optics: primary mirror recoating & doublet corrector refurbishment;
  - Camera readiness;

- **After ZTF camera alignment test to 1st Light:**
  - ZTF camera CCD alignment and thermal mgt modifications; (Est 10 weeks)
  - Trim plate delivery; (earliest estimates @ July 17)

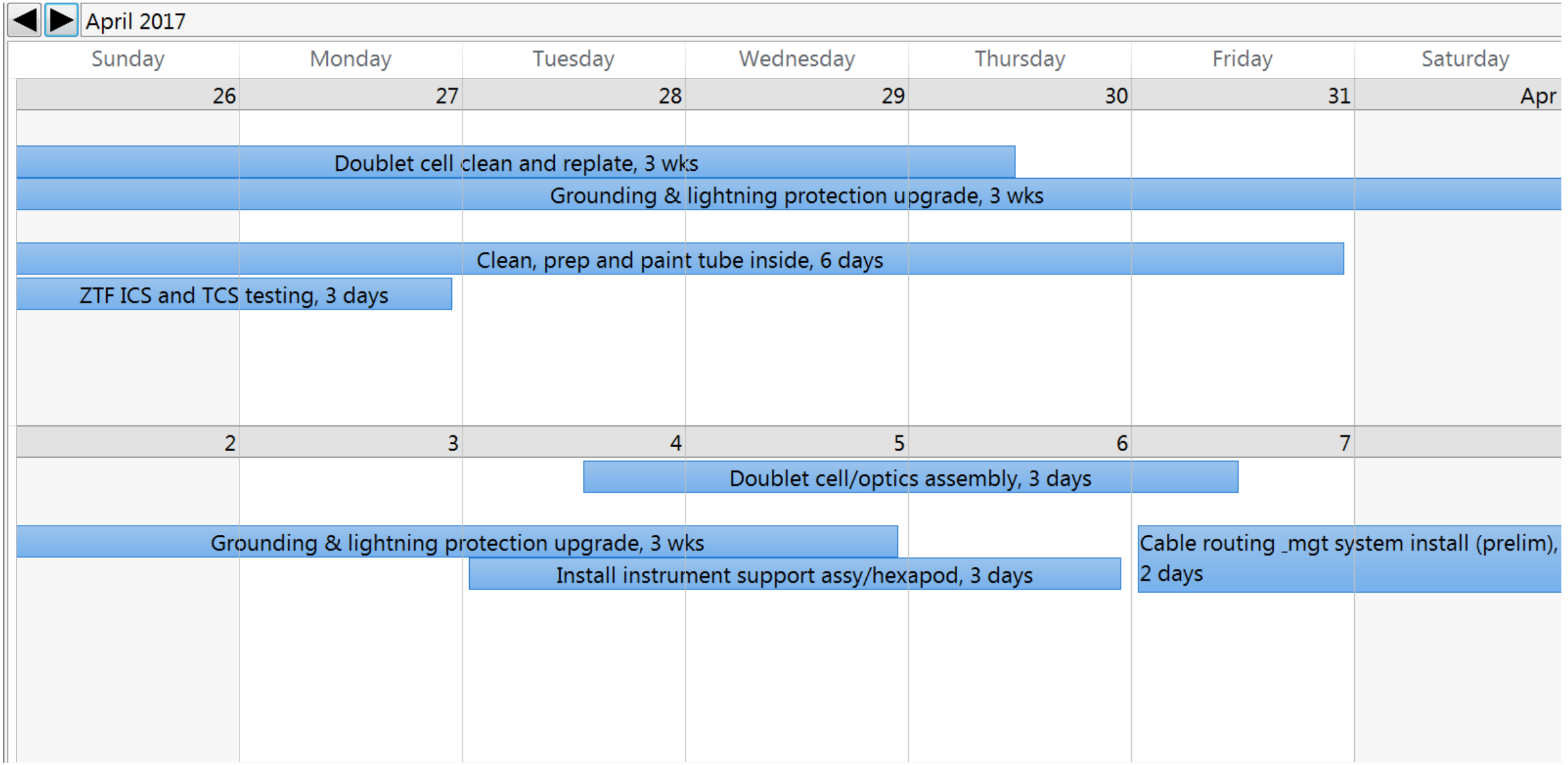
Week 1 - 2


March 2017
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
26
27
28
Mar 1
2
3
PTF camera & e-rack removal, 2 days
Primary mirror removal, 1 day
5
6
7
8
9
10
1
Dummy mirror install, 0.5 days
Remove shutter _ baffle, 0.5 days
Doublet ass'y removal and balance, 0.5 days
Remove focus hub and spiders, 1.5 days
TCS Testing, 2 days
Doublet optics removal from cell, 1 day
Doublet cell clean and replate, 3 wks

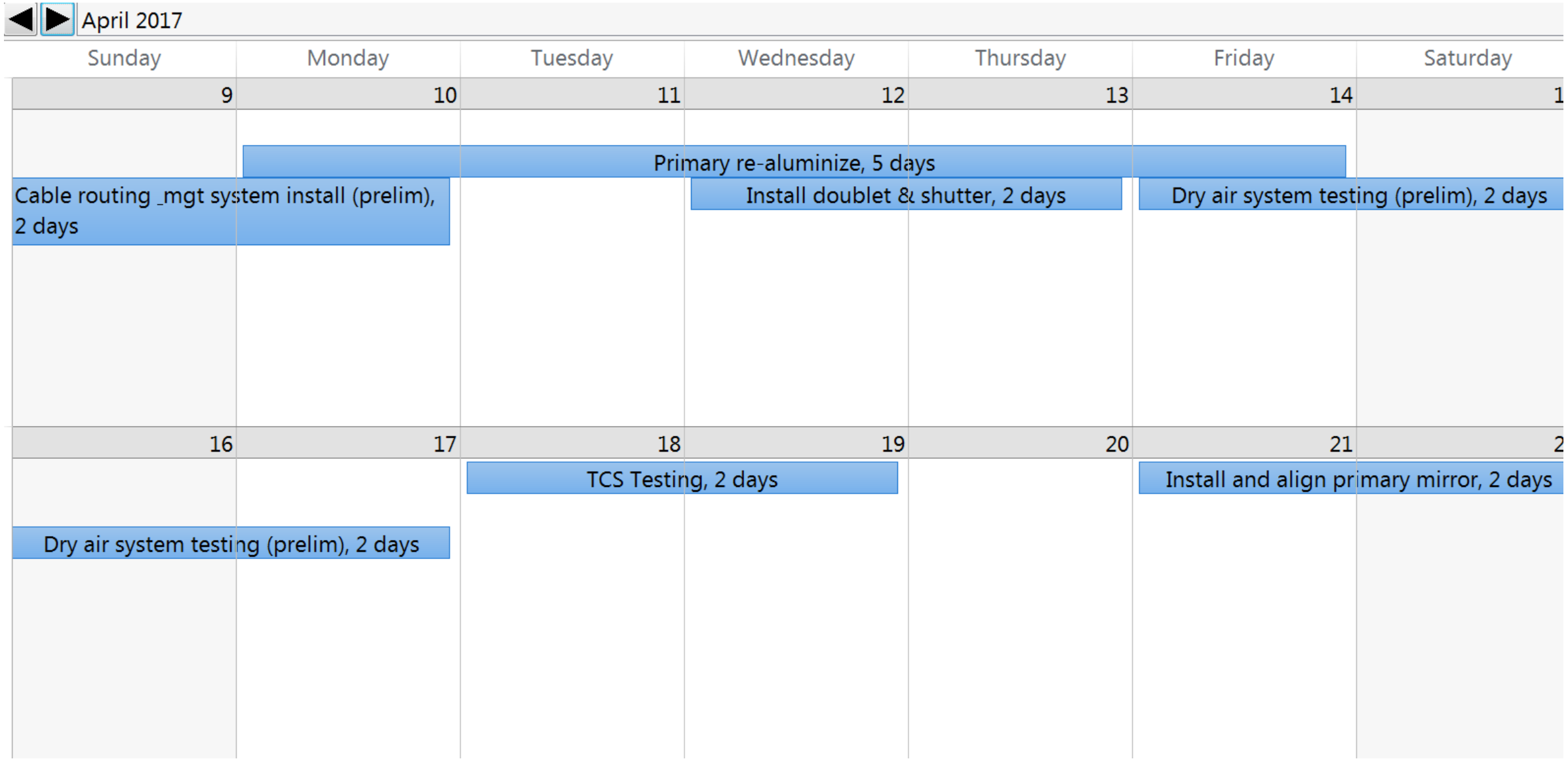
Week 3 - 4


March 2017
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
12
13
14
15
16
17
1
Doublet cell clean and replate, 3 wks
Grounding & lightning protection upgrade, 3 wks
Enlarge access hatch in tube, 3 days
Cut CCD cable port holes in tube, 1 day
Dome power rewiring, 3 days
19
20
21
22
23
24
2
Doublet cell clean and replate, 3 wks
Grounding & lightning protection upgrade, 3 wks
Add primary end c'wgt mounts, 1 day
Remove South Finder Scope, 1 day
Add filter exchanger mount
day
Add elect. rack mtg features
Clean, prep and paint tube inside, 6 days
ZTF ICS and TCS testing, 3 days

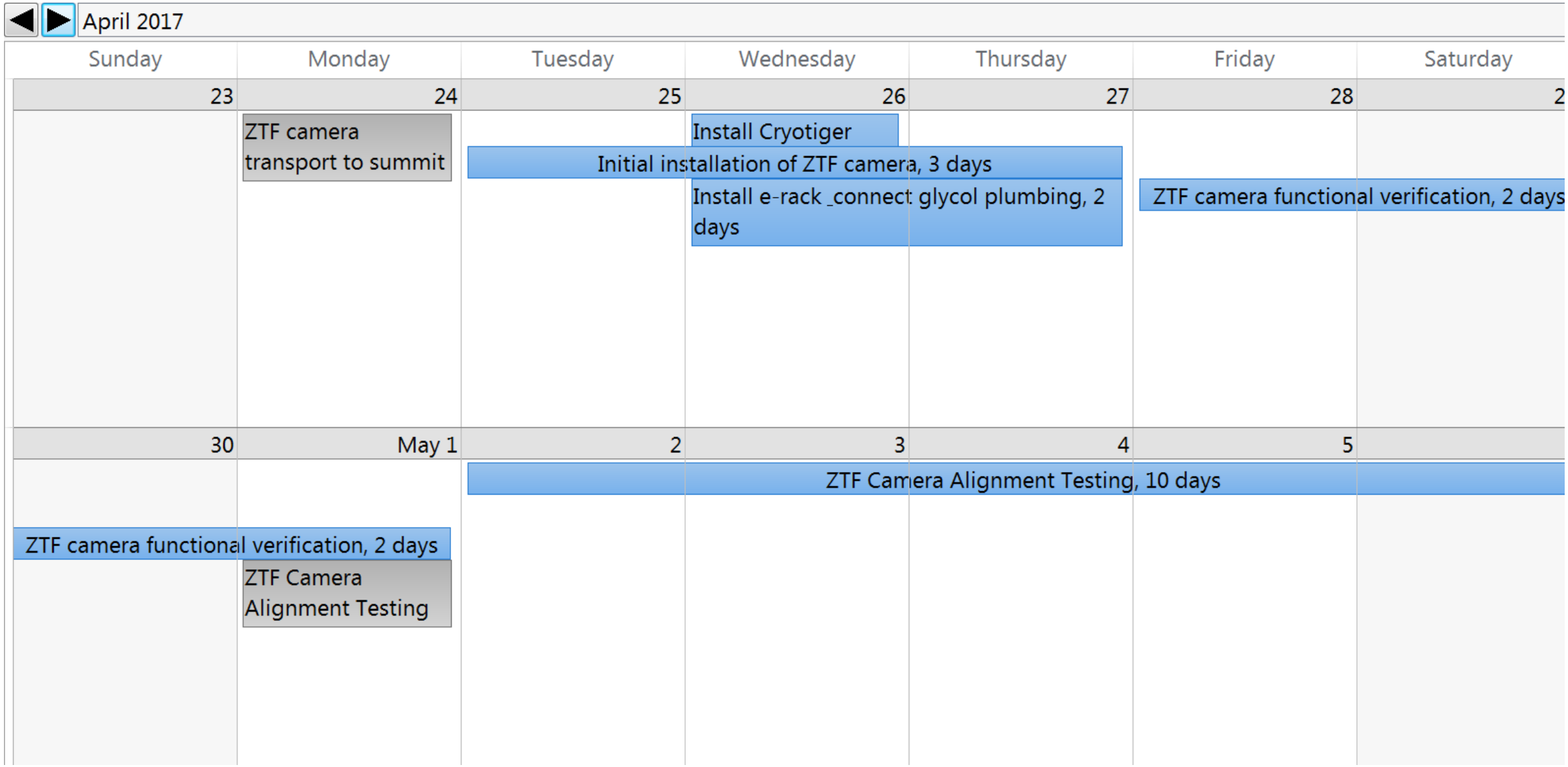
Week 5 – 6


April 2017
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
26
27
28
29
30
31
Apr
Doublet cell clean and replate, 3 wks
Grounding & lightning protection upgrade, 3 wks
Clean, prep and paint tube inside, 6 days
ZTF ICS and TCS testing, 3 days
2
3
4
5
6
7
Doublet cell/optics assembly, 3 days
Grounding & lightning protection upgrade, 3 wks
Cable routing _mgt system install (prelim), 2 days
Install instrument support assy/hexapod, 3 days

Week 7 – 8


April 2017
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
9
10
11
12
13
14
1
Primary re-aluminize, 5 days
Cable routing _mgt system install (prelim), 2 days
Install doublet & shutter, 2 days
Dry air system testing (prelim), 2 days
16
17
18
19
20
21
2
TCS Testing, 2 days
Install and align primary mirror, 2 days
Dry air system testing (prelim), 2 days

Week 9 – 10


April 2017
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
23
24
25
26
27
28
2
ZTF camera transport to summit
Install Cryotiger
Initial installation of ZTF camera, 3 days
Install e-rack _connect glycol plumbing, 2 days
ZTF camera functional verification, 2 days
30
May 1
2
3
4
5
ZTF Camera Alignment Testing, 10 days
ZTF camera functional verification, 2 days
ZTF Camera Alignment Testing

Detailed Work Plan

- Each line item on schedule will be detailed with respect to:
  - Procedure;
  - Material;
  - Equipment;

- This will be transferred into a daily work schedule with personnel assignments;

- Progress will be reported weekly during the changeover work;
- Forecast to be given at least 2 weeks in advance for milestones where campus involvement will be required.

ZTF/P48 Changeover Work Plan

2. PTF camera and E-Rack removal;
   Equipment: hand hoist; lift table, cart; truck
   2.1. De-cable and hoses; Instructions from Roger;
   2.2. Camera removal: small hoist-hand winch;
   2.3. E-rack removal; lift table and cart;
   2.4. Lower thru hatch;
   2.5. Crate camera and hardware, and ship to campus;

3. Primary mirror removal;
   Equipment: Mirror cart and frame; Truck? Documented procedure & equipment;
   3.1. Lower thru hatch, onto truck;
   3.2. Transport to 200";
   3.3. Load into 84" vacuum tank;

4. Dummy Mirror install
   Equipment: Cart & Jack; alignment pins or all-thread to guide onto Tube;
   4.1. Position under tube, raise with jacks, then engage alignment guides and screw into place;
   4.2. Adjust top-down balance as req'd;

5. Shutter & baffle removal;
   Equipment: Adjustable lift beam, shackles; slings….;
   5.1.1. Lower shutter thru hatch;
   5.1.2. Install in ship crate;
   5.1.3. move to 200" ground floor;

Schedule Risks

- **Planned & Unplanned, Non-ZTF related Observatory events**
  - ➢ The same Palomar staff that will be working the ZTF changeover, are responsible for maintaining & fixing all other observatory systems, and supporting other project/customers;
  - ➢ Other work may pull resources away from ZTF work at various times throughout the commissioning period.
  - ❖ **Risk Mitigation**
  - ➢ Maintain a reasonable contingency in the schedule;

Schedule Risks

- **Air treatment system**
  - Compressor/dryer installed and operating;
  - Pressure & temperature regulation system needs development;
  - **Risk Mitigation**
  - Pressure/temperature regulation can be developed without interfering with other commissioning work and is not needed until end of commissioning
- **Hose & cable routing/mgt**
  - Needs development;
  - **Risk Mitigation**
  - Campus engineering assigned to support;
  - Final routing system not needed until end of commissioning;

Schedule Risks

- **TSC development completed so far**
  - New Delta Tau based TCS hardware and interface cabling assembled;
  - Individual sub-system functions have been bench tested;
  - User interface software: Console, GXN interfaces implemented.
- **TCS work to be completed**
  - Demonstration of connection/feedback of all "housekeeping" interfaces.
  - Demonstration of Delta Tau basic functionality with all observatory interfaces;
  - Motion control performance tuning of all drives;

❖**Risk Mitigation**

- Define several TCS testing periods interspersed in schedule;
  - 4 events; 12 days;
- Alignment test can proceed using Vertex controls with manual target acquisition;
- Acquire consulting support for performance tuning phase; (Delta Tau or others)