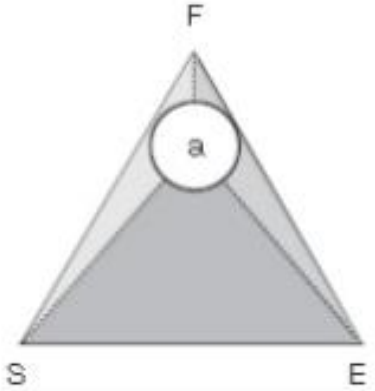
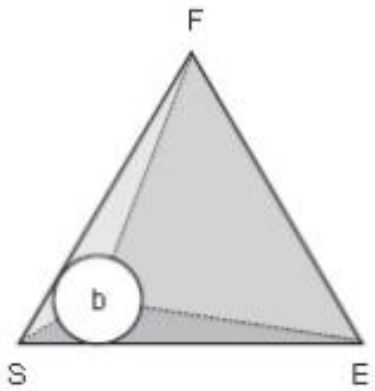
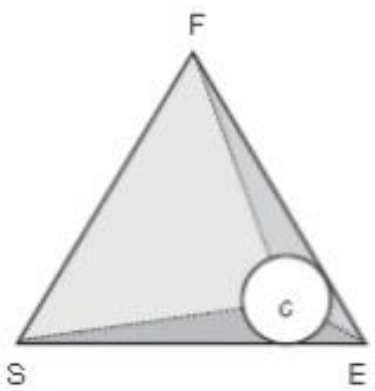
CONSIDERATIONS IN BASKETBALL SPECIFIC CONDITIONING

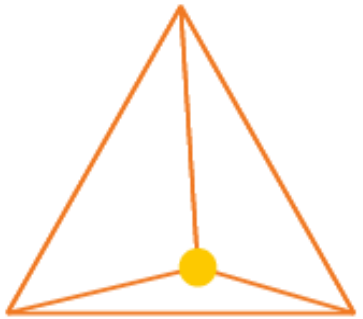
Brady Howe
Phoenix Suns, Head Strength & Conditioning Coach

What is Conditioning ?









Basketball

Overview


1. KNOW YOUR SPORT!
2. PLAYER PROFILING
3. RETURN TO PLAY
4. ALTERNATIVE BASKETBALL CONDITIONING
5. BASKETBALL SPECIFIC CONDITIONING

Considerations

Return to Play (RTP)

- Current Status
- Needs Assessment/Goals
- Programming/Delivery

Role/Developmental Players

- Low MPG/DNP
- Load Monitoring/Matching
- Rookies

CONSIDERATIONS IN BASKETBALL SPECIFIC CONDITIONING

KNOW YOUR SPORT!

Majority of playing time is spent at > 85% HR max.

Stojanović et al., 2018

Higher HR values (85-90%) take place in the first half compared with the second.

Schelling et al., 2013

Guards tend to perform more high-intensity actions compared to BIGS.

Stojanović et al., 2018

High intensity actions lasting <20 seconds (11% time), covering an average of 4500-5000 m.

Crisafulli et al., 2002

ACTIVITY

On-Court	% Live Play
Standing/Walking	23.4 – 66.3%
Jogging	5.6 – 36.3%
Running	4.5 – 33.2%
Sprinting	0.3 – 8.5%
Low Intensity Shuffling	2.1 – 14.7%
Moderate Intensity Shuffling	6.5 – 19.8%
High Intensity Shuffling	0.4 – 9.3%
Jumping	0.6 – 2.3%
Dribbling	1.2 – 10.6%

INTENSITY

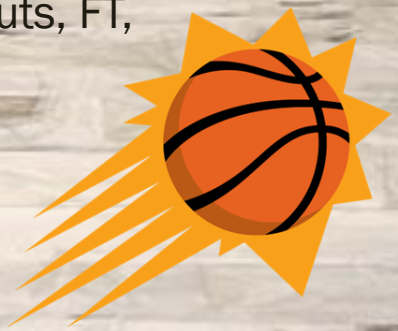
1st Quarter: Highest amount of time spent performing intense activities

4th Quarter: Lowest amount of time spent performing intense activities

*Pace/Speed of play decreases, becomes more half court during 2nd half.

*Stoppages increase via time outs, FT, official reviews

Stojanovic et al., 2018/Schelling et al., 2013



STRUCTURE OF ROSTER

Player Type	Count	MPG
Star	1-3	30-40 Min
Role	3-5	10-30 Min
Back up	~5	5-15 Min
Development	~5	<5 Min

NBA Teams with Youngest Active Rosters

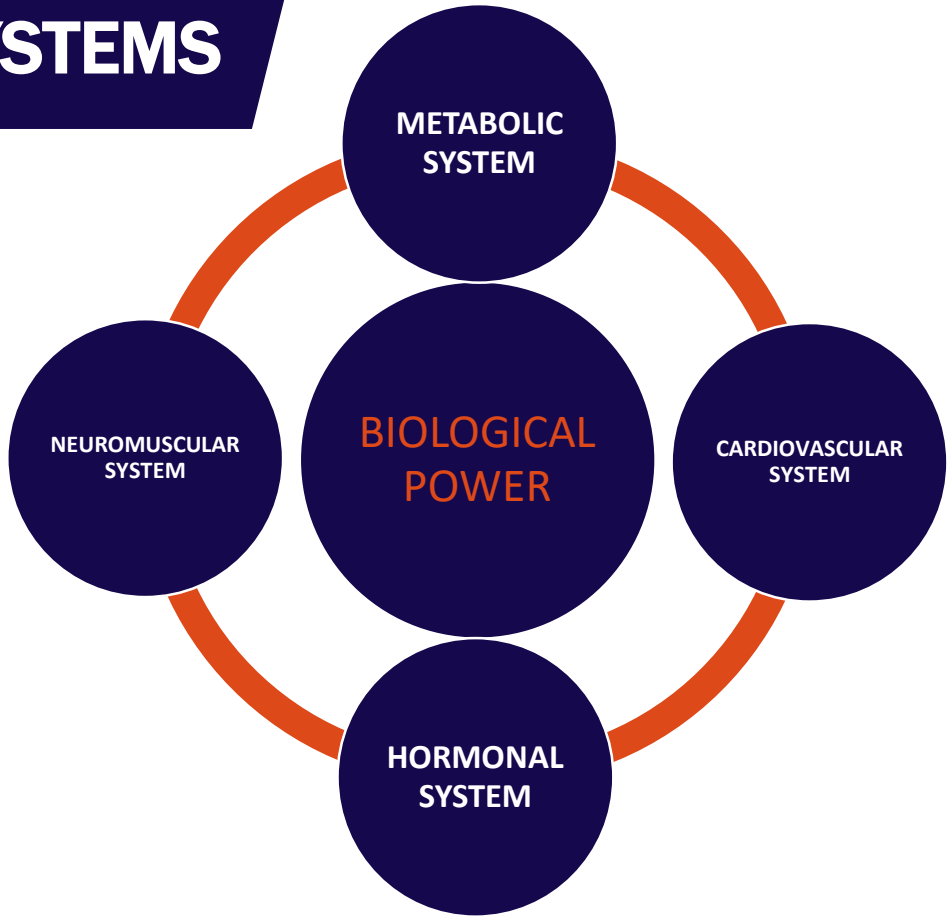
Rank	Team	Ave Age*
1	New York Knicks	23.1
2	Phoenix Suns	23.3
3	Chicago Bulls	23.9
4	Orlando Magic	24.4
5	Denver Nuggets	24.4
6	Portland Trailblazers	24.7
7	Sacramento Kings	24.9
8	Brooklyn Nets	25.1
9	Atlanta Hawks	25.3
10	New Orleans Pelicans	25.4

*Average age of active players. Data via Spotrac (Mar 2019)

Phoenix Suns 2018-19

- 9 Players 22 years old or younger
- 6 Players with less than 1 year of college experience

ENERGY SYSTEMS



Jamieson, 2009

INDIVIDUAL NEEDS (Player Profiling)

TESTING PROTOCOLS (ESTABLISH ABSOLUTES)

Power

- CMJ

Strength Speed

- 135lb Trap Bar Jump

Endurance

- Yo-Yo Test
- 3 Minute Test

Agility/COD

- 505 COD Test

Strength

- IMTP

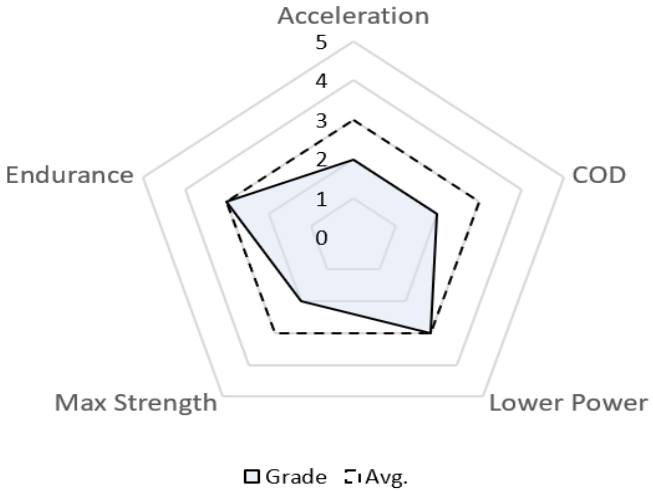
Speed/ACCEL

- 10 M Sprint
- ¾ Court Sprint

PLAYER PROFILE NEEDS ASSESSMENT

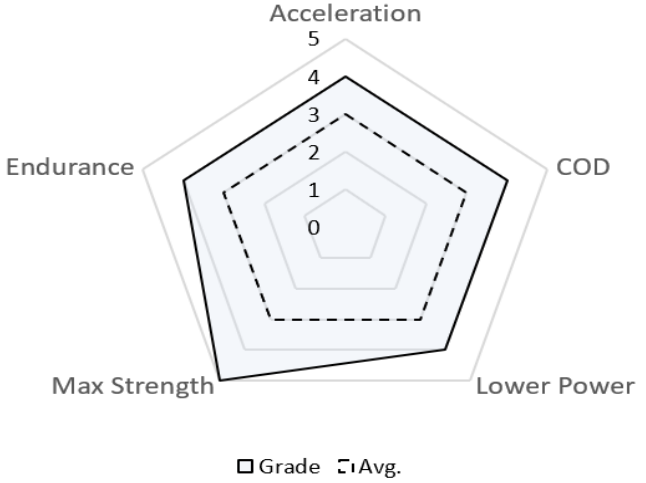
Athlete: Daniel Shapiro < Select Athlete

Trait	Test	Score	Grade
Acceleration	10m Sprint	1.98s	2
COD	505	2.84s	2
Lower Power	CMJ	52 W/kg	3
Max Strength	IMTP	36 N/kg	2
Endurance	YoYo IRTL 2	22 Levels	3

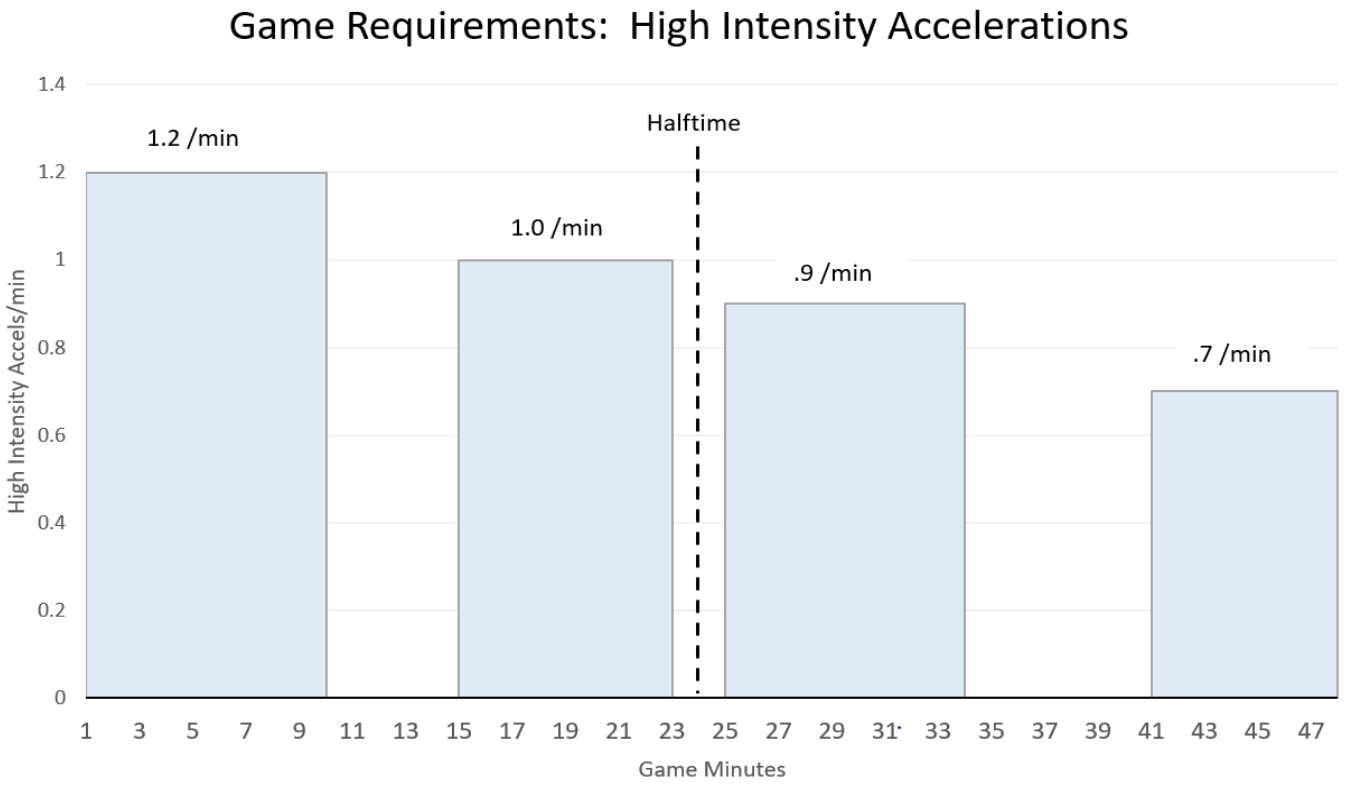


Athlete: Brady Howe < Select Athlete

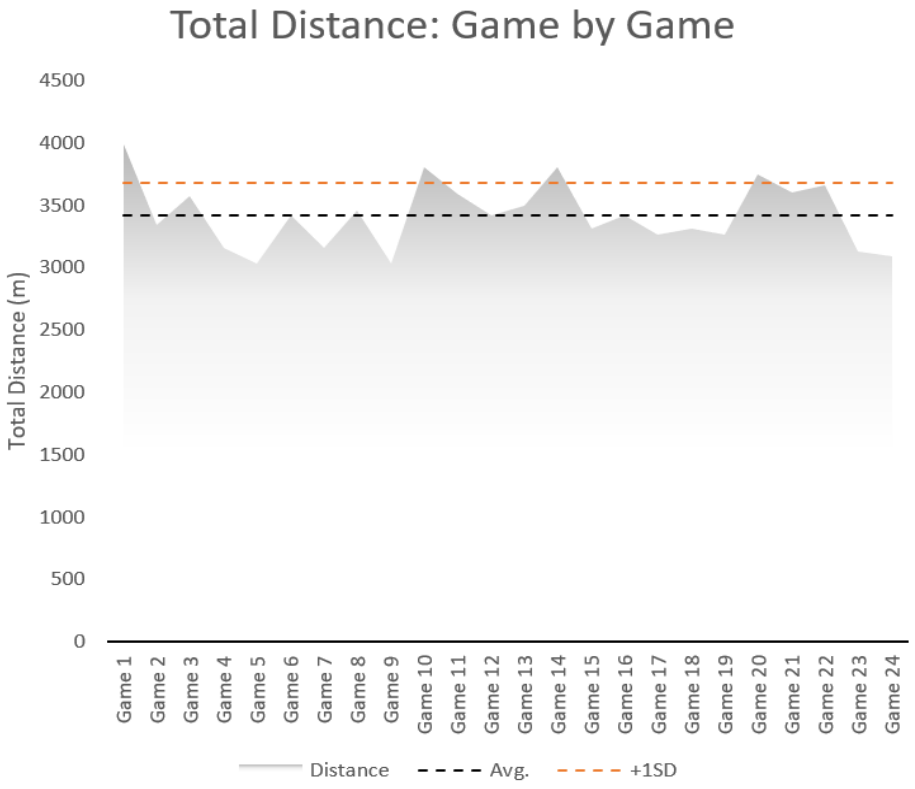
Trait	Test	Score	Grade
Acceleration	10m Sprint	1.70s	4
COD	505	2.45s	4
Lower Power	CMJ	63 W/kg	4
Max Strength	IMTP	51 N/kg	5
Endurance	YoYo IRTL 2	36 Levels	4

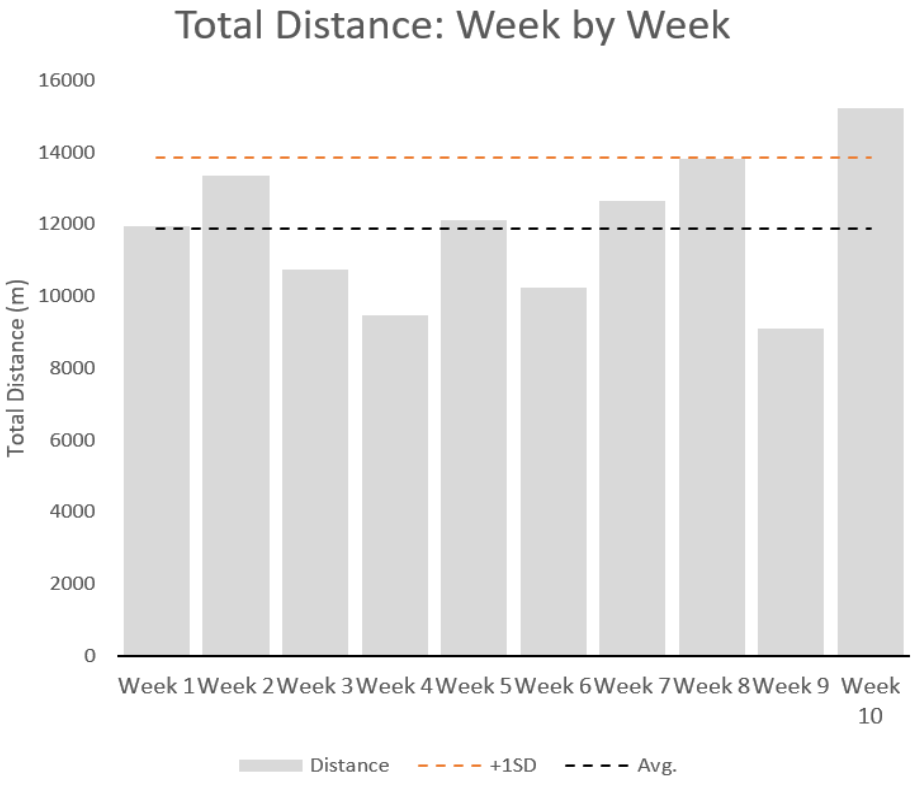


PLAYER PROFILE NEEDS ASSESSMENT



PLAYER PROFILE NEEDS ASSESSMENT





INDIVIDUAL SPECIFIC CONSIDERATIONS

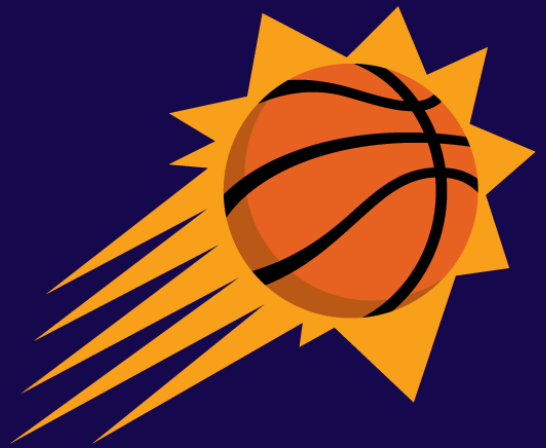
Current Status

- Injury
- History
- Load
- Mental State

Playing Style (Energy System Requirements)

- Volume
- Intensity
- Work: Rest

RETURN TO PLAY CONDITIONING



TRAINING MENU

TARGETED ADAPTATION

- Refer to individual specific conditioning & assessment needs
- Physiological Benefits
  - Stress
  - Response
  - Adaptation

TRAINING STRATEGY (AEROBIC SYSTEM)

- General Endurance
- Threshold Training
- High Resistance Intervals
- H.I.C.T
- Basketball
  - Alternative
  - SSG

EXERCISE SELECTION

- Non Weight Bearing:
  - Pool/Swim-Ex
  - Alter-G
- Assault Bike
- Treadmill
- Versa Climber
- Sled

CARDIAC OUTPUT METHOD (GENERAL ENDURANCE)

Training Adaptations

- Increase cardiac output, improve efficiency of 02 supply
- Stimulate cardiac hypertrophy, increase left ventricular cavity volume
- Improve peripheral vascular network

Training Protocol

- 30-90 Min (continuous work)
  - Increase volume over time
- **Maintain HR Ranges (130-150)**

Objective Measures

- HR Range
- Sustainable work rate

Jamieson, 2009

NON-WEIGHT BEARING (GENERAL ENDURANCE)

(NWB) POOL / ANTI-GRAVITY

GUIDELINES:

WORK: 30-90 Min (Continuous)

REPETITIONS: Maintain HR Ranges (130-150)

SESSIONS: 1-3/Week

Jamieson, 2009

HIGH RESISTANCE INTERVALS (ALACTIC POWER)

Training Adaptations

- Increase in 02 utilization and recruitment of (type II) fast twitch muscle fibers through the use of high resistance interval training
- Working just under anaerobic threshold

Training Protocol

- 8-12 Second Intervals, 10-15 Reps, 45-60 Second Rest
  - Rest until HR reaches 130-140
- Assault Bike, Sled Pushes, Hill Sprints

Objective Measures

- HR Recovery (HR under Anaerobic Threshold)
- Wattage (sustainable power output)

Jamieson, 2009

HIGH RESISTANCE INTERVALS (ALACTIC POWER)

(HRI) SLED PUSHES/ASSAULT BIKE HILL SPRINTS

GUIDELINES:

WORK: 8-12 Seconds

REST: 45-60 Seconds / Rest to HR 130-140

REPETITIONS: 10-15 / Workout

SESSIONS: 1-2/Week

Jamieson, 2009

THRESHOLD TRAINING METHOD (AEROBIC POWER)

Training Adaptations

- Increases the max rate of ATP regeneration with the goal of increasing aerobic power
- Raise anaerobic threshold, increase power output
- Rely less on anaerobic energy system to generate the necessary ATP

Training Protocol

- 1-4 Min (Continuous Work)
  - 3-5 Reps
  - 1:1 Workload Ratio
- Keep HR within range for entire set

Objective Measures

- Repeatable Work Rate
- Wattage (sustainable power output)

Jamieson, 2009

THRESHOLD TRAINING METHOD (AEROBIC POWER)

(TTM) VERSA-CLIMBER/ASSAULT BIKE

GUIDELINES:

WORK: 1-4 Minutes @ 150-165 bpm

REST: 1:1 Work to Rest Ratio

REPETITIONS: 3-5

SESSIONS: 1-2/Week

Jamieson, 2009

HIGH INTENSITY CONTINUOUS TRAINING (H.I.C.T)

Training Adaptations

- Stimulate greater O2 utilization resulting in increased endurance and larger capacity of (type II) fibers
- Training mitochondrial density in (type II) fast twitch muscle fibers
- Increasing hypertrophy in type 1 fibers

Training Protocol

- Max Resistance/Intensity Reps
- Brief 3-5 Seconds of rest
- Offers a combination of high intensity & high volume (high stimulus level)

Objective Measures

- Repeatable Work Rate
- Wattage (sustainable power output)

Jamieson, 2009

HIGH INTENSITY CONTINUOUS TRAINING (H.I.C.T)

(H.I.C.T) SLED PUSHES, VERSA, BIKE

GUIDELINES:

WORK: 10-20 Minutes (Max Resistance)

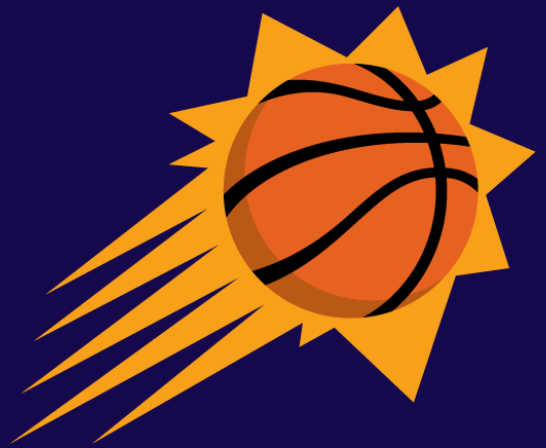
REST: 3-5 Seconds

REPETITIONS: Intermittent, continuous for time.

SESSIONS: 1-2/Week

Jamieson, 2009

ALTERNATIVE BASKETBALL SPECIFIC CONDITIONING

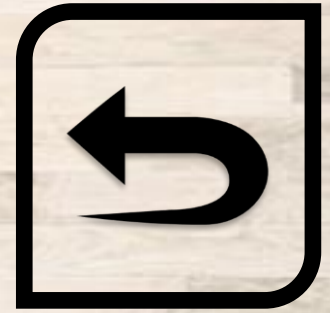


ON-COURT INTRODUCTORY PHASE

GOALS

GAME SPECIFIC

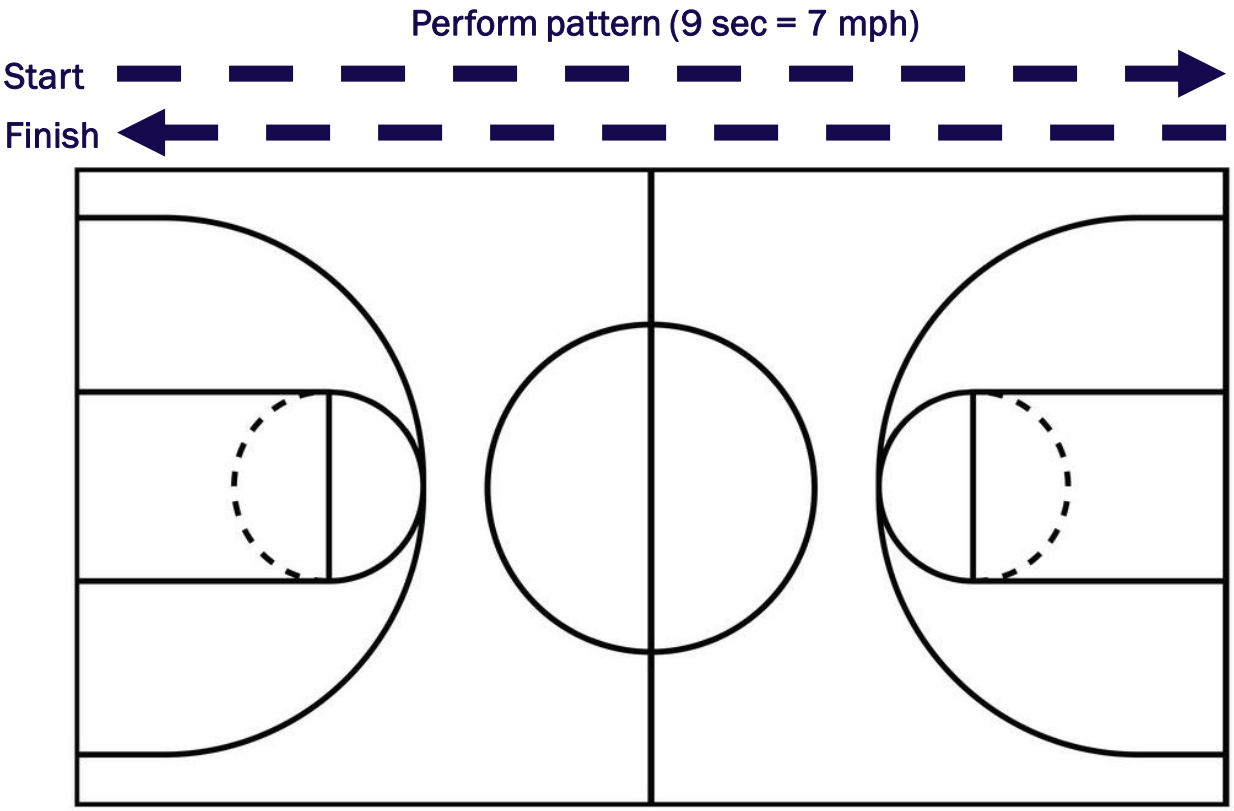
PROGRESSIVE OVERLOAD
GRADED EXPOSURE



MONITOR PROGRESS

Speed (mph)	Full Court	Half Court	Width	FT Line	3pt Line	Opp. FT Line
10.0	6.4	3.2	3.4	1.1	1.6	5.3
10.5	6.1	3.1	3.2	1.0	1.5	5.1
11.0	5.8	2.9	3.1	1.0	1.5	4.8
11.5	5.6	2.8	3.0	0.9	1.4	4.6
12.0	5.3	2.7	2.8	0.9	1.3	4.4
12.5	5.1	2.6	2.7	0.9	1.3	4.3
13.0	4.9	2.5	2.6	0.8	1.2	4.1
13.5	4.7	2.4	2.5	0.8	1.2	3.9
14.0	4.6	2.3	2.4	0.8	1.2	3.8
14.5	4.4	2.2	2.4	0.8	1.1	3.7
15.0	4.3	2.1	2.3	0.7	1.1	3.5
15.5	4.1	2.1	2.2	0.7	1.0	3.4
16.0	4.0	2.0	2.1	0.7	1.0	3.3
16.5	3.9	1.9	2.1	0.7	1.0	3.2
17.0	3.8	1.9	2.0	0.6	1.0	3.1
17.5	3.7	1.8	1.9	0.6	0.9	3.0
18.0	3.6	1.8	1.9	0.6	0.9	3.0
18.5	3.5	1.7	1.8	0.6	0.9	2.9
19.0	3.4	1.7	1.8	0.6	0.9	2.8
19.5	3.3	1.6	1.7	0.6	0.8	2.7
20.0	3.2	1.6	1.7	0.5	0.8	2.7

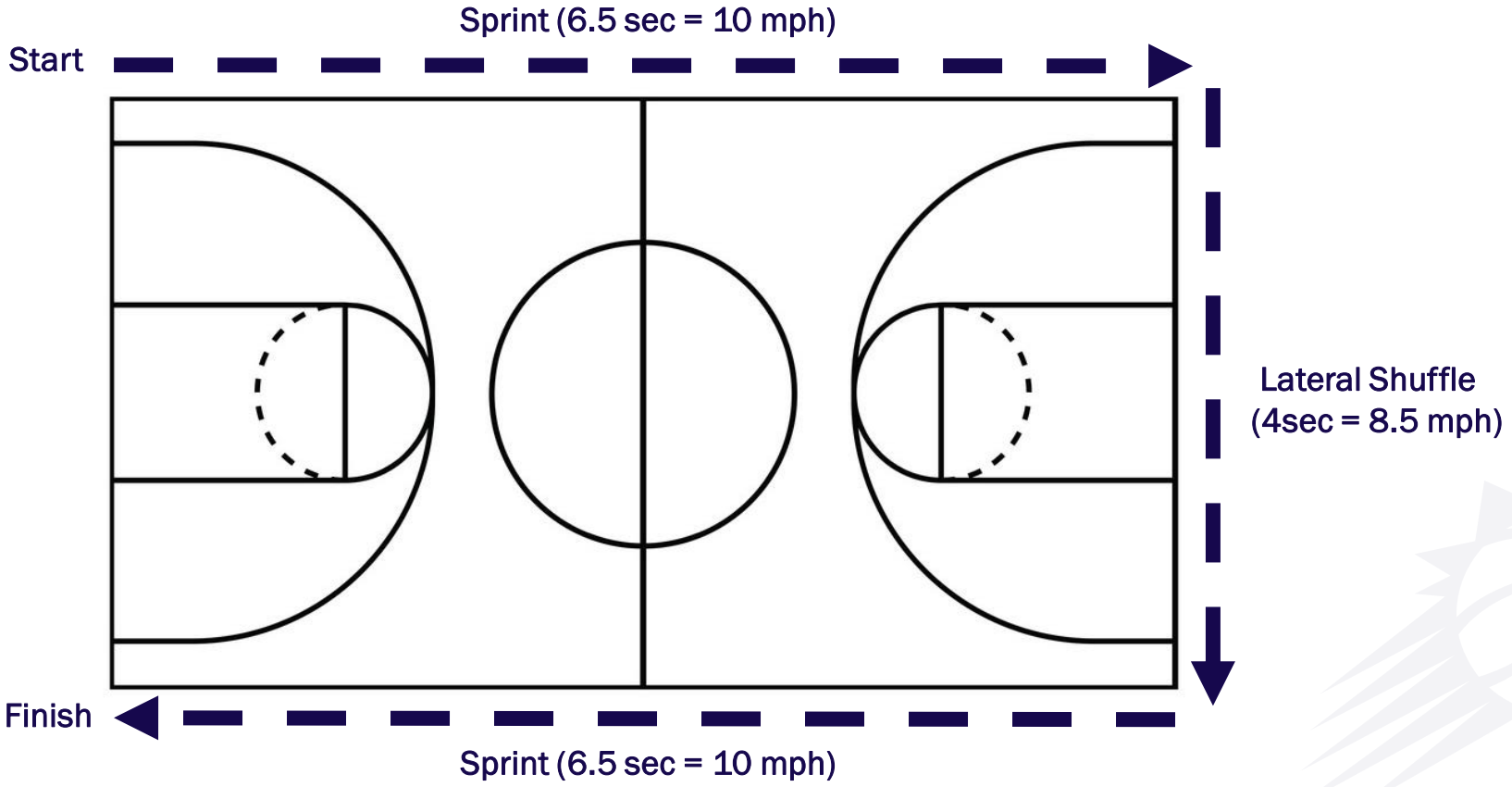
Warm up: Medium Speed Locomotion 15 sets x 18 sec (no rest) Distance = 1.0 miles @7mph



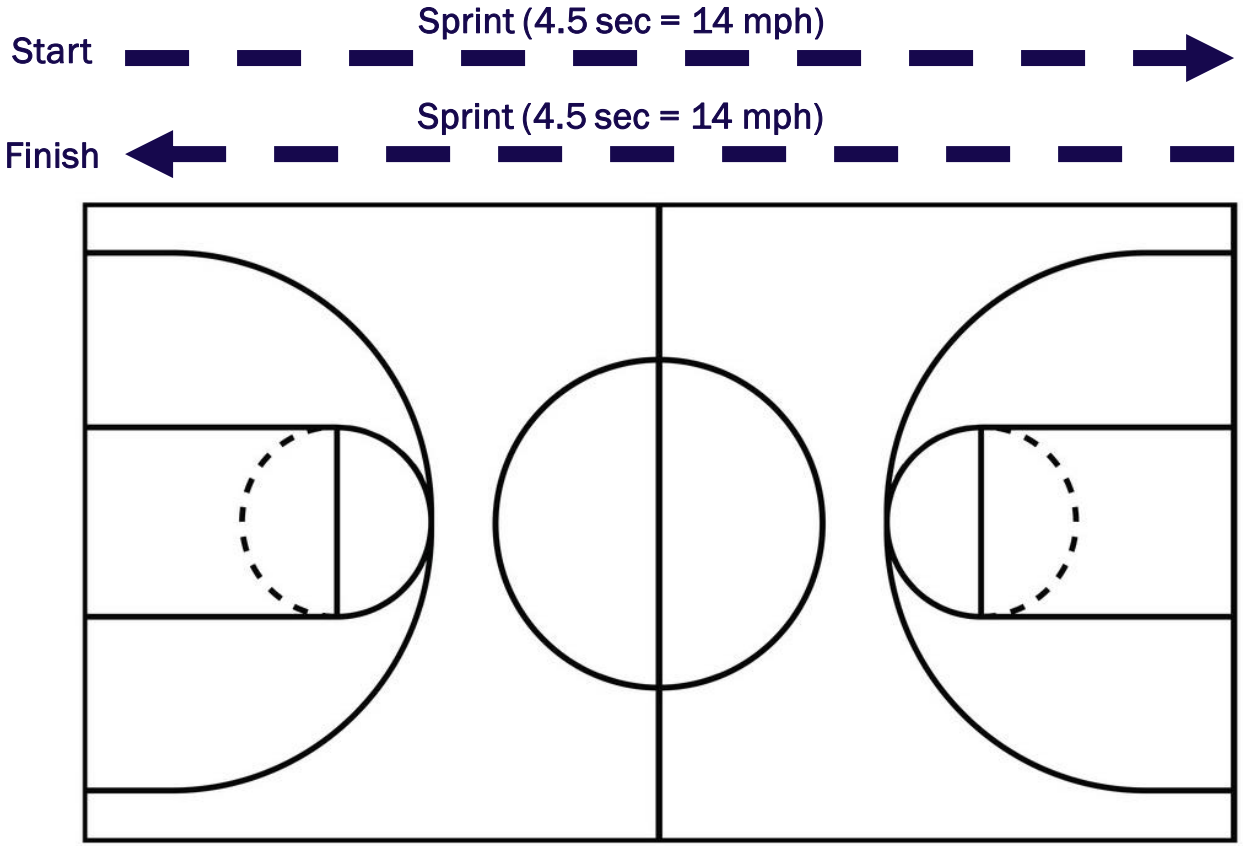
Patterns (Sets):

1. Jog
2. Back pedal
3. Low skip
4. Skip for distance
5. Skip for height
6. Side shuffle w/ arm swing
7. Side shuffle
8. Karaoke
9. Side skip
10. Hop forward
11. Hop backward
12. Lateral hop
13. Zig zag hop
14. Zig zag backwards
15. Skater bound

Part 1: High Speed Running | 6 sets x 17 sec (17 Sec rest) | Distance = .3 miles @10mph

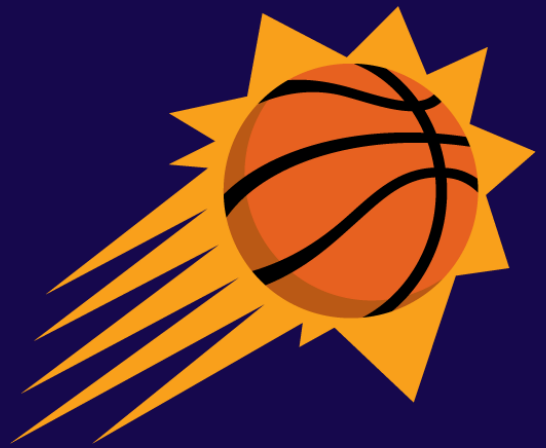


Part 2: V. High Speed Running 5 sets x 9 sec (18 Sec rest) Distance = .1 miles @14mph

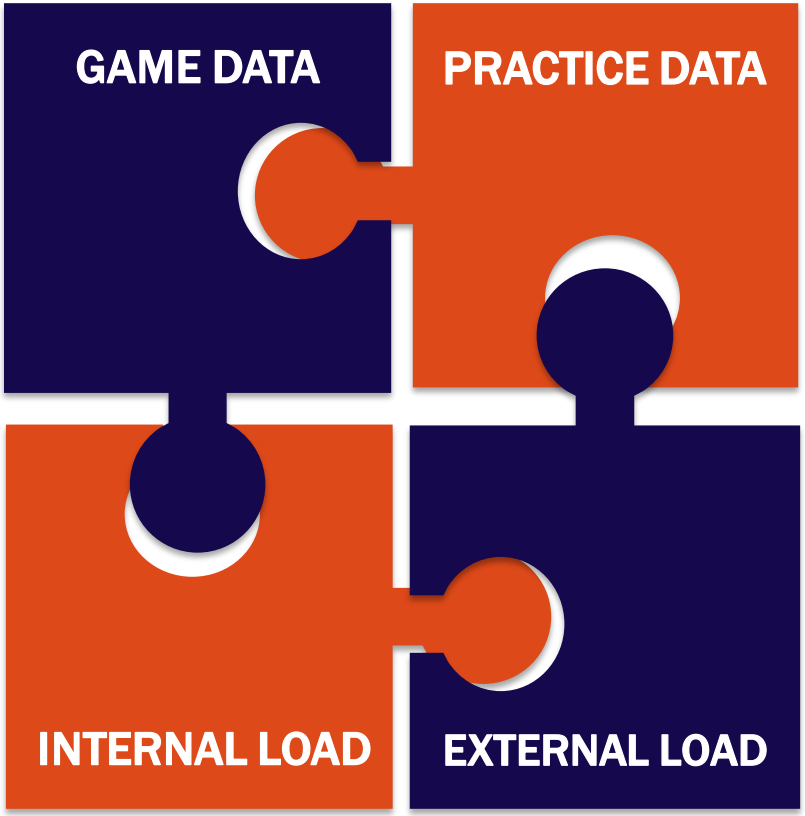


BASKETBALL SPECIFIC CONDITIONING

ROLE/DEVELOPMENTAL PLAYERS



MATCHING PLAYER LOADS & INTENSITY



MATCHING PLAYER LOADS & INTENSITY

SECOND SPECTRUM

- GPS
- Speeds
- Distance Covered

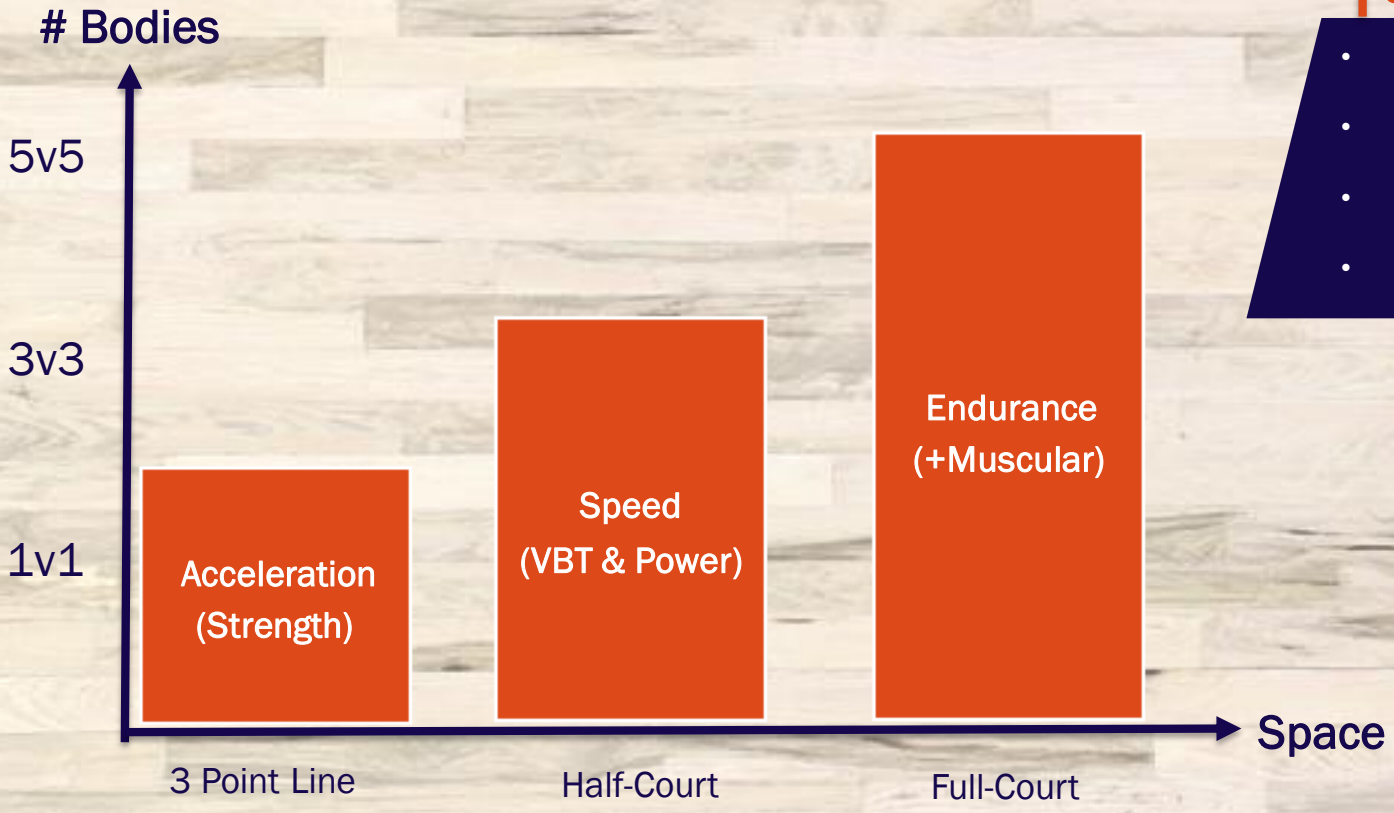
Wearables

- Training Load Monitoring
- ACCEL/DECEL
- Jump Count
- COD
- Distance Covered

Internal Measures

- RPE
- Heart Rate

SMALL SIDED GAMES (SSG)



GOALS

- Blending Skill Work + Conditioning
- Collaborate with Coaching Staff
- Overlap of Training & Conditioning
- Matching Load & Intensities

LOGISTICS

PRACTICALITY

LIMITATIONS

- Travel/Hotels
- Facilities/Equip Availability
- Court Availability
- Preparing for worst case scenarios.

PRACTICE DAYS

- Breakfast Club
- PRE/During Practice
- Post-Practice

GAME-DAYS

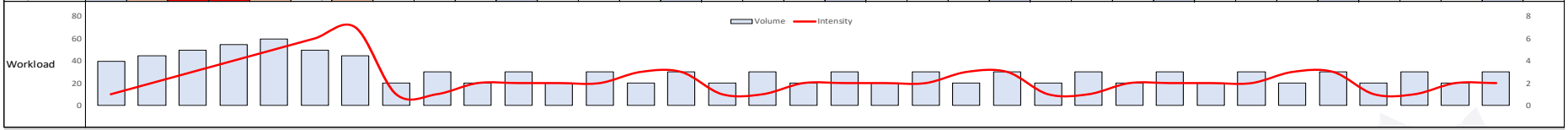
- Breakfast Club
- PRE/POST Shoot Around
- PRE/POST Game

PLANNING

Season Snap Shot

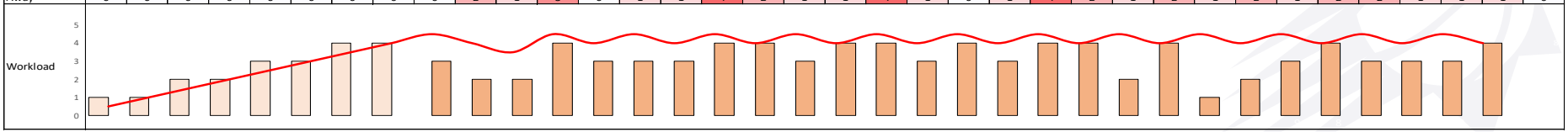
S & C

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Date	8/6	8/13	8/20	8/27	9/3	9/10	9/17	9/24	10/1	10/8	10/15	10/22	10/29	11/5	11/12	11/19	11/26	12/3	12/10	12/17	12/24	12/31	1/7	1/14	1/21	1/28	2/4	2/11	2/18	2/25	3/4	3/11	3/18	3/25	4/1	4/8
Phase	OTA							Pre-season				Regular Season																								
Emphasis	Re-introduction (Stab, Str, Pow)							Stability				Strength				Stability				Strength				Stability				Strength				Stability				
Reps						Away																														
Intensity						Away																														
Perturbations						Away																														
Pauses						Away																														
Landings						Away		None	None	None		None	None	None		None	None	None		None	None	None		None	None	None		None	None	None		None	None	None	
Jumps						Away		None	None	None		None	None	None		None	None	None		None	None	None		None	None	None		None	None	None		None	None	None	



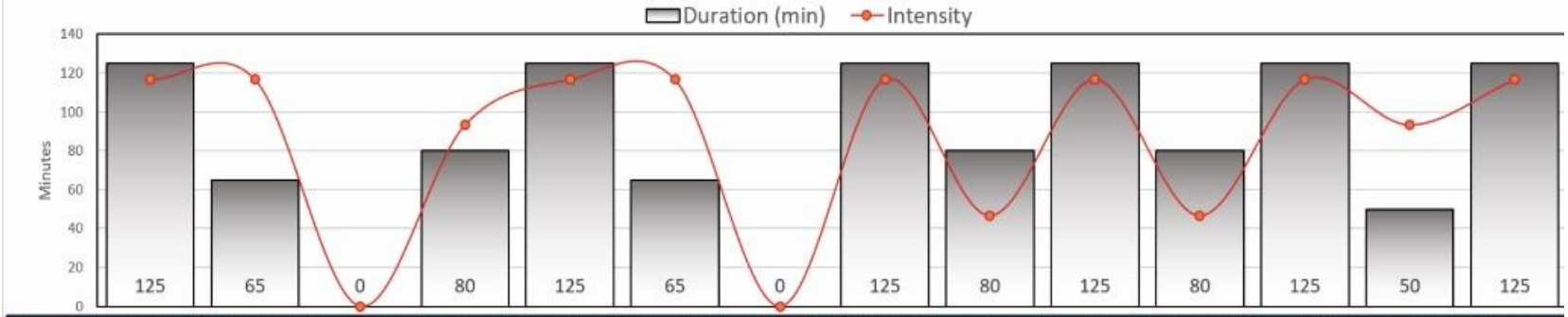
On-Court

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Date	8/6	8/13	8/20	8/27	9/3	9/10	9/17	9/24	10/1	10/8	10/15	10/22	10/29	11/5	11/12	11/19	11/26	12/3	12/10	12/17	12/24	12/31	1/7	1/14	1/21	1/28	2/4	2/11	2/18	2/25	3/4	3/11	3/18	3/25	4/1	4/8
Phase	OTA							Pre-season				Regular Season																								
Emphasis	Skill							Skill + Game				Game																								
Games	0	0	0	0	0	0	0	0	3	2	2	4	3	3	3	4	4	3	4	4	3	4	3	4	4	2	4	1	2	3	4	3	3	3	4	0
Home	0	0	0	0	0	0	0	0	3	0	1	1	3	2	2	0	2	2	3	0	2	4	2	0	2	1	2	0	0	2	2	1	2	2	3	0
Away	0	0	0	0	0	0	0	0	0	2	1	3	0	1	1	4	2	1	1	4	1	0	1	4	2	1	2	1	2	1	2	2	1	1	1	0



PLANNING

Weekly Snap Shot



Date:	12/6/2018	12/7/2018	12/8/2018	12/9/2018	12/10/2018	12/11/2018	12/12/2018	12/13/2018	12/14/2018	12/15/2018	12/16/2018	12/17/2018	12/18/2018	12/19/2018
Day:	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday
Type:	Game + Shoot	Game	Off	Normal Intense Practice + Vit	Game + Shoot	Game	Off	Game + Shoot	Normal Light Practice + Vit	Game + Shoot	Normal Light Practice + Vit	Game + Shoot	Short Intense Practice + Vit	Game + Shoot
Location:	Away	Home			Home	Away		Home		Home		Away		Away
Opponent:	POR	MIA			LAC	SAS		DAL		MIN		NYK		BOS
PACE:	18	10			9	24		14		15		17		22
FastBreak:	24	23			20	30		11		13		24		8

Plan:			Off	Normal Intense Practice + Vit			Off		Normal Light Practice + Vit		Normal Light Practice + Vit		Short Intense Practice + Vit	

LEADERSHIP

- Establish Trust
- Create Buying-in

“Player’s don’t care how much you know, until they know how much you care.”

KEY TAKE-AWAY POINTS

- **OPEN-MINDED**
- FORWARD THINKING
- **SPECIFIC**
- **PRACTICAL**

THANK YOU!

Brady Howe
Phoenix Suns, Head Strength & Conditioning Coach

Figure 1

Specificity-based training: Orientation and approach level characteristics

Orientation	Approach Level	Similarity	Training Method	Place	Ball	Decision-making	Confrontation format	Intensity	Main metabolic requirement [*]	Bout duration	Density	Example [**]
COMPETITIVE	V	Basketball	Actual game; Simulated game	On court	With	Actual complexity	4v4, 5vX	Optimal [modified rules?]	All	Required	Required	4-6 x [2-4 min '5v5 game']; 2-4 min rest
SPECIAL	IV	Basketball	Small-sided games	On court	With	Complex	(1v1), 2vX, 2v2, 3vX , 3v3, (4vX)	Optimal, but complexity should not lower intensity [modified rules?]	Manageable [format & rules]	Depending on the main fitness goal	Manageable [format & rules]	4 x [3', 3v3, full-court, no FT, no 3p shots]
DIRECTED	III	Basketball-based	Short HIT [RST-COD]	On court	With / Without	None or simple	1v0, 2v0, (3v0)	'All-out'	Depletion of the stored phosphagens [ATP and PCr]	2-5 s [<60 s]	1 : 5-10	2 x [10 x 5 s @'all-out' - 30 s rest]; 4 min rest
	II	Basketball-based	Short HIT [SIT-COD]	On court	With / Without	None or simple	1v0, 2v0, (3v0)	'All-out'	Anaerobic glycolysis [Lactic acid metabolism]	15-40 s [<60 s]	1 : 3-6	3 x [6 x 15 s @'all-out' - 45 s rest]; 4 min rest
GENERAL	I	Run-based / Basketball-based	Short HIT [SIT-COD?]	Off / On court	With / Without	None or simple	None / 1v0, 2v0, (Xv0)	>VO_2max [ASR]	Aerobic-Anaerobic transition zone	40-60 s [<60 s]	1-2 : 1	4 x [4 x 40 s @ASR – 40 s rest]; 2-4 min rest
		Run-based / Basketball-based	Long HIT	Off / On court	With / Without	None or simple	None / 1v0, 2v0, (Xv0)	>90% VO_2max	Aerobic system [Power / VO_2max]	3-5 min [>60 s]	1-2 : 1	4 x 4 min @90-95% VO_2max; 3 min rest
	0^+	Nonspecific [run based]	Continuous or Interval Training	Off court	(With) / Without	None	None	<85% VO_2max	Aerobic system [Capacity]	30-40 min [6-10 min intervals]	2-4 : 1	3-4 x 8 min @75-85% VO_2max; 2 min rest
	0^-	Nonspecific	Continuous or Interval Training	Off court	Without	None	None	<70% VO_2max	Aerobic system [Efficiency]	30-40 min	1 : 0	30 min @70% VO_2max

/: or; **?**: optional; **( )**: optional but normally unused; **X**: a number smaller than the indicated firstly (e.g: 3vX = 3v1 and 3v2, but non 3v3 or 3v4).); **ASR**: anaerobic speed reserve (faster than VO_{2max} speed and slower than maximum sprint speed) (9) ; VO_{2max}: maximal oxygen uptake; ATP: adenosine triphosphate; PCr: phosphocreatine; **[*]**: different metabolic processes are closely related and integrated (*continuum energetic*); **[**]**: here are shown only a few examples, there are a myriad of options; **@**: at intensity; **min**: minutes; FT: free throws; 3p: three points.